

**License Application, Attachment A, “Proposed License Conditions”**

**RAI PLC-1:**

Provide a description of onsite and offsite insurance coverage, as described in the License Application, Attachment A, “Proposed License Conditions,” proposed license condition No. 19, which states:

“The Licensee shall obtain onsite and offsite insurance coverage in the amounts committed to by ISP in the ISP license application.”

The NRC staff could not find a description of onsite and offsite insurance coverage in the license application

**Response to RAI PLC-1:**

ISP has revised the License Application by adding Section 1.6.4, “Insurance,” to specify the minimum insurance that ISP will have in place before accepting spent nuclear fuel on site at the CISF for reception and storage.

**Impact:**

License Application Section 1.6.4 has been added as described in the response.

**RAI PLC-2:**

Clarify the terms, “to the extent practicable,” and, “by this test,” contained in Proposed License Condition 22 which states, “Prior to removing the shipping cask closure lid, the gas inside the shipping cask shall be sampled to verify that the canister confinement boundary is intact *to the extent reasonably practicable by this test.*”

As written, the license condition is vague and does not identify a specific procedure, test, or acceptance criteria.

This information is needed to determine compliance with 10 CFR 72.24(b), (c), (d), (e) and (l) and 72.120(a).

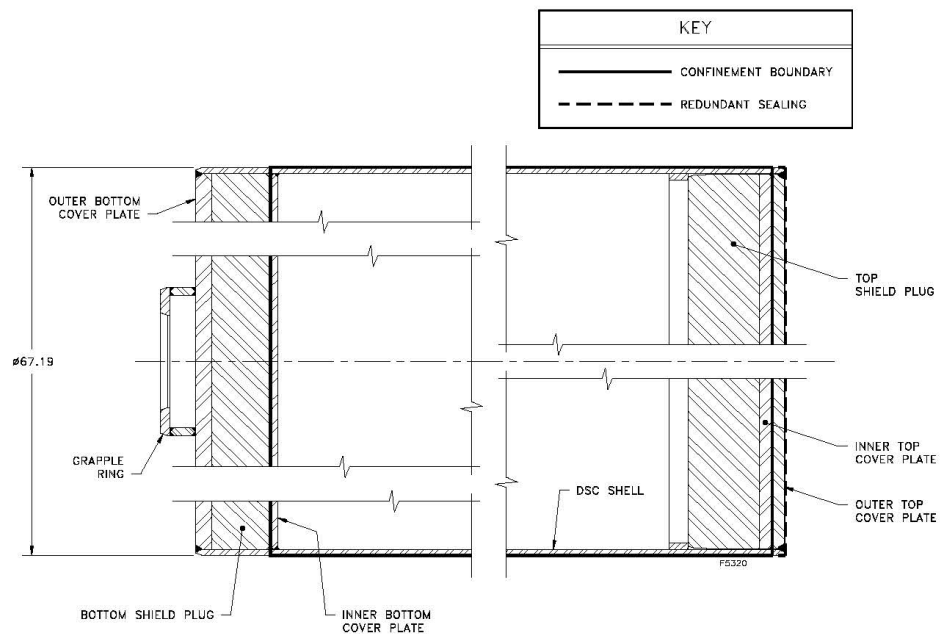
**Response to RAI PLC-2:**

ISP has revised the License condition to clarify that the test to be performed is that referenced in Sections 5.1.3.1, 7.2, 8.2 and the operating procedures in the appendices in accordance with QP-10.02. License Condition 22 is revised to read, “A Post-Transportation Verification shall include an evacuated volume helium leak test on 100% of the canisters that are received at the WCS CISF to ensure that the accessible portions of the confinement boundary are leak tight as defined in ANSI N 14-5 following transport to the site.” The language in Section 4.5.5 of the SAR is also updated consistent with this change.

The confinement boundary of each canister is leak tested in accordance with ANSI-N 14.5 during fabrication and during closure of the canister. The reference “to the extent practicable” is meant to acknowledge the fact that due to the geometry of the canisters it is impossible to leak test the entire confinement boundary once fabrication and closure of the canister is complete. Incorporation by reference is employed in Sections A.11.1, B.11.1, C.11.1, D.11.1, E.11.1.1, E.11.2.1, F.11.1.1 and G.11.1.1 to define the confinement boundary for each canister. By way of example, SAR Section C.11.1 incorporates Figure K.3.1-1 by reference from TN Document NUH-003, Revision 14, “Updated Final Safety Analysis Report for the Standardized NUHOMS® Horizontal Modular Storage System for Irradiated Nuclear Fuel.” (Basis for NRC CoC 72-1004). Figure K.3.1-1 from the NUHOMS® SAR provides the figure that shows the components and welds that make up the confinement boundary for the 61BT DSC. Figure K.3.1-1, reproduced below, shows that portions of the confinement boundary are enclosed by other welded components (bottom cover plate, top cover plate etc.). Since all of the other canisters have similar designs, Figure K.3.1-1 is representative for all.

**Impact:**

SAR Section 4.5.5 and License Condition 22 have been revised as described in the response.



**Figure K.3.1-1**  
**61BT-DSC Confinement Boundary**

**License Application, Appendix A, "Proposed Technical Specifications"****RAI TS-1:**

Specify the total design basis heat load for each of the storage cask designs to be used at the WCS CISF. Ensure the design basis values are included in the appropriate section of the Technical Specifications.

WCS CISF SAR Section 8.1.1, "Criteria," states, "Thermal assessments documented in this Chapter and associated Appendices verify that the WCS CISF characteristics and environmental conditions are bounded by the cask thermal analyses." However, the total design basis heat load for each type of canister received at the site is not provided in the Technical Specifications or anywhere else in the application. The NRC staff needs to evaluate whether thermal analyses of the storage cask systems proposed for use at the WCS CISF are bounding.

This information is needed to determine compliance with 10 CFR 72.44(c).

**Response to RAI TS-1:**

Only canisters that have been previously approved by the NRC to store and transport commercial light water (pressurized water reactor (PWR) and boiling water reactor (BWR)) spent nuclear fuel and greater than class C (GTCC) waste will be received at the WCS CISF. The controls for limiting the total design basis heat load for each of the storage cask designs received at the WCS CISF include those placed on the cask systems by the NRC-issued site licenses or certificates of compliance for the included transportation and storage systems. The approved systems are incorporated by reference by listing each in Section 2.1 of the proposed WCS CISF Technical Specifications. Additionally, the design basis storage heat loads are incorporated by reference in the WCS CISF SAR appendices (see SAR Tables A.3-1, B.3-1, C.3-1, D.3-1, E.3-1 and G.3-1).

As long as the canister is loaded to an amendment authorized in the WCS CISF site-specific license, there is no need to include the loaded configuration details in the WCS CISF technical specifications. The systems will be licensed under the existing storage LCOs for the design basis storage heat loads just as they would at the originating site. The design basis heat loads were initially needed to load SNF canisters into the various storage systems at Part 50 licensed facilities.

Design basis thermal performance for canisters in storage is, in general, significantly higher than that of the canisters in its licensed transportation cask. Thus, the canisters received at the WCS CISF following transportation will be significantly below their design basis storage heat loads and therefore, will have additional margin against the referenced cask thermal analyses.

The design basis heat loads are not repeated in technical specifications.

**Impact:**

No change as a result of this RAI.

**RAI TS-2:**

Clarify why the Technical Specifications are not consistent among the different storage systems to be used at WCS CISF. Ensure the Technical Specifications include any appropriate additional requirements for all storage systems.

Sections 3.2 through 3.4 of WCS CISF Technical Specifications provide Limiting Conditions for Operation (LCOs) and Surveillance Requirements (SRs) for all NAC storage systems, but equivalent LCOs and SRs are not provided for TN America's dry storage systems. The applicant should ensure the Technical Specifications include appropriate additional requirements for the TN America's storage systems or provide adequate justification why this information is not needed. The NRC staff needs this information to determine that adequate protection is provided during storage to preclude any important to safety materials from exceeding safety limits.

This information is needed to determine compliance with 10 CFR 72.122 and 72.44(c).

**Response to RAI TS-2:**

NAC and TN Americas storage systems cover a more than 20-year licensing history. Over that time, the NRC has approved each amendment and system. This has resulted in not only differences within the certificates of compliance (CoCs) and Materials Licenses themselves, but also in substantial differences between storage systems. The proposed WCS CISF Technical Specifications (TS) are derived from these as-approved conditions within each storage system CoC or Material License. The WCS CISF will receive previously loaded canisters from specific sites. The WCS CISF site-specific license and LCOs are written to accommodate this. Section 2.1 of the proposed WCS CISF TS requires that the authorized canister be loaded to a specific CoC and amendment or Material License and amendment. As long as a canister is loaded to one of these amendments, the canister is authorized to be received at the WCS CISF. The proposed WCS CISF technical specification LCOs are derived from these amendments and where appropriate incorporated directly. Thus, each system will continue to operate in accordance with the NRC approved operating requirements after receipt at the WCS CISF. To require the WCS CISF TS to be harmonized across all systems would disrupt the relationship to the as-approved NRC issued CoCs or Materials License and associated TS, which are justified within the final safety analysis report for each system.

There are no LCOs for the NUHOMS® Systems because all of the LCOs in the source license are based on original loading operations and are not applicable at the WCS CISF Site.

**Impact:**

No change as a result of this RAI.

**RAI TS-3:**

Ensure the Technical Specifications (TS) include the appropriate information regarding the minimum center-to-center spacing between two canisters for vertical systems such as NAC-MPC, NAC-UMS, and MAGNASTOR.

The minimum center-to-center spacing between two canisters for vertical systems is not provided in the Proposed Technical Specifications. Section 4.3, "Storage Area Design Features," of the proposed TS state that the Vertical Concrete Casks for NAC-MPC, NAC-UMS, and MAGNASTOR Systems shall meet the minimum center-to-center spacing requirements presented in the WCS CISF SAR. The minimum spacing values should be included in the TS because these values are used to perform the thermal evaluations for normal, off-normal, and accident-level conditions of storage.

This information is needed to determine compliance with 10 CFR 72.44(c).

**Response to RAI TS-3:**

The minimum center-to-center spacing requirements are presented in the WCS CISF proposed Technical Specifications (TS) in the same manner as they are presented in the licensing basis for the MAGNASTOR system, i.e., the minimum spacing values are not included in the TS, but instead the TS require that the minimum spacing values be maintained as designated in the SAR. Note, the NAC-MPC and NAC-UMS do not include such language in their corresponding TS. However, the MAGNASTOR FSAR and NAC-MPC FSAR for Yankee Rowe and Connecticut Yankee states the effects of surrounding casks are considered negligible with a 15-foot center to center spacing. For the NAC-MPC LACBWR system, air flow within the concrete cask is not required to meet all normal, off-normal, and accident conditions.

**Impact:**

No change as a result of this RAI.

**RAI TS-4:**

Ensure that appropriate details of the Horizontal Storage Module (HSM) Thermal Monitoring Program that is used to monitor the thermal performance of each HSM is included in the Technical Specifications (TS).

Section 5.1.3, "HSM Thermal Monitoring Program," of the Proposed Technical Specifications states that the intent of the program is to prevent conditions that could lead to exceeding the concrete and fuel clad temperature criteria. Section

5.1.3 also states that each user must implement either TS 5.1.3(a) OR 5.1.3(b). As the cask user, the applicant is required to implement one of the above TSs; however, it is not clear which TS would be implemented to monitor the thermal performance of each HSM at the site. The applicant should provide details of the program, per either TS 5.1.3(a) or TS 5.1.3(b). For example, if TS 5.1.3(a) is implemented, the user shall develop and implement procedures to perform visual inspection of HSM inlets and outlets on a daily basis. The NRC staff needs this information to make sure adequate protection is implemented to avoid conditions that could lead to safety-related components exceeding applicable safety limits.

This information is needed to determine compliance with 10 CFR 72.44.

**Response to RAI TS-4:**

In general, the existing individual General License NUHOMS® Technical Specifications (TS) allow users to choose between the two methods for implementing the required HSM Thermal Monitoring Program. ISP originally thought providing flexibility in the TS consistent with that provided to General Licensees would allow ISP to perform both thermal monitoring with the thermocouples provided in the horizontal storage module (HSM) roofs and perform visual inspections every 24 hours. This would allow ISP to continue to meet the Technical Specification requirement if there was a breakdown associated with one of the approved methods. However, because the daily visual inspection program does not require thermocouples, readouts and other equipment subject to breakdown, ISP will rely on this approach. Therefore, Section 5.1.3(b) is removed in its entirety from the proposed TS. The existing language in proposed TS 5.1.3(a) provides sufficient detail to ensure that the requirements for performing visual inspections are captured in the implementing procedures that must be in place before placing loaded canisters into storage. Sections A.4.4; A.5.1.3 Step 2; B.4.4; B.5.1.3 Step 2; C.4.4; C.5.1.3 Step 2; D.4.4; and D.5.1.3 Step 2 have also been updated to remove references to TS 5.1.3(b).

**Impact:**

SAR Sections A.4.4, A.5.1.3, B.4.4, B.5.1.3, C.4.4, C.5.1.3, D.4.4, and D.5.1.3 have been revised as described in the response.

TS 5.1.3 has been revised as described in the response.

**RAI TS-5:**

Ensure that the Proposed Technical Specifications include adequate administrative controls such as limiting the amount of flammable material (including diesel fuel) to the equivalent of 50 gallons of diesel fuel.

Table 3-1 in Appendices A-D of the application for the Rancho Seco/MP187/NUHOMS® Systems list the WCS CISF design criteria as 300 gallons of diesel fuel. Table 3-1 in Appendices E-G of the application for the NAC systems list the WCS CISF design criteria as 50 gallons of diesel fuel.

WCS CISF SAR Section 3.3.6 states: “The CTS and the VCT are quantity limited (< 50 gallons) and are described in Section 12.2.1. The transfer vehicle for the NUHOMS® System is also quantity limited (< 60 gallons) and will not be in the Cask Handling Building (CHB) during handling of the vertical systems. As the NUHOMS® System is evaluated for fire with 300 gallons of diesel fuel, the quantity of fuel in the transfer vehicle is bounded for NUHOMS® Systems operations.” On the other hand, Section SAR 7.5.3.8, “On-Site Accidents” states, “During operations, the amount of flammable liquids that are in the CHB will be administratively controlled to ensure the amount of flammable liquids is maintained below the fire load limits for the respective systems (e.g., 300 gallons of diesel fuel for NUHOMS® Systems). In combination with fuel limitations and a fire suppression system, the fire hazard for the building is adequately mitigated (see WCS CISF SAR Section 3.3.6).”

The information provided in WCS CISF SAR Table 3-1 of Appendices A-G, and WCS CISF SAR Section 3.3.6, and Section 7.5.3.8 appears to be inconsistent with regards to the WCS CISF design criteria for fire/explosions protection; therefore, administrative controls should be included in the Proposed Technical Specifications to limit the amount of combustible material to the equivalent of 50 gallons of diesel fuel to make sure WCS CISF is bounded. Also, inconsistencies in the application should be fixed or clarified. The NRC staff needs this information to determine that adequate protection is provided to preclude any important to safety material from exceeding safety limits.

This information is needed to determine compliance with 10 CFR 72.44, 72.122(b), and 72.122(c).

**Response to RAI TS-5:**

Section 4.5 has been included in the proposed Technical Specifications (TS) limiting the amount of flammable liquids during LOADING OPERATIONS below the fire load limits for the respective systems in the safety analysis report (SAR), and to specifically limit the amount fuel in the transfer equipment to 50 gallons when handling NAC vertical systems and less than 300 gallons for the NUHOMS® Systems.

In addition, SAR Section 7.5.3.8 has been updated to reference the 50-gallon diesel fuel equivalent limit for the NAC-MPC, NAC-UMS and MAGNASTOR Systems.

**Impact:**

SAR Section 7.5.3.8 has been revised as described in the response.

TS Section 4.5 has been added as described in the response.

**RAI TS-6:**

Clarify which version of ACI-349 is called out in Operating Procedures - Administrative and Management Control Section 5.1.3.b.iv of the Proposed Technical Specifications.

Based on the context of the information provided in the Proposed Technical Specifications, Administrative Controls Section 5.1.3.b.iv, it appears that the information referenced is an outdated version of ACI-349 (1985 version with the 1990 Revisions). The ACI-349 standard has been revised in 2006 and again in 2013. Note that starting in the 2006 revision, the thermal considerations were moved to Appendix E.

This information is needed to determine compliance with 10 CFR 72.24(c)(4).

**Response to RAI TS-6:**

In response to RAI TS-4, ISP has removed Section 5.1.3(b), including Section 5.1.3.b.iv, from the Technical Specification (TS). The HSM Thermal Monitoring Program is now completely implemented by daily visual inspections of the inlet and outlet vents with no associated evaluations required.

**Impact:**

No change as a result of this RAI.

**RAI TS-7:**

Ensure that Proposed Technical Specifications Section 5.1.3.b.v clearly explains what measurements or other evidence will be used to determine that, “off-normal or accident temperature limits for fuel cladding have been exceeded,” and what procedures or tests will be used to “verify that the canister confinement is maintained.”

The Proposed Technical Specifications, Operating Procedures - Administrative and Management Control Section 5.1.3.b.v, include these statements but there is no specific procedure or SAR section referenced.

This information is needed to determine compliance with 10 CFR 72.24(b) and (l), 72.120(a) and 72.122(h)(1).

**Response to RAI TS-7:**

In response to RAI TS-4, ISP has removed Section 5.1.3(b), including Section 5.1.3.b.v, from the Technical Specification (TS). The HSM Thermal Monitoring Program is now completely implemented by daily visual inspections of the inlet and outlet vents.

**Impact:**

No change as a result of this RAI.

**RAI TS-8:**

Ensure the application provides the appropriate inspection requirements and acceptance criteria in Proposed Technical Specifications Section 5.2.2, "Cask Drop," Inspection Requirement, which states, "The NUHOMS® CANISTER will be inspected for damage after any STC with CANISTER side drop of 15 inches or greater."

This information is needed to determine compliance with 10 CFR 72.24(c)(4) and 72.120(a).

**Response to RAI TS-8:**

For NUHOMS® Systems, the accident involving the drop of the shielded transfer cask (STC) with the CANISTER and its spent fuel contents during transfer operations is evaluated as a non-mechanistic accident. The structural analysis demonstrates that the basket integrity is retained and the STC and the CANISTER maintain their confinement functions. Therefore, the inspection and acceptance criteria are traditionally provided in the applicable accident analysis sections of the safety analysis report (SAR).

As a result, the inspection requirements and the acceptance criteria are clarified in the SAR Section A.12.2.2, B.12.2.2, C.12.2.2 and D.12.2.2.

**Impact:**

SAR Sections A.12.2.2, B.12.2.2, C.12.2.2, and D.12.2.2 have been revised as described in the response.

**Safety Analysis Report (SAR), Chapter 3, "Principal Design Criteria"****RAI NP-3-1:**

Clarify the application of ASME NOG-1, "Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)," to the design of the canister transfer system (CTS).

The design criteria specified for the canister transfer system is inconsistent. WCS CISF SAR Section 3.2.3.5 states the 1989 edition of ASME NOG-1 [Ref. 3- 26] was used for the static design load combinations, while WCS CISF SAR Section 3.2.8.3 indicates that the important-to-safety canister transfer system load combinations were in accordance with the 2010 edition of ASME NOG-1 [Ref. 3-34].

This information is needed to determine compliance with the 10 CFR 72.24(c)(4).

**Response to RAI NP-3-1:**

All calculations and design specifications have been reviewed and ISP has revised SAR Section 3.2.3.5 to reference ASME NOG-1, 2010 Edition. Reference [3-26] is also updated to indicate that this reference is not used. ISP also verified that Reference [3-26] was only used in Section 3.2.3.5 of the SAR.

**Impact:**

SAR Sections 3.2.3.5 and 3.8 have been revised as described in the response.

**RAI NP-3-2:**

Provide the quality assurance classification and justification for the MP187 and the MP197HB transportation/transfer casks that will be used at the WCS CISF.

WCS CISF SAR Appendices A.3.1.4 and B.3.1.4 identify the MP187 as being qualified for transfer operations and SAR Appendices C.3.1.4 and D.3.1.4 identify the MP197HB as being qualified for transfer operations. WCS CISF SAR Table 7-1: WCS CISF Structures and QA Classification identify the transfer casks as important to safety, but the quality assurance classification of these Structures, Systems, and Components are not included in WCS CISF SAR Table 3-5, "Quality Assurance Classification of Structures, Systems, and Components as Utilized at the WCS CISF."

This information is needed to determine compliance with 10 CFR 72.24(c) and (d).

**Response to RAI NP-3-2:**

The requested information for the NUHOMS® MP187 transportation cask, referenced in SAR Appendices A.3.1.4 and B.3.1.4, are provided in the response to RAI NP-15-2. SAR Section A.3.1 was revised and Tables A.3-5 through A.3-6 were added to the SAR as described in the response to RAI NP-15-2 to provide the quality assurance classifications for the NUHOMS® MP187 cask.

The requested information for the NUHOMS® MP197HB transportation cask, referenced in SAR Appendices C.3.1.4 and D.3.1.4, is included on in the bill of materials (BOM) of Drawing MP197HB-71-1002, Revision 6 which is incorporated by reference in Section C.4.6 (See Item 8) of the SAR.

Finally, see the response to RAI NP-15-5, which dealt with the justification for the quality classification for both the MP187 and MP197HB transportation/transfer casks.

**Impact:**

No change as a result of this RAI.

**RAI NP-3-3:**

Provide the safety classification and quality assurance classification of the NAC Transfer casks for the transfer of Transportable Storage Canisters (TSCs) for the NAC-MAGNASTOR, NAC-UMS and the NAC-MPC systems.

The WCS CISF SAR Appendices E-G identify NAC Transfer casks for the transfer of TSCs for the NAC-MAGNASTOR, NAC-UMS and the NAC-MPC systems. The safety classification of SSCs for these systems is referenced to the respective UFSARs for these systems in WCS CISF Appendices E-G Section 3.1.2.1, however the transfer cask is not classified as either important to safety or not important to safety in the WCS CISF SAR and the quality assurance classification of these SSCs is not included in WCS CISF SAR Table 3-5, "Quality Assurance Classification of Structures, Systems, and Components as Utilized at the WCS CISF."

This information is needed to determine compliance with 10 CFR 72.24(c) and (d).

**Response to RAI NP-3-3:**

ISP has revised Table 3-5 in the SAR to include the safety classifications and quality assurance categories for of the NAC transfer casks used in the transfer of TSCs for the NAC-MAGNASTOR, NAC-UMS and the NAC-MPC systems. All of the transfer casks are classified as important-to-safety (ITS) and have a quality assurance classification of B.

**References:**

1. Tables 2.3-1 and 2.3-2 of NAC-MPC Final Safety Analysis Report, Revision 10, January 2014.
2. Table 2.3-1 of NAC-UMS Universal Storage System Final Safety Analysis Report, Revision 10, October 2012.
3. Table 2.4-1 of MAGNASTOR Final Safety Analysis Report, Revision 7, July 2015.

**Impact:**

SAR Table 3-5 has been revised as described in the response.

**RAI NP-3-4:**

Clarify the information provided in WCS CISF SAR Section 3.3.7.1, "Spent Fuel or High-Level Radioactive Waste Handling and Storage," which states:

*A recovery method for the unlikely loss of confinement event is independent of any bare fuel handling facilities.*

Provide specific information on the recovery method(s) that will be used for the systems incorporated by reference.

This information is needed to determine compliance with 10 CFR 72.120(a).

**Response to RAI NP-3-4**

As described in the introduction to Chapter 11 of the SAR, the design and licensing basis for all of the of the canisterized systems authorized for storage at the WCS CISF is that the canister maintains confinement for all normal, off-normal and accident conditions. In addition, the confinement boundary of each canister type authorized for storage at the WCS CISF is evaluated to demonstrate that the confinement boundary of the canisters is not adversely impacted during transport to the WCS CISF. The canisters are also subject to the applicable NRC-approved Aging Management Program during storage, at both the originating site and at the WCS CISF, based on the original canister load date. Therefore, as the ability to handle bare fuel is not a credible event, it is not part of the licensing basis and, to remove any confusion related to this issue, the bullet referenced in the RAI question has been removed from Section 3.3.7.1 of the SAR.

**Impact:**

SAR Section 3.3.7.1 has been revised as described in the response.

**RAI NP-3-5:**

Provide the basis to classify the Cask Handling Building (CHB) as an important to safety (ITS) Category C structure in WCS CISF SAR Section 3.4.1, "Cask Handling Building Quality Classification."

NUREG/CR-6407, "Classification of Transportation Packaging and Dry Spent Fuel Storage System Components Accordance to Importance to Safety," defines ITS Category C as structures, systems and components (SSCs) whose failure or malfunction would not significantly reduce the effectiveness of storage system components and would not be likely to create a situation adversely affecting public health and safety. Category B items are defined as SSCs whose failure or malfunction could indirectly result in a condition adversely affecting public health and safety. Furthermore, the failure of a Category B item, in conjunction with the failure of an additional item, could result in an unsafe condition.

Based on the above definitions, justify the classification of the CHB as an ITS Category C SSC when collapse of the CHB structural members, failure of other structural members such as the overhead cranes, or dropping of other heavy objects under wind and seismic events, could create conditions leading to damage of canisters during transfer operations within the CHB.

This information is needed to determine compliance with 10 CFR 72.122(b)(2)(ii).

**Response to RAI NP-3-5:**

WCS CISF SAR Section 3.4.1 has been revised to classify the Cask Handling Building (CHB) as an ITS Category B structure.

WCS CISF SAR Sections 1.2.3, 3.2.8.4, 3.4, 3.4.1, 4.3.9.1, 4.7.1, 4.7.1.6, 5.2.1.2.1, and 7.5.3, as well as Tables 3-5 and 7-1, have been revised to reflect the reclassification of the CHB and address consequences thereof.

**Impact:**

SAR Sections 1.2.3, 3.2.8.4, 3.4, 3.4.1, 4.3.9.1, 4.7.1, 4.7.1.6, 5.2.1.2.1, and 7.5.3, as well as Tables 3-5 and 7-1, have been revised as described in the response.

**RAI NP-3-6:**

Revise the discussion in WCS CISF SAR Section 3.2.3.5 to clarify whether the same soil property data presented in WCS CISF SAR Table 7-38 are also being used for WCS CISF SAR Section 7.6.4, "Soil Structure Interaction of NUHOMS NITS Storage Pad."

The present SAR discussion covers only the soil property data used for the NAC system storage pad. The SAR Section 3.2.3.5 discussion on the soil properties data should be revised to also cover the NUHOMS NITS Storage Pad.

This information is needed to determine compliance with 10 CFR 72.24(c)(3), 72.24(d)(1) and (2) and 72.122(b).

**Response to RAI NP-3-6:**

The NUHOMS® not important-to-safety (NITS) storage pad is covered by the soil properties discussed in Table 7-38, as stated at the end of Section 7.6.5.4 Subsection "Soil Modeling" (page 7-93). Section 3.2.3.5 has been revised to include reference to the NUHOMS® NITS storage pad. These soil properties are not used in Section 7.6.4 discussing the soil-structure interaction (SSI) analysis for the NUHOMS® NITS Storage Pad, but in Section 7.6.5 discussing the equivalent static analyses for the NUHOMS® NITS Storage Pad.

**Impact:**

SAR Section 3.2.3.5 has been revised as described in the response.

**SAR Chapter 4, “Facility Design”****RAI NP-4-1:**

Provide additional information to support the differences between the required tests and maintenance activities described in WCS CISF SAR Section 4.5.1, “Transportation Cask Repair and Maintenance Activities,” and specific repair and maintenance activities provided in the SARs for each of the systems incorporated by reference. Alternatively, revise WCS CISF SAR Section 4.5.1 and state all maintenance activities for the transportation casks will follow requirements outlined in Chapter 8 of the SARs for the systems incorporated by reference.

The NRC staff notes the following potential inconsistencies between WCS CISF SAR Section 4.5.1 and SARs of the transportation systems incorporated by reference:

- The NAC STC and NAC-UMST both have quick-disconnect fittings (e.g., vent, drain, inner lid interseal test and interlid ports) for which there are required inspections for proper function during each cask loading and unloading operation. See Table 8.2-1 of each SAR. (Section 8.2.4 of the NAC STC and the NAC-UMST SAR). These connectors shall be replaced, as required, and at a minimum of every 2 years. Neither the required inspections nor the periodic replacement are described in the WCS CISF SAR.
- MP197HB has a structural test in its SAR Section A.8.2.1 and dimensional testing of the trunnions. Neither are described in the WCS CISF SAR.
- Some transportation systems such as the MP187 and the MP197HB require periodic fastener replacement with frequencies that are based on either time or number of uses. The periodic replacement of these fasteners is not described in the WCS CISF SAR.
- The reference to nondestructive examination in the paragraph under Trunnion Inspections in WCS CISF SAR Section 4.5.1 is not descriptive. Clarify whether this is something other than visual testing (VT) and/or beyond the requirements identified in the Chapter 8 of the transportation SARs for the systems incorporated by reference. The NRC staff notes that the NAC-UMS requires periodic penetrant testing (PT) of trunnions (see NAC-UMST SAR Section 8.2.1).

This information is needed to determine compliance with 10 CFR 72.120(a).

**Response to RAI NP-4-1:**

ISP has revised Section 4.5.1 of the SAR to state that any transportation cask maintenance and repair activity conducted at WCS CISF will be performed in accordance with the applicable NRC Certificate of Compliance (CoC) for Radioactive Materials Packages (Part 71), and Chapter 8 of the Transportation SAR referenced in the CoC.

**Impact:**

SAR Section 4.5.1 has been revised as described in the response.

**RAI NP-4-2:**

Describe, or provide a reference to, the testing procedure and the acceptance criteria for Impact Limiter weight tests to detect the absorption of moisture for the NAC-STC and the TN MP197HB. WCS CISF SAR Section 4.5.1 states:

*In addition, the impact limiters are inspected to verify that a significant amount of water has not been absorbed and that degradation of the energy absorbing material has not occurred. These inspections are performed by weighing the impact limiter and visual examination of the impact limiters and welds.*

Weight testing of impact limiters appears to be used only in the NAC-UMST (NAC-UMST SAR Section 8.2.3) and the MP187 (ADAMS Accession No.

ML063520505), which include acceptance criteria. The acceptance tests and maintenance chapters of the SARs for the NAC-STC and the MP197HB do not include testing procedures and acceptance criteria for evaluating the possibility of moisture absorption of the impact limiters. However, the MP197HB does require leak testing of the impact limiters to identify evidence of cracking in the welds (MP197HB SAR Section A.8.2.3.2).

This information is needed to determine compliance with 10 CFR 72.120(a).

**Response to RAI NP-4-2:**MP197HB Impact limiters:

A visual examination of the impact limiters will be performed before each shipment to ensure that the impact limiters have not been degraded between leakage test intervals. If there is no evidence of weld cracking or other damage that could result in water in-leakage, the wood will not be degraded. If there is visual damage, the impact limiter will be removed from service, repaired, if possible, and inspected/tested for degradation of the wood.

Impact limiters will be leakage tested once every five years to ensure that water has not entered the impact limiters. If the leakage test indicates that the impact limiters have a leak, a humidity test will be performed to verify that there is no free water in the impact limiters.

MP187 Impact limiters:

Prior to each use, a visual examination of the impact limiter pipe plugs at the end of the impact limiter will be inspected for damage and replaced prior to use if damaged.

Annually, a visual inspection of the impact limiter foam will be conducted for water absorption by removing the pipe plugs and inspecting the foam in the limiters, respectively. Additionally, each impact limiter shall be weighed. The impact limiters shall be removed from service if there is more than a 3% increase in weight when compared to the weight documented at the completion of fabrication.

**Impact:**

No change as a result of this RAI.

**RAI NP-4-3:**

Describe the administrative controls that will be used to ensure the lift height of the NUHOMS transportation cask is maintained at or below 80 inches with respect to the following areas identified in Section 5.1.1 of NUREG-0612:

- Definition of safe load paths (How will the operator determine load height?)
- Procedures (What level of oversight will be provided and what actions will be taken if load exceeds height limit?)
- Operator training (How will the crane operator and any supervisors be qualified?)
- Crane inspection, testing, and maintenance (How will proper performance of crane controls be verified?)

The NRC staff found that the specified administrative controls do not provide sufficient information to fully demonstrate conformance with the guidance contained in Section 5.1.1 of NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants: Resolution of Generic Technical Activity A-36," because the administrative controls used to maintain that load height were not specified other than by specifying the load height limit in the applicable procedure descriptions in the FSAR. WCS CISF SAR Section 4.7.2 states that the two 130-ton overhead bridge cranes would be provided for transferring loaded NUHOMS fuel canisters within transportation casks from a rail car to the transfer trailer. This section of the WCS CISF SAR also states that the cranes would be administratively controlled to maintain the NUHOMS cask at or below the analyzed 80-inch drop height, and that, as indicated in Section 7.5.3.1 of the WCS CISF SAR, lifts performed by the overhead bridge crane would be governed by the guidance of NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants: Resolution of Generic Technical Activity A-36," to minimize the potential for release of radioactive material from a spent fuel cask.

This information is needed to determine compliance with 10 CFR 72.24(h).

**Response to RAI NP-4-3:**

The overhead cranes in the Cask Handling Building (CHB) will be installed with limit switches and the lifting procedures will specify the use of physical limit switches when the loaded NUHOMS® casks are being lifted. Limit switches are adjustable electromechanical components that are commonly used to regulate industrial machinery and are widely used in crane operations. One of the most common applications of limit switches in overhead crane operation is to control the length of the travel of the hoist which determines the height of the load.

As the crane approaches the end of its pre-set travel limit (maximum allowed cask lifting height), an electrical or mechanical switch will trigger and begin to slow down the hoist motion to notify the operator that the load is approaching the maximum allowed lifting height. If the hoist continues to travel, the limit switch will cut power to the hoist at the pre-set height limit, preventing the load from being lifted any higher.

The training program applicable to these activities is described in Sections 13.3.1.3 and 13.3.1.4 of the SAR.

Limit switch settings are coordinated with the configuration of rigging and lift beam assembly components to ensure that cask is not lifted above its maximum allowed drop height. Before the start of each shift involving lifting a cask, the limit switch is tested to verify that it is set at the correct height and that it is functioning correctly. The lifting procedure will require that two independent individuals sign-off that the forgoing has been completed prior to any lift of a loaded NUHOMS® cask. In addition to the pre-shift limit switch test and inspection, the overhead cranes and their components will be inspected and maintained as recommended by the crane manufacturer and in accordance with the requirements in ASME B30.2 "Overhead and Gantry Cranes".

SAR Section 4.7.2 has been updated to clearly state that the overhead cranes shall include limit switches as described above.

Any violation of the above will be documented in the ISP Corrective Action Program. In the highly unlikely event a cask is lifted above 80 inches, the cask will be placed in a safe condition and a stop work will be immediately issued in addition to the follow-on corrective action.

**Impact:**

SAR Section 4.7.2 has been revised as described in the response.

**RAI NP-4-5:**

Revise WCS CISF SAR Section 4.4.1, "Equipment Decontamination" to: 1) define the term "weeping," and 2) address decontamination of the interior of transportation packages and transfer casks.

WCS CISF SAR Section 4.4.1 states "the only radioactive wastes are solid wastes generated from residual quantities of radioactive contamination that may be encountered on the surfaces of the transportation casks due to weeping." It is not clear what the applicant means by the term "weeping." Additionally, WCS CISF SAR Section 4.4.1 discusses decontamination of the exterior of incoming transportation packages, but does not discuss decontamination of the interior surfaces of transportation packages or transfer casks after removing spent fuel canisters. These decontamination activities could be a significant contributor to solid decontamination waste, and should be discussed in this section.

This information is needed to determine compliance with 10 CFR 72.126.

**Response to RAI NP-4-5:**

The following definition of "weeping" is found in NRC Information Notice 85-46, Clarification of Several Aspects of Removable Surface Contamination Limits for Transport Packages.

[Weeping] is a phenomena whereby certain casks, after their removal from underwater storage basins (pools) and decontamination, subsequently exhibit an increase in the level of removable radioactive surface contamination during and after transport. This increase is believed to be the result of a "weeping" or "sweating" of previously entrapped activity within surface pores, fissures, etc. Its occurrence and magnitude appear to be dependent on such variables as cleanup methods, surface porosity, types of detergents used, surface treatment history, duration of and temperature during transport, and the period of time between completion of transportation and performance of a contamination survey.

Only the transportation casks that have been submerged in contaminated water (fuel pools) are expected to exhibit "weeping." Because the interior of the casks and exterior surfaces of the canisters are protected from coming in contact with contaminated pool water during loading operations, ISP does not anticipate that decontamination of the interior of transportation packages will be performed at the WCS CISF. Transportation packages will be returned as "empty packages" under Department of Transportation (DOT) regulations (49 CFR 173.428 (d)) and are not expected to exceed the contamination limits specified in 49 CFR 173.428 (d).

Finally, the transfer casks used to transfer the canisters included as part of the NAC vertical systems from their transportation casks to the vertical concrete casks (VCCs) are never submerged in contaminated water and the exterior surfaces of the canisters are clean; therefore, the transfer casks are not expected to exhibit this phenomena nor become contaminated.

As requested, Section 4.4.1 (and 4.9 References) of the SAR have been updated to reflect the above information.

**Impact:**

SAR Sections 4.4.1 and 4.9 have been revised as described in the response.

**RAI NP-4-6:**

Revise WCS CISF SAR Section 4.5, "Transportation Casks and Associated Components," discussion regarding the transportation casks design for protecting the canisters from the effects of environmental conditions, natural phenomena, and accidents.

The spent fuel transportation casks, which are designed in accordance with the 10 CFR Part 71 requirements, do not specifically address the effects of environmental conditions, natural phenomena, and accidents associated with 10 CFR 72.122(b) provisions. As such, the basis for citing the transportation cask evaluation results to address broadly the canister storage operation at WCS ICSF is unclear.

This information is needed to determine compliance with 10 CFR 72.24(c)(3) and 72.24(d)(1) and (2).

**Response to RAI NP-4-6:**

WCS CISF SAR Section 4.5, "Transportation Casks and Associated Components," has been revised to delete reference to transportation cask designs providing protection of canisters from the effects of environmental conditions, natural phenomena, and storage accidents. The revised sentence now reads:

Transportation casks are designed and certified in accordance with 10 CFR 71 to protect the casks and canisters during normal conditions of transport and severe hypothetical transport accidents.

**Impact:**

SAR Section 4.5 has been revised as described in the response.

**SAR Chapter 7, "Installation Design and Structural Evaluation"****RAI NP-7-2:**

Describe the inspection and maintenance programs associated with the Canister Transfer System (CTS), including the air-powered chain hoist and the hydraulic jacking tower components.

WCS CISF SAR Section 7.5.1.13, "Maintenance," addresses maintenance and inspection of CTS components. However, the guidance in NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants," specifies inspection, testing, and maintenance to a specific consensus standard for overhead cranes, and the specified actions do not fully correspond with those included in the applicable consensus standards for hydraulic gantries and chain hoists in the ASME B30 series, "Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings."

This information is needed to determine compliance with 10 CFR 72.24(n).

**Response to RAI NP-7-2:**

To impose the applicable consensus standards related to inspection and maintenance program requirements for the hydraulic gantries and chain hoists in the ASME B30 series for the CTS, SAR Section 7.5.1.13 has been revised to add a reference to ASME B30.1-Chapter 1-6 for hydraulic gantries and ASME B30.16-Chapter 16-2 chain hoists.

**Impact:**

SAR Section 7.5.1.13 has been revised as described in the response.

**RAI NP-7-9:**

Provide the basis for the assumption in WCS CISF SAR Section 7.5.3.2 that an administrative control will be adequate to prevent failures of structural members and potential collapse of overhead cranes onto canisters during receipt, transfer, storage, and retrieval operations for the spent nuclear fuel and GTCC waste within the CHB.

The NRC staff needs additional information to determine the effectiveness of the administrative control to prevent failures leading to a reduction of storage cask system effectiveness. The evaluation of the effectiveness of this administrative control should consider factors such as time available to take mitigative actions because of an inclement weather watch/warning or other notification; estimated time to complete activities to place systems in a safe configuration; estimates of the tornado strike probabilities and maximum wind speeds for the site; and the capability of SNF transportation, transfer, and storage cask systems to withstand tornado missile impacts.

This information is needed to determine compliance with 10 CFR 72.122(b)(2)(i) and (ii).

**Response to RAI NP-7-9:**

Reduction or loss of storage cask system effectiveness, due to failure of structural members and potential collapse of overhead cranes onto canisters during receipt, transfer, storage, and retrieval operations for the spent nuclear fuel and Greater than Class C (GTCC) waste within the Cask Handling Building (CHB), will be prevented by a combination of (1) administrative controls to prevent potential collapse of overhead cranes onto canisters and (2) design of the CHB to resist failure of structural members against design-basis tornados and tornado-generated missiles, in accordance with American Society of Civil Engineers (ASCE) code ASCE 7-05. WCS CISF SAR Section 7.5.3.2 has been revised to reflect that administrative controls are no longer being credited solely for prevention of reduction in storage cask system effectiveness due to failures of structural members and potential collapse of overhead cranes onto canisters during wind or tornado events. Additional explanation of relevant administrative controls and a discussion of the design and analysis of the CHB to resist failure of structural members under design-basis tornado and tornado missile loading are provided in the revised Section 7.5.3.2.

WCS CISF SAR Sections 3.2.1.1, 3.2.1.4, 4.7.1.1, 7.5.3.2.1, 7.5.3.3.4, and 7.5.3.2, and Table 1-2 have been revised, and Section 3.2.1.3 has been deleted, to reflect that the CHB is designed to prevent collapse under design-basis tornado and tornado missile loading, and to provide the relevant standards.

**Impact:**

SAR Sections 3.2.1.1, 3.2.1.4, 4.7.1.1, 7.5.3.2.1, 7.5.3.3.4, and Table 1-2 have been revised, and Section 3.2.1.3 has been deleted, as described in the response.

**RAI NP-7-10:**

Pertaining to the seismic loads information in WCS CISF SAR Section 7.5.3.2, "Design Analysis:" (1) Provide the basis to use IBC/ASCE 7 default response spectra for the seismic loads of the CHB rather than the site-specific response spectra developed from the Probabilistic Seismic Hazard Evaluation described in WCS CISF SAR Chapter 2; and (2) Provide a comparison of the IBC/ASCE 7 default spectrum with the site-specific uniform hazard spectrum at 2% probability of exceedance in 50 years. Define the soil classification used for the soil amplification factor coefficients in order to reach the conclusion that the site could be classified as Seismic Design Category C.

The NRC staff needs additional justification on the applicability of the International Building Code (IBC) as the seismic design criteria for the CHB. Standards such as the ASCE 4 establish criteria for nuclear facilities and provide facilities such as the CHB with design methods that result in a lower probability of unacceptable seismic performance than conventional facilities.

This information is needed to determine compliance with 10 CFR 72.122(b)(2)(i) and (ii).

**Response to RAI NP-7-10:**Item 1:

As discussed in the ISP Response to RAI NP-3-5, the Cask Handling Building (CHB) has been reclassified in the WCS CISF SAR as an important-to-safety (ITS) Category B structure. Accordingly, the seismic demands and analysis methods are determined using nuclear facility standards, including American Society of Civil Engineers (ASCE) 4-16 and ASCE 43-05. In accordance with seismic analysis requirements in these codes, modal response spectrum analysis is performed to determine seismic demands for structural design of the CHB. The input response spectra for this analysis are developed from the site-specific response spectra generated by the Probabilistic Seismic Hazard Analysis for the WCS CISF site (discussed in WCS CISF SAR Chapter 2).

Item 2:

Since ASCE 7 is no longer being used to define the input response spectra, but rather the site-specific uniform hazard spectra are used, comparison with the site-specific spectra is not required, nor is discussion of the ASCE 7 soil classification for the WCS CISF site. Nevertheless, soil-structure interaction (SSI) effects must be addressed in the CHB seismic analysis, as required by ASCE 4-16, Section 5.1(a). However, SSI effects can be neglected in accordance with the code due to the stiff soils at the WCS CISF site and the relatively low dominant structural frequencies. Further discussion of this is provided in the revised WCS CISF SAR Section 7.5.3.2.

WCS CISF SAR Sections 7.5.3.2.1 and 7.5.3.3.3 have been revised to reflect the use of ASCE 4-16 and ASCE 43-05 as seismic design criteria for the CHB, to reflect that the response spectrum analysis is performed using the site-specific seismic response spectra from the Probabilistic Seismic Hazard Analysis, and to provide a justification for neglecting SSI effects on the CHB structure.

SAR Sections 3.2.3, 3.2.3.5, 3.2.3.8, and 3.2.3.9 have also been revised to reflect that CHB seismic demands and analysis methods are determined using nuclear facility standards.

**Impact:**

SAR Sections 3.2.3, 3.2.3.5, 3.2.3.8, 3.2.3.9, 7.5.3.2, and 7.5.3.3.3 have been revised as described in the response.

**RAI NP-7-11:**

Provide the basis for the use of the IBC load combinations and ACI 318 in WCS CISF SAR, Section 7.5.3.2.1, "Reinforced Concrete Load Combinations" for the design of reinforced concrete members of the CHB, which is an ITS structure.

NUREG-1567 Section 5.4.4, "Other SSCs Important to Safety," references ANSI 57.9 standards. The standards referenced on load combinations and design limits are in line with those for nuclear facilities such as ACI 349. Further justification is needed on the applicability of the IBC and ACI 318 for the design of reinforced concrete members of the CHB.

This is needed to determine compliance with 10 CFR 72.122(b)(2)(i) and (ii).

**Response to RAI NP-7-11:**

As stated in the ISP Response to RAI NP-3-5, the WCS CISF SAR has been revised to classify the Cask Handling Building (CHB) as an important-to-safety (ITS), Category B structure. Consequently, load combinations for the design of CHB reinforced concrete structures such as the CHB foundations are developed in accordance with American Concrete Institute (ACI) code 349-13. Construction of CHB reinforced concrete members remains in accordance with ACI 318-08.

WCS CISF SAR Section 7.5.3.2.3, in addition to Section 3.2.8.5, has been revised to reference ACI 349-13 for development of reinforced concrete load combinations for design.

**Impact:**

SAR Sections 3.2.8.5 and 7.5.3.2.3 have been revised as described in the response.

**RAI NP-7-13:**

Revise WCS CISF SAR Section 7, "Installation Design and Structural Evaluation," to add Concrete Casks (e.g., CC1 through CC4) to the item 2 description for the NAC MAGNASTOR storage cask system on WCS CISF SAR page 7-1. Alternately, provide an appropriate SAR note for generic use of the terminology, "Vertical Concrete Cask (VCC)," to also cover the MAGNASTOR overpacks, CC1 through CC4.

This information is needed to determine compliance with 10 CFR 72.24(c)(3) and 72.24(d)(1) and (2).

**Response to RAI NP-7-13:**

A note has been added to "VCCs" on WCS SAR Page 7-1 to state that references to "VCC" is generic since there are several different designs for the NAC-MPC, NAC-UMS, and MAGNASTOR storage systems.

**Impact:**

SAR Section 7.0 has been revised as described in the response.

**RAI NP-7-14:**

Revise the WCS CISF SAR page 7-3 statement, “No new analyses are required for the NAC storage system,” to recognize that a seismic reconciliation soil- structure interaction analysis is performed in SAR Section 7.6.3, “Soil Structure Interaction of the VCC Storage Pad,” to demonstrate seismic stability of the VCCs using the site-specific design basis earthquake motions.

This information is necessary to determine compliance with 10 CFR 72.24(c)(3), 72.24(d)(1) and (2) and 72.122(b).

**Response to RAI NP-7-14:**

SAR Page 7-3 has been updated as requested to recognize the seismic reconciliation soil-structure interaction analysis documented in SAR Section 7.6.3.

**Impact:**

SAR Section 7.2 has been revised as described in the response.

**RAI NP-7-15:**

Provide the basis for the use of the International Building Code (IBC) as stated in WCS CISF SAR Section 7.5.3.2, "Design Analysis" to determine the design earthquake loads for the Cask Handling Building, which is an important to safety structure.

NUREG-1567, Section 5.4.4, "Other SSCs Important to Safety," references ANSI 57.9 standards. The standards on earthquake loading follow references that are in line with those for nuclear facilities. The use of codes and standards such as the IBC appear in NUREG-1567, Section 5.4.5, "Other SSCs," which invokes commercial building codes for the design of Non-ITS SSCs, including load combinations.

The NRC staff needs additional justification on the applicability of the IBC as the seismic design criteria for the CHB. Standards such as ASCE 4 establish criteria for nuclear facilities. This code also provides analysis methods for facilities such as the CHB with design methods that result in a lower probability of unacceptable seismic performance than conventional facilities.

This information is needed to determine compliance with 10 CFR 72.122(b)(2)(i) and (ii).

**Response to RAI NP-7-15:**

As discussed in the ISP Response to RAI NP-3-5, the Cask Handling Building (CHB) has been reclassified in the WCS CISF SAR as an important-to-safety (ITS) Category B structure. Additionally, as discussed in the ISP Response to RAI NP-7-10, WCS CISF SAR Sections 7.5.3.2.1 and 7.5.3.3.3 have been revised to state that seismic design and analysis methods are determined using ASCE 43-05 and ASCE 4-16. This approach is considered consistent with the intent of NUREG-1567 and its reference to ANSI 57.9 for design of structures important to nuclear safety.

**Impact:**

No change as a result of this RAI.

**SAR Chapter 9, "Radiation Protection"****RAI NP-9-1:**

Ensure that the shielding analysis in the WCS CISF SAR Section 9.4, "Estimated On-Site Collective Dose Assessment," includes the appropriate information specifying the neutron and gamma cross section libraries used to determine off site dose rates.

Both NAC Analysis 30039-5001, Rev. 0, and Areva Calculation WCS01-0503, Rev. 0, specify which version of MCNP is used for each part of the dose rate analysis, but do not specify which neutron and gamma cross section libraries are used. The WCS CISF SAR should include this information.

This information is needed to determine compliance with 10 CFR 72.104 and 72.106, and 10 CFR 20.1201 and 20.1301.

**Response to RAI NP-9-1:**

The gamma and neutron cross-section libraries used to determine off-site dose rates have been added to SAR Section 9.4.1, including additional Table 9-8.

**Impact:**

SAR Section 9.4.1 has been revised and SAR Table 9-8 has been added as described in the response.

**RAI NP-9-2:**

Ensure that the WCS CISF SAR includes the appropriate written policy that states management's commitment to maintain exposures to workers and the public As Low As Is Reasonably Achievable (ALARA) levels and addresses both facility design and operations. Consistent with 10 CFR 20.1101, the policy should include the following provisions as set forth in NUREG-1567, section 11.4.1.1.:

- No practice involving radiation exposure will be undertaken unless evaluation of the practice demonstrates that its use will produce a net benefit to society.
- All exposures will be kept ALARA, with technological, economic, and social factors considered.
- Individual dose limits will be established that are appropriate for practices involving radiation exposure, and exposures to individuals will not exceed these limits.
- Supervisors will integrate appropriate radiation protection controls into all work activities.
- Workers will be appropriately instructed in the objectives and implementation of the ALARA program, with this information included in training modules.
- There will be strict compliance with all regulatory requirements and license conditions regarding procedures, radiation exposures, and releases of radioactive materials.
- A comprehensive program will be maintained, and periodically evaluated, to ensure that both individual and collective doses meet ALARA objectives and do not exceed acceptable levels.

This information is needed to determine compliance with 10 CFR 20.1101.

**Response to RAI NP-9-2:**

ISP had added SAR Section 9.1.4, "ISP ALARA Policy," which is the policy written by ISP maintaining the commitment of their management to maintain exposure levels to workers and the public As Low As Reasonably Achievable (ALARA).

**Impact:**

SAR Section 9.1.4 has been added as described in the response.

**RAI NP-9-3:**

Ensure that WCS CISF SAR Section 9.6.2.4, "Environmental Monitoring," includes appropriate details on the facility Radiological Environmental Monitoring Program (REMP).

WCS CISF SAR Section 9.6.2.4 provides minimal details about the REMP for the WCS facility. The NRC staff needs to evaluate details, including: 1) number of samples; 2) sample locations; 3) collection frequency; 4) sample analysis to be performed; and 5) sample analysis frequency. The SAR should also include a map of suitable scale that identifies the sampling locations to show distance and direction of monitoring stations, with release points and relevant boundaries (e.g., controlled area boundary, site boundary) also indicated on the map. Additionally, the WCS CISF SAR description of the REMP should include the approach for determining background levels and the contribution of the facility's incremental releases to background levels. The WCS CISF SAR should include the results of the background level determination.

This information is needed to determine compliance with 10 CFR 72.104.

**Response to RAI NP-9-3:**

ISP has revised SAR Section 9.6.2.4 to include 1) number of samples; 2) sample locations; 3) collection frequency; 4) sample analysis to be performed; and 5) sample analysis frequency. References to figures in Chapter 4 and Chapter 6 of the WCS CISF Environmental Report (ER) have also been included for the current monitoring locations and proposed owner controlled area (OCA) dosimeter monitoring locations.

Additionally, the information is included within the WCS CISF ER, Chapter 4 Section 4.12.2.3 Summary of Environmental Monitoring Program. ISP joint venture member Waste Control Specialists conducts a comprehensive environmental sampling and analysis program, commonly referred to as the consolidated REMP. As part of the REMP, samples of media and effluents, including gases and vapor, air particulates, soil, sediment, fauna, vegetation, surface water, waste waters, and groundwater, are collected and analyzed. A monitoring network of optically stimulated luminescence (OSL) is also used to measure ambient gamma radiation. The sampling media and sampling locations included in the REMP provide a measure of the routine operations within and around the facility and monitor the potential impact of the facility operations on the off-site environment, including the general public. ER Figures 4.12-7 through 4.12-12 show the locations of the various types of environmental samples that are collected at Waste Control Specialists. One of the background locations (Station 9) is located in the bottom right corner of ER Figures 4.12-7, 4.12-9, 4.12-10 and 4.12-12.

**References:**

1. WCS CISF Environmental Report, Chapter 4 and Chapter 6.

**Impact:**

SAR Section 9.6.2.4 has been revised as described in the response.

**RAI NP-9-4:**

Ensure the WCS CISF SAR Section 9.6.2.4 includes information clearly stating how neutron doses will be determined at the Owner Controlled Area (OCA) boundary dosimeter locations.

WCS CISF SAR Section 9.6.2.4 states that the Landauer Inlight® Environmental X9 (beta/photon) dosimeter will be used for the perimeter environmental monitoring program. As neutrons will represent some fraction of OCA boundary dose, and the referenced dosimeter does not detect neutrons, it is not clear how the neutron component of the dose will be determined.

This information is needed to determine compliance with 10 CFR 72.104.

**Response to RAI NP-9-4:**

As stated in SAR Table 9-6, based on the amount of material and the storage system(s), the average neutron dose rate inside the protected area will be  $7.174\text{E-}2$  mrem/hr (average of locations DSB-01 through DSB-10 from Table 9-6). Based on this information, the OCA boundary will be monitored using the Landauer Inlight® Environmental X9 (beta/photon) dosimeter. Additionally, as stated in SAR Section 9.6.2.4, the Landauer Luxel+ Ta (beta/photon/neutron) dosimeter will be used for the radiation safety area monitoring program on the inner fence of the protected area at a minimum of eight locations. This data will be used to assess the neutron dose, by extrapolating with the inverse square law and distance from the source term, at the OCA boundary. Direct measurement surveys at the PA and OCA dosimeter locations will be performed on a quarterly basis, during dosimeter change outs, with the Ludlum 12-4 neutron monitoring instrument. This is to ensure that the dose estimates stated in Table 9-6 are monitored at this frequency. More dosimeter locations can be added if routine monitoring with the Ludlum 12-4 neutron monitoring instrument indicates the need for additional locations.

SAR Section 9.6.2.4 has been updated to reflect the foregoing discussion.

**Impact:**

SAR Section 9.6.2.4 has been revised as described in the response.

**RAI NP-9-5:**

Ensure that WCS CISF SAR Section 9.5.2 includes appropriate information on radiation detection equipment and instrumentation to be used at the WCS CISF.

WCS CISF SAR Section 9.5.2 provides information on the radiation protection facilities at WCS, but only limited information on the radiation detection equipment and instrumentation to be used. The SAR should include information regarding the operational sensitivity and range, and frequency and methods of calibration for all of the equipment and instrumentation identified in the SAR.

This information is needed to determine compliance with 10 CFR 20.1501(c).

**Response to RAI NP-9-5:**

ISP has updated Section 9.5.2 of the SAR to include the radiation and detection equipment and instrumentation information requested and added SAR Section 9.8, "Supplemental Data," with the listed instrumentation technical description pages.

**Impact:**

SAR Section 9.5.2 has been revised and Section 9.8 has been added as described in the response.

**RAI NP-9-6:**

Ensure that WCS CISF SAR Section 9 includes appropriate information about the facility health physics program.

Table 10A-2 of Draft NUREG-2215, "Standard Review Plan for Spent Fuel Dry Storage Systems and Facilities," contains a list of program elements expected to be included as part of a facility health physics program. Many of these elements are included in various sections of the SAR. However, several elements are missing, including:

- Requirements for initial and refresher radiation protection training, contents (topics), and health physics-related qualification of workers;
- Provisions to inform female workers of fetal protection requirements, to monitor fetal dose, and to provide alternatives to minimize fetal dose;
- Requirements and procedures for calibration, maintenance, and care of radiation detection, monitoring, and dosimetry instruments and records; and
- Preparing of reports and records for health physics program contents and audits, surveys, calibrations, and personnel monitoring results.

The description of the health physics program in the SAR should be revised to include these elements or justification should be provided for the alternative proposed.

This information is needed to determine compliance with 10 CFR 20.1208, 20.1501(b), 20.1501(c) and (d), 20.2103, and 10 CFR Part 20 Subparts L and M.

**Response to RAI NP-9-6:**

ISP has revised SAR Section 9 to include a new Section 9.5.4, "Radiological Worker Training," which includes the information requested. SAR Section 9.5.1 has also been updated to point to Section 9.5.4 for the details related to these training requirements.

In addition, the current Waste Control Specialists Radiation Safety Program is a 10 CFR 20 compliant program. Although the program is under the agreement state oversight, the regulatory requirements are therefore compliant with 10 CFR 20.1208, 20.1501(b), 20.1501(c) and (d), 20.2103, and 10 CFR Part 20 Subparts L and M.

**Impact:**

SAR Sections 9.1.1 and 9.5.1 have been updated and Section 9.5.4 has been added as described in the response.

**RAI NP-9-7:**

Ensure that WCS CISF SAR Section 9.1.2 clearly provides what is meant by, “remote inspection of storage overpack vents for blockage.”

This statement appears on WCS CISF SAR Page 9-5 as part of a discussion of measures to minimize dose to WCS personnel by avoiding the need to perform daily walkdowns near the storage casks. It is not clear how remote vent inspection would be accomplished, and such inspections are not discussed further in the SAR. The SAR should be revised to clarify remote inspections, this verbiage should be removed from Section 9.1.2, or justification should be provided for the proposed alternative approach.

This information is needed to determine compliance with 10 CFR 20.1101(b).

**Response to RAI NP-9-7:**

One of the methods used to determine whether vents are blocked on vertical concrete casks (VCCs) is to measure the outlet vent temperatures and compare them to the WCS CISF ambient temperature. (See proposed Technical Specifications 3.32 and 3.42). Temperature monitoring systems installed on the outlet vents allow for the remote readout of vent temperatures, which minimizes radiation dose to WCS CISF personnel by eliminating the need to perform daily walkdowns, to take measurements, or to read instrumentation near the VCC. For the NUHOMS<sup>®</sup> overpacks, a physical inspection of the vents is required as the option to use similar temperature measurements was removed as part of ISPs response to RAI TS-4. Visual inspection of the of vents for the line of NUHOMS<sup>®</sup> overpacks can be performed from the front of the array and does not require that the personnel performing the inspection be too near the vents or other storage overpacks.

SAR Section 9.1.2 has been modified to include this clarification.

**Impact:**

SAR Section 9.1.2 has been revised as described in the response.

**RAI NP-9-8:**

Address an apparent typographical error in WCS CISF SAR Section 9.3.2.1, "Controlled Area."

The third paragraph of WCS CISF SAR Section 9.3.2.1 starts with the sentence: "ISP will establish access controls to ensure that unauthorized access inside the OCA and the PA." This sentence is incomplete and should be clarified.

**Response to RAI NP-9-8:**

ISP has revised Section 9.3.2.1 to include the information requested.

"ISP will establish access controls to ensure that unauthorized access inside the OCA and the PA is prevented."

**Impact:**

SAR Section 9.3.2.1 has been revised as described in the response.

**RAI NP-9-9:**

Ensure that all the collective dose estimates from transportation and storage cask operations in the WCS CISF SAR Appendices are provided so that all operating procedure steps that could expose personnel are included.

It is not clear that all operating procedure steps that could expose personnel to radiation are captured in the collective dose estimates in WCS CISF SAR Sections A.9, B.9, C.9, D.9, E.9, F.9, and G.9. For example, inspection of Table B.9-2 indicates that step 11 for installing the cask shear key plug assembly, and steps 13 and 14 for sampling and leak testing the transportation package, are not reflected in the dose estimate. Similarly, Table B.9-3 does not include steps for removing the AHSM door, ensuring vents are clear of debris, and lubrication of support rails. All of these steps involve personnel close to a loaded transportation package or storage overpack, and should be reflected in the collective dose assessment. The applicant should ensure that all of the collective dose assessments from the cited Appendixes accurately reflect the operating procedures for the various cask systems.

This information is needed to determine compliance with 10 CFR 20.1101(b).

**Response to RAI NP-9-9:**

The occupational collective dose estimates in WCS CISF SAR include all transportation and storage cask operations that could cause exposure to personnel. The way the dose estimates are listed in the SAR does not share a one-to-one with the detailed list of operating procedures estimates in WCS CISF SAR Sections A.9, B.9, C.9, D.9, E.9, F.9, and G.9, because the lists serve two different purposes. The list of operating procedure steps provides a detailed list of instructions that need to be followed in precise order to effect a particular operation, while the list of dose estimates are organized to capture the procedural steps that cause the potential exposure to personnel.

The occupational collective dose estimates in WCS CISF SAR are conservative compared with doses that have been measured during actual transportation and storage cask operations.

Specifically, the occupational collective dose estimates in WCS CISF SAR are based on dose rates from existing shielding analysis in storage UFSARs and transportation cask SARs considering design basis sources (no additional cooling time due to pool cooling or storage on ISFSI pads), main cask operations, and personnel and durations based on engineering judgment and experience to provide an overall total bounding estimate. Past experience shows that the total occupational collective dose estimates in Orano TN SAR, using a similar approach, over-estimate actual pool-to-pad occupational collective dose by a factor of about 4 to 10: for example, actual pool-to-pad dose performance ranging from 200 mrem to 606 mrem for 10 BWR canisters loading while estimated at 2370 mrem in CoC 1004 UFSAR Chapter T.10.

Additional occupational collective doses related specific cask or horizontal storage module (HSM) operations may be estimated for dose budgeting using appropriate dose rates from storage FSARs and transportation cask SARs in conjunction with appropriate distance, personnel and duration.

**Impact:**

No change as a result of this RAI.

**RAI NP-9-10:**

Ensure that the collective dose estimates from transportation and storage cask operations in the WCS CISF SAR Appendices are provided so that all the cited distances and dose rates are appropriate for the specific operating step, and that the total dose calculations are correct.

It is not clear that all cited distances and dose rates for each operating step, and total dose calculations, are correct for the collective dose assessments in WCS CISF SAR Sections A.9, B.9, C.9, D.9, E.9, F.9, and G.9 of the WCS CISF SAR. For example, inspection of Table G.9-1 indicates the following inconsistencies:

- For the process step “Perform radiation and contamination survey of MAGNATRAN Cask,” the table indicates a worker distance of greater than two meters. It is not clear how personnel would be able to decontaminate the transportation package from that distance.
- For process steps “Inspect top impact limiter security seal and verify it is intact and correct ID,” and “Remove Personnel Barrier and complete surveys,” it appears that the dose calculations are incorrect. For the first step, one person working for 15 minutes in a dose field of 20 millirem per hour should be five millirem total, instead of the table reading of one. For the second step, two people working for 30 minutes in a 20 millirem per hour dose field should equate to 20 millirem total, instead of the table reading of 32.
- For the process step “[Using VCT, move empty MAGNASTOR VCC to transfer position in CTF and set down adjacent to MAGNATRAN cask. Set up appropriate work platforms/man lifts for access to top of VCC and MAGNATRAN],” the table indicates a distance of greater than two meters, and an associated dose rate of zero millirem per hour. Personnel will need to be closer than two meters to the MAGNATRAN package to set up work platforms around it, and other activities in the table list non-zero values for estimated dose for similar distances.
- The process steps “[Remove vent port cover and connect pressure test system to vent port to check for excessive pressure. If pressure is high, take sample and check. If clean vent to HEPA filter],” and “[Remove 48 MAGNATRAN lid bolts, install alignment pins and lid lifting hoist rings/slides and remove inner lid and store. Remove alignment pins],” both cite worker distances of half a meter. However, the table cites different dose fields for the same distance (50 millirem per hour for the first step, and 30 millirem per hour for the second).

These inconsistencies, and any others in the collective dose estimates of WCS CISF SAR Sections A.9, B.9, C.9, D.9, E.9, F.9, and G.9 of the WCS CISF SAR, should be revised or justified.

This information is needed to determine compliance with 10 CFR 20.1101(b).

**Response to RAI NP-9-10:**

The contamination and radiation surveys take place in two separate steps. The first, is performed with the personnel barrier in place, therefore working at >2m with dose rates of 10mrem/hr. The second set of contamination and radiation surveys take place after the personnel barrier is removed, therefore working at 1m with dose rates of 20 mrem/hr. Decontamination, if required, takes place when the personnel barrier and impact limiters have been removed. A statement will be added to SAR Tables E.9-1, F.9-1, and G.9-1 to clarify that decontamination will be added to the second contamination survey activity. During the review of these items, it was determined that a step to remove the security seal was also needed. SAR Tables E.9-1, F.9-1, and G.9-1 have been revised to add this step to the dose tables.

For process steps "Inspect top impact limiter security seal and verify it is intact and correct ID," and "Remove Personnel Barrier and complete surveys," the entries in the table noted in the RAI are not correct and should be 5 person-mrem and 20 person-mrem respectively. SAR Tables E.9-1, F.9-1, and G.9-1 have been revised accordingly. SAR Sections E.9, F.9.1.3, and G.9 have been updated to be consistent with the changes in the Tables.

With respect to set up of appropriate work platforms/man lifts for access to top of vertical concrete cask (VCC) and MAGNATRAN, the zero dose rates are correct. There will be semi-permanent scaffolding that is able to be moved into place once the transport cask is set into the unloading area.

The estimated dose rates for removing the vent port cover and connecting the pressure test system to the vent port to check for excessive pressure are different from those for removing lid bolts, installing alignment pins, and they originate on the inner lid due to the location of the port covers being inside of the lid bolt circle. The radial position dose rates increase moving toward the center of the cask. While the workers would be at the same area of the cask to perform each of these two activities, the removal of the port covers and connecting of the pressure test system would require the worker to reach slightly farther across the top of the cask. No changes to the table entries are required for these steps.

**Impact:**

SAR Sections E.9, F.9.1.3, and G.9; and Tables E.9-1, F.9-1, and G.9-1 have been revised as described in the response.

**SAR Chapter 11 “Confinement Evaluation”****RAI NP-11-1:**

Provide information on corrective actions that would be taken if leak testing does not meet acceptance criteria for the post transportation leakage testing performed at the WCS CISF.

In response to RSI P-9-1, “Description of actions that will be taken if a leakage rate test does not meet the acceptance criterion in a post transport package evaluation,” the applicant stated: “Although the procedure does not specify what actions will be taken should testing fail to satisfy an acceptance criterion, the Quality Assurance program implementing procedure on Test Control dictates that test failure will be managed through the corrective program. This will be defined within operational test procedures prior to implementation.”

To enable the NRC staff to assess the corrective actions taken at the WCS CISF, the applicant should describe in detail the corrective actions taken for each type of cask system to ensure that the confinement safety is maintained.

This information is needed to determine compliance with 10 CFR 72.24(e) and (l).

**Response to RAI NP-11-1:**

RAI NP-11-4 provides information about the corrective actions that would be taken if leak testing does not meet the acceptance criteria for the post transportation leakage testing to be performed at the WCS CSIF. As discussed in the response to RAI NP-11-4, non-conforming canisters will need to be evaluated on a case-by-case basis and the specific conditions of the canister.

**Impact:**

No change as a result of this RAI.

**RAI NP-11-2:**

Provide (a) a limit for the release of radioactive gas (volume) for the gas sampling performed for each of the canister types to be received at the WCS CISF and (b) guidance to prevent/minimize risks caused by the release of radioactive gas during gas sampling, taking into account ALARA concerns.

In its response to RSI 9.4, the applicant stated that the likelihood of releasing radioactive gases during post-transport sampling is small because canisters are seal welded and tested to assure compliance with the leaktight standard of ANSI N14.5 or equivalent. The exceptions to this are FO-, FC- and FF-DSCs that were leak-tested to a leakage rate of  $10^{-5}$  ref-cm<sup>3</sup>/sec.

Even though the likelihood of the release of radioactive gases is small, the applicant should provide the limit on the volume of radioactive gas to be released for each of the canister types received at the WCS CISF and guidance to prevent/minimize risk caused by the releasing radioactive gases during gas sampling, taking into account ALARA concerns.

This information is needed to determine compliance with 10 CFR 72.24(e).

**Response to RAI NP-11-2:**

The release of radioactive material into the space between the canister and cavity inside the sealed transportation cask is a beyond design basis event. As discussed in the response to RAI NP-11-4, the canister has been shown to maintain confinement under all normal, off-normal, and accident conditions for storage and the WCS CISF SAR includes evaluations that demonstrate that the canisters maintain confinement under all normal conditions of transport (NCT). Therefore, release of radioactive material is not a credible event and does not require further evaluation.

**Impact:**

No change as a result of this RAI.

**RAI NP-11-3:**

Explain the gas sampling process in sufficient detail to demonstrate that gas sampling would be appropriately performed during post-transportation verification of canisters received at the WCS CISF.

The applicant proposed License Condition No. 22, which would provide that "Prior to removing the shipping cask closure lid, the gas inside the shipping cask shall be sampled to verify that the canister confinement boundary is intact to the extent reasonably practicable by this test."

However, a description of the gas sampling process is not provided in the application (e.g., QP-10.02) and the applicant did not describe:

- (a) Whether gas sampling would be performed for each canister or just a certain number of the "bounding" canisters from each site of origin. The applicant should clarify whether the canister selection basis for post-transportation verification described in Section 5.2 of QP-10.02 is applicable to gas sampling;
- (b) What rationale is used for not performing sampling for all canisters received at the WCS CISF;
- (c) The acceptance criteria (e.g., gas volume/concentration) for gas sampling performed on the canisters received at the WCS CISF.

This information is needed to determine compliance with 10 CFR 72.24(e) and 72.44(c)(1)(i).

**Response to RAI NP-11-3:**Response to Item a:

In response to RAI PLC-2, Condition 22 has been updated to clarify that Post-Transportation Verification shall include an evacuated volume helium leak test on 100% of the canisters that are received at the WCS CISF. The gas inside a shipping cask will only be sampled for radioactive gas if required by its 10 CFR Part 71 Certificate of Compliance.

ISP Procedure, QP-10.02, "Post Transport Package Evaluation," Section 5.1.3 states: "The visual inspection of the two canisters that are identified using Electric Power Research Institute (EPRI) report, Susceptibility Assessment Criteria for Chloride-Induced Stress Corrosion Cracking (CISCC) of Welded Stainless Steel Canisters for Dry Cask Storage Systems (Report No. 3002005371, September 2015) as likely needing inspections and enhanced monitoring from each reactor and/or ISFSI site combined with the helium leak check of 100% of the canisters that are received at the WCS CISF form a robust Post-Transportation Package Evaluation program that provides reasonable assurance that the canister confinement barrier remains intact and that the canister remains able to perform its safety function and is therefore acceptable to place back into storage at the WCS CISF."

Response to Item b:

Electric Power Research Institute (EPRI) report, Susceptibility Assessment Criteria for Chloride-Induced Stress Corrosion Cracking (CISCC) of Welded Stainless Steel Canisters for Dry Cask Storage Systems (Report No. 3002005371, September 2015), states that: "Only a subset of [Dry Cask Storage Systems] (DCSSs) using welded stainless steel (SS) canisters is likely to need inspections and enhanced monitoring programs in order to detect potential CISCC initiation and propagation prior to through wall growth."

The EPRI Susceptibility Assessment Criteria for CISCC of Welded Stainless Steel Canisters for DCSSs report identifies a set of criteria that may be used to rank welded SS canisters at ISFSIs with regard to the relative priority for inspections. The report summarizes the major factors that affect the susceptibility of stainless steel dry storage canisters to atmospheric CISCC. It then develops assessment criteria based on these factors. Criteria and associated numerical ranking values are developed for both the relative CISCC susceptibility of ISFSIs and of different canisters at a given ISFSI.

Through the evaluation and grading of each canister's susceptibility to CISCC, ISP will have the ability to assess all canister from each generating facility. Using these assessments, ISP will perform visual examination of the two canister most likely to present CISCC. Additionally, all canisters will have helium leak testing performed in accordance with ISP Procedure QP-10.02. Post Transport Package Evaluation.

This inspection program is informed by the design basis for the canisters and consideration of radiological dose expenditures to site personnel.

Response to Item c:

Helium is present in the atmosphere at very small amounts (about 5 parts per million in normal air). The final two steps are to purge and evacuate the interstitial space and while monitoring the evacuated space with the helium mass spectrometer leak detection unit for the required period of time necessary to confirm that the canister is meeting performance specifications ( $10^{-9}$  atm·cm<sup>3</sup>/s).

**References:**

1. Susceptibility Assessment Criteria for Chloride-Induced Stress Corrosion Cracking (CISCC) of Welded Stainless Steel Canisters for Dry Cask Storage Systems (Report No. 3002005371, September 2015).
2. ISP Procedure, QP-10.02, "Post Transport Package Evaluation," Revision 2.
3. EOS01-0105, Procurement Specification for the NUHOMS EOS-37PTH Dry Shielded Canisters.
4. ANSI N14.5-1997, "Leakage Test on Packages for Shipment for Radioactive Materials."
5. ASNT SNT-TC-1A, "Personnel Qualification and Certification in Nondestructive Testing," 2006 Edition.

**Impact:**

No change as a result of this RAI.

**RAI NP-11-4:**

Provide a deadline by which to return a canister to the place of origin, or other facility licensed to perform fuel loading procedures, in License Application, Appendix A, "Proposed Technical Specifications.", if the canister does not pass the gas sampling testing and the post-transportation leakage testing acceptance criterion and therefore cannot be stored at the WCS CISF. If a deadline is not specified, the application should discuss how storage of such canisters is considered and accounted for in the site's safety analyses (e.g. normal and accident doses due to confinement and shielding, thermal time limits) and operating procedures.

The applicant needs to provide the information for each type of canister or each type of cask system used at the WCS CISF.

This information is needed to determine compliance with 10 CFR 72.24(g) and 72.44(c)(1).

**Response to RAI NP-11-4:**

A discussion of the timeline to return a canister to the place of origin, or other facility licensed to perform fuel loading procedures, in the highly unlikely event that corrective actions necessitate such response to the identification of a non-conforming canister during receipt inspection, is provided in revised WCS CSIF SAR Section 11.5. This information is applicable to all types of canisters and cask systems to be used at the proposed WCS CISF.

**Impact:**

SAR Section 11.5 has been revised as described in the response.

**SAR Chapter 12, “Accident Analysis”****RAI NP-12-1:**

Provide a conclusion for the fire and explosion analysis in WCS CISF SAR Appendix A.12.2.5.

State whether the analysis in the Rancho Seco SAR Section 8.2.5, “Fire” is the same or bounding for the WCS site.

This information is needed to determine compliance with 10 CFR 72.122 (c).

**Response to RAI NP-12-1:**

Section A.12.2.5 has been modified in order to provide a conclusion for the fire and explosion analysis.

The maximum amount of fuel allowed in the Cask Handling Building (CHB) or on the storage pad(s) in the vicinity of the NUHOMS® storage overpacks is limited by administrative procedure in accordance with the Technical Specifications (TS), which provides a limit of 300 gallons of diesel fuel for transfer and storage operations involving the NUHOMS® Systems. Therefore, the fire evaluated in Section 8.2.5 of Volume I of the “Rancho Seco Independent Spent Fuel Storage Installation Safety Analysis Report,” NRC Docket No. 72-11, Revision 4. (Reference [A.12-1] of the SAR) is the same as the worst-case fire at the WCS CISF.

**Impact:**

SAR Section A.12.2.5 has been revised as described in the response.

**RAI NP-12-2:**

Provide accident analysis for the GTCC systems that address drop accidents, floods, lightning, tornado and wind missiles, and tip over for the NAC GTCC systems.

WCS CISF SAR Appendix H.8 addresses earthquakes and fire/explosion, but none of the other accidents listed are analyzed for the GTCC systems.

This information is needed to determine compliance with 10 CFR 72.122(b).

**Response to RAI NP-12-2:**

Accident analyses for the greater than Class C (GTCC) systems that address drop accidents, floods, lightning, tornado and wind missiles, and tip over have been incorporated into Appendix H by reference.

Specifically, Section H.8.2 has been revised to add a paragraph to state that since the structural design criteria for the GTCC storage systems used at WCS CISF are the same as the structural design criteria used for the storage systems listed in Table 1-1, the results of the accident analyses for the storage systems (which include drop accidents, floods, lightning, tornados and wind missiles, and tip-over) bound the results for the same accidents involving the GTCC storage systems. The statement will further clarify that these accident analyses are presented in Appendix A.12 (NUHOMS®-MP187 Cask System), Appendix E.12 (NAC-MPC), Appendix F.12 (NAC-UMS) and Appendix G.12 (NAC-MAGNASTOR).

**Impact:**

SAR Section H.8.2 has been revised as described in the response.

**RAI NP-12-3:**

Provide a technical basis for the offsite explosion analysis and explain why the 1,660 feet criteria is applicable for the operations at the quarry.

The analysis in WCS CISF SAR Section 12.2.2, "Offsite Accident Analysis," appears to utilize the analysis for a truck transport on a highway using the guidance from Regulatory Guide 1.91. Provide additional information to support that the material limit of 50,000 lbs used in the accident analysis is applicable to the quarry operation located northwest of the facility. In addition, provide information to support the assessment for potential future quarry operations in the area.

This information is needed to determine compliance with 10 CFR 72.122(b), (c) and (e).

**Response to RAI NP-12-3:**

Permian Basin Materials, LLC (PBM) operates an aggregates quarry and concrete ready-mix facility near the CISF in New Mexico. PBM shares a property boundary with Waste Control Specialists and this boundary is approximately 4,000 feet from the CISF Protected Area. Actual blasting activities are further away, but distances vary depending on exact locations.

PBM does not have any permits or licenses with the U.S. Bureau of Alcohol Tobacco and Firearms (BATF) or any other state or federal agency to store explosives on their property. Blasting activities are handled by a blasting contractor that delivers the blasting agents by truck to the quarry. The blasting agents are delivered, placed, and detonated all in the same day so that no explosives are stored at the quarry. The fact that delivery, placement, and blasting have to occur on the same day limits the amount of explosives that can be delivered in one day. The blasting contractor, ORICA USA, has indicated that blasting at the quarry occurs approximately once a month and up to 11,000 lb of explosives are used in a blasting event (Reference [4]).

There are several types of explosives used in the mining and quarry industry and the type of explosive used is generally determined by the regional geology. PBM has been using ammonium nitrate/ fuel oil (ANFO) as their blasting agent. ANFO has the added safety benefit of being shipped on the same truck as a binary explosive with the ammonium nitrate in a separate compartment from the fuel oil. The truck drives to each individual pre-drilled hole, where the specific weight of explosive is mixed and poured into the hole.

Trucks that deliver explosives to PBM are regulated by Department of Transportation regulations (23 CFR 658.17) that establish maximum gross vehicle weights at 80,000 lb resulting in a maximum cargo weight of under 50,000 lb. This is consistent with guidance from Regulatory Guide 1.91, "Evaluation of Explosions Postulated to Occur at Nearby Facilities and Transportation Routes Near Nuclear Power Plants," Revision 2, which recommends using 50,000 lb of equivalent weight TNT for a postulated accident involving a truck on a highway.

Based on the typical blasting activities and regulations precluding storage of explosives, the guidance in Regulatory Guide 1.91 provides a reasonable evaluation of the hazard associated with the PBM quarry to the CISF. This evaluation establishes that an acceptable safe distance for an explosion involving 50,000 lb of equivalent weight TNT is approximately 1,660 ft from the point of detonation, which is well short of the CISF.

Evaluating potential future quarry operations is problematic due to the unknown nature of future activities, potential new owners, or quarry expansion. Potential future activities will be limited by BATF regulation 27 CFR 555.218, "Table of Distances for Storage of Explosive Materials (High)." This table establishes that the minimum safe distance from an unbarricaded stockpile of 300,000 lbs of high explosives to inhabited buildings shall be 2,275 feet. This safe distance is well below the 4,000 feet between the CISF PA and the PBM property line providing assurance that future operations at the quarry will not impact the CISF.

**References:**

1. Regulatory Guide 1.91, "Evaluation of Explosions Postulated to Occur at Nearby Facilities and Transportation Routes Near Nuclear Power Plants," Revision 2.
2. 27 CFR Part 555, Commerce in Explosives, U.S. Bureau of Alcohol Tobacco and Firearms (BATF), U.S. Department of Justice.
3. 23 CFR Part 655, Traffic Operations, Federal Highway Administration, U.S. Department of Transportation.
4. Permian Basin Materials, Personal communications between M. Ulibari, Permian Basin Materials, D. Maggard, ORICA USA, C. Patterson, ORICA USA, A. Melton, ORICA USA, and B. Mason, Waste Control Specialists LLC, April 2019.

**Impact:**

SAR Sections 2.2, 12.2.2, and 12.3 have been revised as described in the response.

**RAI NP-12-4:**

Provide the following information for the gasoline, diesel, and propane tanks located on the Waste Control Specialists commercial waste disposal facility identified in WCS CISF SAR Section 12.2.2:

1. The distance between the proposed WCS CISF and the propane tanks and provide an analysis to support the conclusion that an accident involving these storage tanks would not impact the proposed WCS CISF. WCS CISF SAR Section 12.2.2 states that there are a number of gasoline, diesel and propane tanks located on the Waste Control Specialists commercial waste disposal facility. The location of each gasoline and diesel tank is provided and all gasoline and diesel tanks are greater than 1,660 feet from the proposed ISFSI and none of the locations have quantities that would create overpressures in excess of 1 psi at the CISF. The location of the propane storage tanks with respect to the CISF are not provided.
2. Indicate whether the analysis of the offsite accidents of the propane, gasoline and diesel storage tanks includes an assessment of the combined explosion overpressures of multiple storage tanks that are collocated at the Waste Control Specialists commercial waste disposal facility. WCS CISF SAR Section 12.2.2 states that there are a number of gasoline, diesel and propane tanks located on the Waste Control Specialists commercial waste disposal facility. The location of each gasoline and diesel tank is provided and all gasoline and diesel tanks are greater than 1660 feet from the proposed ISFSI and none of the locations have quantities that would create overpressures in excess of 1 psi at the CISF. However, it is not clear from the SAR whether the analysis considers the overpressure from a single tank explosion or the possible combined explosions of collocated tanks such as the 5,000 gallon gasoline tank and the 8,000 gallon diesel tank located 4,732 feet from the proposed CISF.

This information is needed to determine compliance with 10 CFR 72.122(b), (c) and (e).

**Response to RAI NP-12-4:**

Gasoline, diesel, and propane tanks located on the Waste Control Specialists commercial waste disposal facility and separation distances with the CISF consistent with the CISF Protected Area (PA) boundary are listed in Table NP-12-4-1.

In addition to the tanks listed in Table NP-12-4-1, there are three 475-gallon mobile diesel tanks. These tanks are mounted on truck trailers and are used to fill heavy equipment around the Waste Control Specialists facility.

The twelve tanks in Table NP-12-4-1 are shown on Figure NP-12-4-1 to this response to provide an overview of where tanks are in relation to each other and in relation to the CISF. Tanks identified as 3, 4, and 5, which consist of a combined total of 8,500 gallons of diesel fuel and 5,000 gallons of gasoline, are directly adjacent to each other, resulting in a total of 13,500 gallons of fuel in one location.

Regulatory Guide 1.91(Reference [1]) sets forth acceptable distances from explosions at which no significant damage would be expected. The guidance establishes the safe distance where the overpressure from the explosion is less than 1.0 psi.

The three collocated tanks were modeled as a vapor cloud using guidance from Regulatory Guide 1.91. The following assumptions were made in the model:

1. All three tanks consisting of 8,500 gallons of diesel fuel and 5,000 gallons of gasoline have a catastrophic failure (leak) resulting in immediate release of 100% of the fuel.
2. Waste Control Specialists is experiencing a maximum temperature of 115 °F (A conservative value that is higher than the maximum temperature recorded in the region).
3. Vaporization of diesel fuel is determined by the vapor pressure in equilibrium with liquid diesel fuel since the diesel fuel is still well below its boiling point. The amount of gasoline vapor produced is based on a distillation curve for standard gasoline since the maximum temperature (115 °F) is within the lower end of the boiling range for some gasoline components.
4. Vapor concentrations are assumed to be with the lower explosive limits and upper Explosive limit.
5. The diesel and gasoline vapors remain confined in a single cloud and do not disperse.
6. The vapor detonates soon after release.
7. The TNT equivalent mass for the three collocated tanks is the sum of the TNT equivalent masses for diesel and gasoline vapors.

Applying these assumptions and utilizing the guidance of Regulatory Guide 1.91 for vapor cloud explosions shows that the safe distance from this cluster of fuel tanks is 454 ft (Reference [2]). This distance is significantly less than the 4,400 ft that exists between the cluster of tanks and the CISF PA boundary.

The calculation (Reference [2]) models the potential vapor cloud explosion that could result from failure of the 5,000-gallon propane tank. Propane has a boiling point well below ambient temperatures and will completely vaporize as soon as it is no longer under pressure. The model shows that the safe distance from the propane tank is 1,010 ft. This distance is significantly less than the 4,340 ft that exists between the propane tank and the CISF PA boundary.

As indicated in Table NP-12-4-1, these evaluated cases bound all of the fixed diesel/gasoline tanks and the propane tanks at the existing Waste Control Specialists facility. As noted previously, there are three 475-gallon mobile diesel tanks. Applying the results from the evaluation of the three much larger collocated tanks, the Owner-Controlled Area boundary provides 660 feet of standoff distance from the Protected Area of the CISF. This is more than adequate to provide safe distance from an accident involving the mobile diesel tanks.

SAR Section 2.2 has been updated to indicate that the existing Waste Control Specialists facility has several fuel tanks used for facility operation. It has also been updated to point to new Table 2-20, "Waste Control Specialists Facility Fuel Tank Capacity and Proximity." SAR Section 12.2.2 has been updated to provide consistent distances from the Waste Control Specialists facility fuel tanks to the CISF Protective Area boundary. New safe distances based on the new calculation (Reference [2]) provided for the fuel tanks at Waste Control Specialists. Finally, Reference [2] has also been included as part of this submittal for information and is included in Enclosure 9.

**References:**

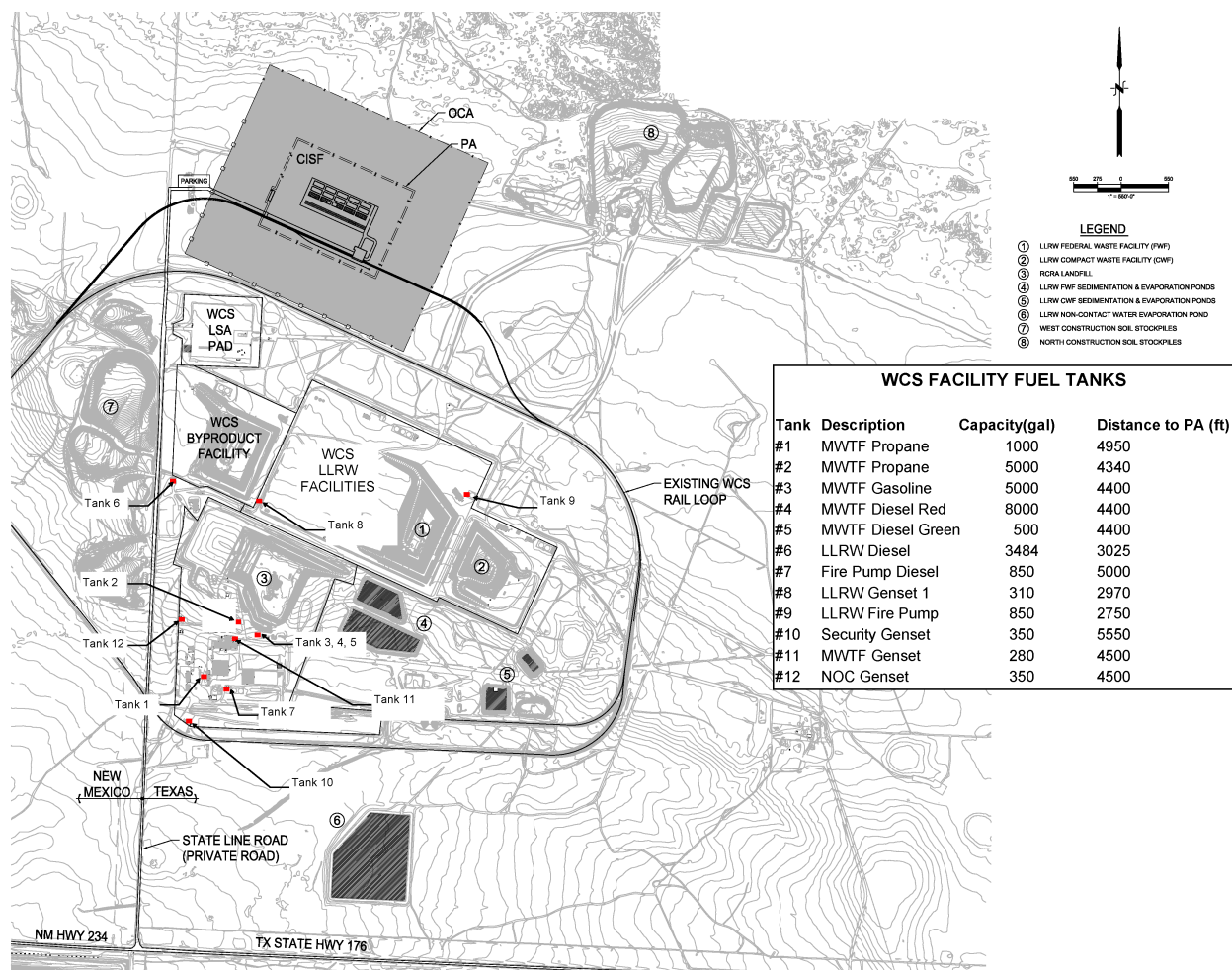
1. Regulatory Guide 1.91, "Evaluation of Explosions Postulated to Occur at Nearby Facilities and Transportation Routes Near Nuclear Power Plants," Revision 2.
2. Calculation WCS01-0212, "Fuel Tank Evaluation," Revision 0.

**Impact:**

SAR Sections 2.2, 12.2.2, and 12.3 have been revised and SAR Table 2-20 has been added as described in the response.

**Table NP-12-4-1 Gasoline, Diesel and Propane Tank Inventory**

ID	Description	Capacity (gal)	Distance to CISF PA (ft)
1	TSDf Propane Tank	1,000	4,950
2	MWTF Propane Tank	5,000	4,340
3	MWTF Gasoline Tank	5,000	4,400
4	MWTF Diesel Tank (Red)	8,000	4,400
5	MWTF Diesel Tank (Green)	500	4,400
6	LLRW Diesel Tank	3,484	3,025
7	TSDf Fire Pump (Diesel)	850	5,000
8	LLRW Generator (Diesel)	310	2,970
9	LLRW Fire Pump (Diesel)	850	2,750
10	Security Generator (Diesel)	350	5,550
11	MWTF Generator (Diesel)	280	4,500
12	NOC Generator (Diesel)	350	4,500

**Figure NP-12-4-1 Gasoline, Diesel and Propane Tank Locations**

**SAR Chapter 13, “Conduct of Operations”****RAI NP-13-2:**

Provide an operating startup plan that identifies those specific operations involving the initial handling of radioactive material to be placed into storage.

WCS CISF SAR does not appear to include an operating startup plan. NUREG- 1567 provides guidance on the elements that should be included in an operating startup plan. The operating startup plan should identify those specific operations involving the initial handling of radioactive material to be placed into storage. Although procedures to be used for normal operations or during steady-state conditions would not necessarily be included in the operating startup plan, the evaluation of the effectiveness of those procedures should be elements of the operating startup plan. For As Low As Reasonably Achievable (ALARA) considerations, as many of the operating startup actions as feasible should be performed during preoperational testing (i.e., before sources of exposure are present).

The operating startup plan should include the following elements:

- tests and confirmation of procedures and exposure times involving actual radioactive sources (e.g., radiation monitoring, in-pool operations);
- direct radiation monitoring of casks and shielding for radiation dose rates, streaming, and surface hot-spots;
- verification of effectiveness of heat removal features; and
- Documentation of results of tests and evaluations.

This information is needed to determine compliance with 10 CFR 72.24(p).

**Response to RAI NP-13-2:**

ISP has incorporated a new SAR Section 13.2.4, Operating Startup Plan, describing ISP’s commitment to implement an operating startup plan at least 90 days prior to receipt and storage of canisterized spent nuclear fuel and greater than class C (GTCC) waste at the WCS CISF.

In addition, ISP has added the following new license condition (Condition 25) to the proposed Materials License:

The licensee shall submit a Startup Plan to the NRC no later than 90 days prior to receipt and storage of canisterized spent nuclear fuel and GTCC waste at the WCS CISF.

**Impact:**

SAR Section 13.2.4 has been added as described in the response.

Material License Condition 25 has been added as described in the response.

**SAR Appendix A, “NUHOMS-MP187 Cask System,”****RAI NP-A-1:**

Provide the confinement calculations (e.g., Excel Spreadsheet), documented in WCS CISF SAR Section A.11, in order for the NRC staff to verify that the radionuclide inventory in WCS CISF SAR Table A.11.1, “SNF Assembly Activities,” an analysis with 24 spent nuclear fuel assemblies per canister, and an analysis with 21 canisters, is bounding for all fuel and GTCC waste in FO-, FC-, and FF- DSCs.

The applicant provided a new confinement evaluation documented in Section A.11 of the WCS CISF SAR to include all of the isotopes required to meet current standards. The radioactive inventory was determined using the same design basis fuel assemblies that were demonstrated to be bounding in the Rancho Seco ISFSI FSAR, except that updated methods were used to calculate the radionuclide inventories.

The bounding assembly burnup and initial enrichment combinations used for the original analysis remain bounding for the radionuclide inventories regardless of the updated methods used to generate the source term. Therefore, assuming that all 21 canisters containing fuel under the SNM-2510 license are loaded with 24 fuel assemblies, each with the maximum radionuclide inventory for each assembly, the results bound the 21 canisters that are actually loaded.

The applicant should provide the confinement calculations (e.g., Excel Spreadsheet) for purposes of the staff’s verification on the applicant’s confinement evaluation.

This information is needed to determine compliance with 10 CFR 72.104(a) and 72.106(b).

**Response to RAI NP-A-1:**

Spreadsheet “WCS01-0502R0 - 0B PROPRIETARY.xls” from the confinement evaluation has been provided as requested (Enclosure 10).

**Impact:**

No change as a result of this RAI.

**RAI NP-A-2:**

Clarify whether the computed air leakage rates shown in WCS CISF SAR Section A.11.3.3, Appendix A, represent the allowable air leakage rate ( $\text{cm}^3/\text{sec}$ ) or the reference leakage rate ( $\text{ref-cm}^3/\text{sec}$ )?

The applicant used the method described in ANSI N14.5 and assumed a leakage hole length to be the size of the weld length (3/16 inches) to compute a hole diameter of  $4.7611 \times 10^{-4}$  cm for a leakage rate of  $1.0 \times 10^{-5}$  std- $\text{cm}^3/\text{sec}$ , as shown in SAR Section A.11.3.3. The computed air leakage rates, based on ANSI N14.5, are  $4.4914 \times 10^{-6}$ ,  $7.5892 \times 10^{-6}$ , and  $2.5413 \times 10^{-5}$   $\text{cm}^3/\text{sec}$ , respectively, under normal, off-normal, and accident conditions.

The applicant should either revise the unit of the leakage rate from " $\text{cm}^3/\text{sec}$ " to " $\text{ref-cm}^3/\text{sec}$ " or convert the allowable leakage rate to the reference leakage rate for clarification. The applicant should use the reference air leakage rate (medium: air; cavity pressure: 1 atm abs; ambient pressure: 0.01 atm abs; temperature  $25^\circ\text{C}$ ) as the acceptance criterion for testing as recommended by ANSI N14.5.

This information is needed to determine compliance with 72.24(e).

**Response to RAI NP-A-2:**

The unit of the leakage rate is  $\text{ref-cm}^3/\text{sec}$ . SAR Sections A.11.1, A.11.2, A.11.3, and A.11.3.3 have been updated to clarify that specify the correct units ( $\text{ref-cm}^3/\text{sec}$ ).

**Impact:**

SAR Sections A.11.1, A.11.2, A.11.3, and A.11.3.3 have been revised as described in the response.

**RAI NP-A-3:**

Provide a rationale for the statement in WCS CISF SAR Appendix A.7, "Structural Evaluation," p. A.7-1, that the canister confinement boundaries are evaluated for Normal Conditions of Transport (NCT) for the WCS CISF. On the basis of the rationale, also revise, as appropriate, the last paragraph of page A.7- 3 on the need for performing a bounding evaluation in WCS CISF SAR Section A.7.7, "Structural Evaluation of Canister Confinement Boundary under Normal conditions of Transport," to demonstrate that the canister confinement boundaries are not adversely impacted by transport to the WCS CISF.

The FO-, FC-, FF- Dry Shielded Canisters (DSCs) should all have been certified for transport as part of the Model NUHOMS MP-187 transportation package (Docket 71-9255) by meeting the 10 CFR Part 71.71 requirements for Normal Conditions of Transport. It is unclear why the canister confinement boundaries need to be re-evaluated for the so-called "Normal Conditions of Transport" for transport of spent nuclear fuel to the WCS CISF site. However, If the Normal Conditions of Transport are considered to address certain handling and transfer operations upon canister receipt at the site, specifics to these operations must be provided and justified in the SAR for their applicability.

(Note: This request applies similarly to the evaluations proposed in Appendix B, Section B.7.9, "Structural Evaluation of 24PT1-DSC Confinement boundary under Normal Conditions of Transport," Section C.7.8, "Structural Evaluation of 61BT DSC Confinement Boundary under Normal Conditions of Transport, and Section D.7.8, "Structural Evaluation of 61BTH Type 1 DSC Confinement Boundary under Normal Conditions of Transport)

This information is needed to determine compliance with 10 CFR 72.24(c)(3), 72.24(d)(1) and (2) and 72.122(b)(1).

**Response to RAI NP-A-3:**

The rationale for evaluating the canister confinement boundaries for the FO-, FC-, FF- dry shielded canisters (DSCs) for normal conditions of transport (NCT) is to provide a method to ensure that canisters arriving at the WCS CISF are not adversely affected during normal transport. The evaluations are needed because the canister boundaries were not relied upon to verify containment for NCT in the Part 71 certification of the NUHOMS<sup>®</sup> MP-187 transportation package (Docket 71-9255), but rather the boundaries of the transportation cask were credited fully for containment. The evaluations are intended to show that the canisters themselves can maintain the boundary required for storage when exposed to the loads generated during normal transport to provide reasonable assurance that the confinement boundary is not adversely impacted by transport to the WCS CISF. While these evaluations are the primary method that ISP proposes to verify that canisters arriving at the WCS CISF are not adversely affected during normal transport, ISP is also proposing that an additional leak test be performed on every incoming canister to ensure that confinement has not been compromised. The discussed evaluations and leak test are not necessary to justify the continued efficacy of the confinement boundary during transfer and storage.

Based on this rationale, ISP believes that the need to evaluate canister confinement boundaries for NCT is appropriately referenced in WCS CISF SAR Section A.7.7, "Structural Evaluation of Canister Confinement Boundary under Normal Conditions of Transport," and this represents a valid method to demonstrate that the canister confinement boundaries are not adversely impacted by transport to the WCS CISF.

A similar rationale applies to the 24PT1, 61BT, and 61BTH Type 1 DSCs.

The normal handling and transfer operations upon canister receipt at the site are described in Section 5.1.3 of the WCS CISF SAR.

SAR Sections A.7, B.7, C.7, and D.7 have been revised to clarify that the evaluation of canister boundaries for NCT is only to provide reasonable assurance that the confinement boundary is not adversely impacted by transport to the WCS CISF.

**Impact:**

SAR Sections A.7, B.7, C.7, and D.7 have been revised as described in the response.

**RAI NP-A-4:**

Provide evaluations, as appropriate, to substantiate statements in SAR Section A.7.1, "Discussion". At the bottom of page A.7-2, the SAR states:

"The evaluation of the MP187 cask as a transfer cask is based on Revision 13 of Drawing NUH-05-4001 (Cask Main Assembly) and Revision 8 of NUH- 05-4003 (Cask On-Site Transfer Arrangement), as shown in Volume IV of [A.7-4]. The current revision of NUH-05-4001 is Revision 15 as shown in Section 1.3.2 of [A.7-7]. There are no significant design differences in the cask main assembly configuration between these two revisions."

The broadbase statement of the above, "[T]here are no significant differences in the cask main assembly configuration between these two revisions," lacks clarity for the details through the process of incorporation by reference (IBR). The details addressed in individual revisions, including the design criteria on loads and load combinations and resulting changes in structural performance margins, should be properly summarized in the SAR for the NRC staff to evaluate the design differences as a basis for making a safety finding.

This information is needed to determine compliance with 10 CFR 72.24(c)(3), 72.24(d)(1) and (2) and 72.122(b)(1).

**Response to RAI NP-A-4:**

The table below lists the changes between Revision 13 and Revision 14 and Revision 14 and 15 of Drawing NUH-05-4001. A review of the changes shows that the changes do not affect design criteria on loads and load combinations and resulting changes in structural performance margins.

Changes between Revision 13 and 14	Changes between Revision 14 and 15
<p>Revised –Amendment Application No. 7</p> <p>Changes from Revision 13:</p> <p>Sheet 1 of 6</p> <ul style="list-style-type: none"> <li>• Sheet 1- in Bill of Material (BOM) Item # 33 (hardened washer) revised – Item Quantity updated to "20" from "12" (revision 13)</li> <li>• Sheet 1-Note # 8 added to item # 32, 33, 34 and 44 in BOM. Note # 8 added "electroless nickle plated "</li> </ul> <p>Sheet 3 of 6</p> <p>Section V and view J</p> <ul style="list-style-type: none"> <li>• Revised to chamfer and provide radius details at the bottom end closure</li> </ul>	<p>Changes from Revision 14</p> <p>Title Block:</p> <ul style="list-style-type: none"> <li>• Changed company name to A TRANSNUCLEAR-(No other changes)</li> </ul>

SAR Section A.7.1 has been updated to clearly state that that the changes between revisions do not affect design criteria related to loads and load combinations and do not impact structural performance margins.

**Impact:**

SAR Section A.7.1 has been revised as described in the response.

**SAR Appendix B, “Standardized Advanced NUHOMS® System”****RAI NP-B-1:**

Revise the following statement in WCS CISF SAR Section B.3.3.3, “Seismic Design”:

“This system was designed for very high seismic regions, such as the west coast, and as such the design basis earthquake shown in Figures 2.2-1 and 2.2-2 of reference [B.3-1] for the AHSM easily envelops the enveloping acceleration response spectra at the concrete pad base and HSM center of gravity obtained by the WCS CISF soil-structure interaction (SSI) analysis at all frequencies as demonstrated in Sections B.7.5 and B.7.8. Due to the very low accelerations, the ties between the individual modules and the shear keys used to transfer vertical motions are not required at the WCS CISF.”

The NRC staff notes that the AHSM arrays evaluated in WCS CISF SAR Section 7.6.4 are markedly different from those evaluated in the AHSM FSAR. For the previously approved AHSM, the analysis is performed for an assembly of three AHSM modules. For the analyzed assembly, the adjacent modules are tied to each other with module-to-module ties to prevent out-of-phase tipping and module-to-module separation. The analysis indicates that, for the high seismic region, the AHSM row assembly will need 10 feet of space around all sides to accommodate sliding and to facilitate retrievability of the 24PT1-DSC. For the AHSMs at the WCS CISF, where ties between the individual modules and shear keys are removed, the FSAR approved AHSMs (Docket No. 72-1029) are reconfigured. As such, the seismic stability description for the AHSM must be revised considering the site-specific analysis results presented in SAR Section 7.6.4, “Soil Structural Interaction of the NUHOMS NIT Storage Pad.”

This information is needed to determine compliance with 10 CFR 72.24(c)(3), 72.24(d)(1) and (2) and 72.122(b)(1)(i).

**Response to RAI NP-B-1:**

The statement in WCS CISF SAR Section B.3.3.3 has been revised to clarify that advanced horizontal storage module (AHSM) row assemblies of greater than three modules side-by-side, and including configurations with modules back-to-back with this row, are bounded by the configuration in the evaluation in the AHSM FSAR. Section B.3.3.3 is also revised to remove the sentence stating: “Due to the very low accelerations, the ties between the individual modules and the shear keys used to transfer vertical motions are not required at the WCS CISF.” Removal of this statement reflects that no design change to the incorporated-by-reference design will be pursued for installation at the proposed WCS CSIF. Therefore, the AHSM assembly configuration and seismic accelerations as evaluated in the AHSM FSAR remain bounding for the configuration and accelerations evaluated in WCS CISF SAR Section 7.6.4.

In addition, ISP notes that the WCS CISF SAR indicates that the NAC-MPCs are lifted via lift lugs, but these lift lugs are not included in the incorporated-by-reference design. WCS CISF SAR Appendix E, Sections E.7.1.6 and E.7.2.6 discuss that the lift lugs are not part of the original design and references the NAC FSARs for clarity. These sections also point to Reference E.7-8 for the evaluation of these lift lugs. Reference E.7-8 is NAC Calculation 30039-2020, “MPC Concrete Cask Lift Evaluation,” Revision 0, which was submitted to the NRC in Enclosure 6 of the original license application on April 28, 2016.

**Impact:**

SAR Section B.3.3.3 has been revised as described in the response.

**RAI NP-B-2:**

Revise the following statement on WCS CISF SAR page B.7-3, Section B.7.1, "Discussion" and make conforming changes to WCS CISF SAR Section B.7.8

"The cask stability evaluations in [B.7-4] use the hypothetical case of the cask as a storage component, and hence in the vertical configuration, as bounding the horizontal configuration in the transfer mode."

The MP-187 in the transfer mode remains horizontal in the transfer trailer. As such, the cask stability and missile penetration evaluation of Section B.7.8 evaluation is the only evaluation that needs to be performed for the MP-187 transfer operation. The word, "alternate," of the section title, which also appears throughout, should be removed from Section B.7.8, "Alternate Cask Stability and Missile Penetration Evaluation of the MP187 Cask On-Site Transfer Configuration."

This information is needed to determine compliance with 10 CFR 72.24(c)(3), 72.24(d)(1) and (2) and 72.122(b)(1).

**Response to RAI NP-B-2:**

The statement on Revision 2 of WCS CISF SAR page B.7-3, Section B.7.1, "Discussion" has been revised to read:

"The cask stability evaluations in [B.7-4] consider the MP187 cask in the transfer horizontal configuration, the only configuration for the MP187 cask."

The word "alternate" has been removed from Sections B.7.3 and B.7.8.

**Impact:**

The SAR Sections B.7.1, B.7.3.1, and B.7.8 have been revised as described in the response.

**RAI NP-B-3:**

Provide additional information for the WCS CISF SAR Section B.7.4, "Structural Analysis of AHSM with a Canister," seismic reconciliation analysis of the AHSM configured for WCS CISF. As a further clarification, also revise the last paragraph on page B.7-7, which states: "[T]he stress qualification for AHSM ties and concrete keys is provided in Table 3.3-21 of [B.7-1]"

The IBR evaluation of the AHSM uses the component design basis stress analysis results in UFSAR, Revision 6. The 1.5 g horizontal and 1.0 g vertical peak ground accelerations used are significantly higher than those of SAR Section 7.6.4, "Soil Structural Interaction of the NUHOMS NTS Storage Pad," which considers the design changes of removing the module-to-module ties and shear keys from the analyzed AHSM configuration. As such, the IBR stress results must clearly be delineated to address both the loading conditions and corresponding structural margins of safety for the AHSM storage system components.

This information is needed to determine compliance with 10 CFR 72.24(c)(3), 72.24(d)(1) and (2) and 72.122(b)(2)(i).

**Response to RAI NP-B-3:**

The incorporated-by-reference (IBR) evaluation of the advanced horizontal storage module (AHSM) uses the component design basis stress analysis results in the AHSM UFSAR, Revision 6. The 1.5 g horizontal and 1.0 g vertical peak ground accelerations used are significantly higher than those of the WCS CISF SAR Section 7.6.4, "Soil Structural Interaction of the NUHOMS NTS Storage Pad." Hence, design of the AHSM with a canister has significant margin and no reconciliation for seismic loads needs to be performed for these components in this configuration. SAR Section 7.6.4 *does not* consider the design change of removing the module-to-module ties and shear keys from the analyzed AHSM configuration; refer to the response to RAI NP-B-1 wherein the statement "Due to the very low accelerations, the ties between the individual modules and the shear keys used to transfer vertical motions are not required at the WCS CISF" has been removed. Removal of this statement reflects that no design change to the IBR design will be pursued for installation at the proposed WCS CSIF. As discussed in WCS CISF SAR Section 7.6.4.3 and shown in Figures 7-33 through 7-35, Section 7.6.4 considers a simplified, lumped-mass model of an AHSM row assembly, for which module-to-module ties and shear keys are below the level of detail necessary for the analysis. As such, the structural margins of safety for the AHSM storage system components are adequately delineated in the IBR evaluation to Section B.7.4 of the WCS CISF SAR. The loading conditions are adequately delineated in the IBR evaluation to Section B.7.5. Additionally, no revision is required for the last paragraph on page B.7-7, which states: "[T]he stress qualification for AHSM ties and concrete keys is provided in Table 3.3-21 of [B.7-1]," as the design function of these components is retained.

**Impact:**

No change as a result of this RAI.

**SAR Appendix C, “Standardized NUHOMS®-61BT System”****RAI NP-C-1:**

Replace the acronym “PWR” to read “BWR” in WCS CISF SAR Section C.3.4.2, by noting that the NUHOMS-61BT1 storage system is designed for storing the BWR FAs.

This information is needed to determine compliance with 10 CFR 72.24(c)(3) and 72.24(d)(1) and (2).

**Response to RAI NP-C-1:**

The typos in Sections C.3.4.2 and D.3.4.2 of the WCS CISF SAR have been corrected to replace the acronym “PWR” with “BWR,” as the NUHOMS®-61BT and NUHOMS®-61BTH Type 1 canisters are both designed for storing BWR fuel assemblies, not PWR fuel assemblies.

**Impact:**

SAR Sections C.3.4.2 and D.3.4.2 have been revised as described in the response.

**RAI NP-C-2:**

Confirm that the IBR citation, "Section K.2.3.2," is accurately identified in WCS CISF SAR Section C.3.4.2, "Structural," for presenting the principal design criteria for evaluating the DSC confinement structural performance. If it is not the correct citation, please provide appropriate IBR citation(s) to facilitate the staff review of the principal design criteria.

Section K.2.3.2 of the Standardized NUHOMS FSAR appears to address the confinement barrier leak testing only and there is no discussion regarding the confinement boundary structural design criteria.

This information is needed to determine compliance with 10 CFR 72.24(c)(3) and 72.24(d)(1) and (2).

**Response to RAI NP-C-2:**

As noted in the RAI the citation provided in SAR Section C.3.4.2 is incomplete only stating that the NUHOMS®-61BT DSC provides a leak-tight confinement. SAR Section C.3.4.2 has been updated to include references to Section K.2.2.5.1, "NUHOMS®-61BT DSC Structure Design Criteria and K.3.1.2 Design Criteria." Section K.3.1.2 includes subsections, K.3.1.2.1, "DSC Confinement Boundary and K.3.1.2.3 ASME Code Exception for the 61BT DSC," providing complete incorporation by reference (IBR) citations for the DSC confinement structural performance.

**Impact:**

SAR Section C.3.4.2 has been revised as described in the response.

**RAI NP-C-3:**

With respect to the WCS CISF SAR Section C.7.7.3.1, Incorporated By Reference (IBR) use of the two FSARs (Rancho Seco, Revision 4 and TN Document NUH-003, Revision 14) to evaluate the MP197HB drop accident, provide an IBR list of the SAR sections, subsections, and paragraphs for identifying the specific analysis attributes and results to facilitate the staff safety review. In addition to Section C.7.7.3.1, "Loads," the list should also cover, as appropriate, other subject areas, including Section C.7.7.3.2, "Finite Element Analysis Models," Section C.7.7.3.3, "Boundary Conditions," and Section C.7.7.3.4, "Stress Analysis Methodology."

The proposed use of the two previously approved SARs covers multiple transfer cask models, including MP 187, OS187, OS197, OS197L, and OS197H. It is unclear how the DSC 61BT was evaluated against the previously approved transfer cask model(s). A detailed IBR list of information is needed to facilitate the staff review of the MP 197HB for transfer operation drop accidents.

This information is needed to determine compliance with 10 CFR 72.24(c)(3), 72.24(d)(1) and (2) and 72.122(b)(1).

**Response to RAI NP-C-3:**

WCS CISF Section C.7.7.3.1 uses the two FSARs (Rancho Seco, Revision 4, Reference [C.7-12], and TN Document NUH-003, Revision 14, Reference [C.7-13]) solely to justify that 75g load magnitude remains bounding for the MP197HB cask design in the cask accident drop evaluations. The conclusion that 75g static load remains highly conservative for the MP197HB design is derived only from the comparison of key design parameters of the MP197HB cask and casks already approved for that load magnitude.

These two IBRs are not used to evaluate MP197HB drop accidents. The boundary conditions, finite element model, stress analysis methodology and stress criteria presented in these two IBRs should not be considered as a basis for the MP197HB design approval. The Section C.7.7 information is based entirely on Calculation WCS01-0201 provided in Enclosure 9 performed specifically for 61BT DSC and MP197HB cask system transfer operations in WCS facility.

WCS CISF SAR Section C.7.5 reconciles MP197HB and OS197 cask designs and reviews the geometric parameters of the MP197HB and OS197 casks that may affect the 61 BT DSC structural analyses. Calculation WCS01-0201 reconciles the design differences. The major design parameters are: cask cavity inner diameter, cask rail locations, cask rail width, and cask rail thickness. Transport and transfer of the 61BT DSC in the MP197HB cask requires the use of a sleeve installed inside the MP197HB cask. Section C.7.5 compares the interface dimensions for the MP197HB cask with an internal spacer sleeve and for the OS197 transfer cask and determines that they are identical.

In consequence, stress analyses of the 61BT DSC transferred in the OS197 cask, documented in Reference [C.7-13] Appendix K, remain applicable for 61BT DSC when it is transferred in MP197HB cask. Specific IBR information to individual Appendix K sections is provided in WCS CISF SAR Section 7.7.

WCS CSIF SAR Table C.7-9 has been revised to correct a typographical error in the title and add a note to clarify the relevance of the data to the evaluations presented in Section C.7.7 of the SAR. WCS CSIF SAR Section C.7.7.3.1 has been revised to provide reference to calculation WCS01-0201.

**Impact:**

SAR Table C.7-9 and SAR Section C.7.7.3.1 have been revised as described in the response.

**RAI NP-C-4:**

In WCS CISF SAR Figure C.7-21, "Top End Drop Buckling," revise the erroneous abscissa labeling, "Time," to read, "Deceleration (g)," as appropriate to recognize that the canister end drop buckling capability is tracked against the load, in lieu of time increment.

This information is necessary to assure compliance with 10 CFR 72.24(c)(3) and 72.24(d)(1) and (2).

**Response to RAI NP-C-4:**

As described in Section C.7.7.3.5 of WCS CISF SAR, Figure C.7-21 represents the buckling deformation at the buckling location for the top end drop. The plot at the bottom of Figure C.7-21 was for information only, based on the ANSYS contour plot at the top of this Figure. The plot has been taken out to avoid confusion, and the words "and radial displacement curve" under Section C.7.7.3.5 on Page C.7-26 have been removed.

**Impact:**

SAR Figure C.7-21 and Section C.7.7.3.5 have been revised as described in the response.

**SAR Appendix D, “Standardized NUHOMS®-61BTH Type 1 System”****RAI NP-D-1:**

Provide the calculation package(s) from which the summary discussions can be assessed and reviewed by the staff for the evaluation discussed in WCS CISF SAR Section D.7.3, “Seismic Reconciliation of the Canister HSM Model 102, MP197 Cask.”

The WCS CISF SAR summary discussion lacks clarity in a number of areas essential for assessing the applicability of analysis assumptions and results. For example, WCS CISF SAR Section D.7.3.1.3 states: “[T]he forces and moments for each HSM subcomponent (roof slab, walls, floor slab) are determined for the WCS CISF spectra obtained from the SSI analysis, and then compared to their respective capacities, calculated as described in Section 8.1.1.5.E of [D.7-2]. The comparison is shown in Table D.7-1.” It’s unclear whether the noted SSI analysis is related to the site-specific analysis of SAR Section 7.6.4, where no HSM concrete subcomponents are explicitly modeled for extracting shear forces and bending moments for developing the data reported in Table D.7-1.

This information is needed to determine compliance with 10 CFR 72.24(c)(3), 72.24(d)(1) and (2) and 72.122(b)(2)(i).

**Response to RAI NP-D-1:**

The followings are the design basis calculations that support the evaluations discussed in WCS CISF SAR Section D.7.3:

- TN Americas LLC Calculation WCS01-0208, Rev. 0, “Evaluation of HSM 80/102 Modules for WCS SSI Loading.”
- TN Americas LLC Calculation WCS01-0202, Rev. 1, “NUHOMS® MP197HB Cask Structural qualification for Normal/Off-Normal conditions.”
- TN Americas LLC Calculation WCS01-0209, Rev. 0, “FO, FC, FF, 61BT, and 61BTH Type 1 DSC Seismic Reconciliation.”

These calculations are provided in Enclosure 9. Contents from WCS01-0208 are summarized in UFSAR Section D.7.3.1 for the HSM Model 80 and Model 102. Similarly, contents from WCS01-0202 are summarized in UFSAR Section D.7.3.2 for the MP197HB Cask as On-Site Transfer Cask, and contents from WCS01-0209 are summarized in Section D.7.3.3 for the 61BTH Type 1 DSC.

SAR Section D.7.3 has been revised to provide reference to the aforementioned calculations.

**Impact:**

SAR Section D.7.3 has been revised as discussed in the response.

**RAI NP-D-2:**

Clarify the use of “stress ratio,” cited in WCS CISF SAR Section D.7.3.1.5.2, “Evaluation of Heat Shield,” for presenting the Heat Shield stud evaluation methodology and results. To facilitate NRC staff review, also provide calculation package(s) to substantiate the interaction ratio safety margins determination.

The NRC staff notes that the “interaction ratio” evaluation is generally required of the stud embedment strength qualification, when the studs are subject to concurrent axial, bending, and shear stresses. The use of stress in lieu of interaction ratios suggests that the combined effects of axial, bending, and shear stresses may not have been considered for evaluating the structural adequacy of the studs. The stress ratio criterion alone is insufficient and is also deviated from that of Section 8.1.1.7 of the FSAR, Revision 14, of Docket No. 1004.

This information is needed to determine compliance with 10 CFR 72.24(c)(3), 72.24(d)(1) and (2) and 72.122(b)(2)(i).

**Response to RAI NP-D-2:**

The WCS CISF SAR Section D.7.3.1.5.2 has been modified to be consistent with the description of Section 8.1.1.7 of the Docket Number 1004 FSAR, Revision 14, and to accurately represent the results documented in the substantiating calculation.

The results summarized in Section D.7.3.1.5.2 are taken from TN Calculation WCS01-0208, provided in Enclosure 9 of this RAI transmittal. Reference to this calculation has been added to SAR Section D.7.3.1.5.2.

**Impact:**

WCS CISF SAR Section D.7.3.1.5.2 has been revised as described in the response.

**SAR Appendix E, “NAC-MPC”****RAI NP-E-2:**

In WCS CISF SAR Section E.3.1.2, “Safety Protection Systems,” in addition to those of the NAC-STC FSAR, add to the discussion of the other ITS SSCs to be considered for the WCS CISF safety evaluation. For the other ITS SSCs, also discuss the design description, design criteria, materials used for construction, and structural performance analysis in order to facilitate the staff safety review. [Note: This request applies also to WCS CISF SAR Section E.3.2.2 for the MPC- LACBWR storage system.]

The ITS SSCs listed in Tables 2.3-1 and 2.3-2 of the NAC-MPC FSAR are those associated primarily with the storage cask system, such as the transportable storage canister and basket, vertical concrete cask, and transfer cask. Safety classification for other ITS SSCs must also be evaluated for the WCS CISF discussed in Section E.4, “Operating Systems, NAC-MPC,” including the ancillary equipment, adapter plate vertical cask transporter, rigging and slings, and storage pad used for receipt, handling, storage, and retrievability of the canisters.

This information is needed to determine compliance with 10 CFR 72.24(c)(3) and 72.24(d)(1) and (2).

**Response to RAI NP-E-2:**

The response and associated SAR Markup for RAI NP-E-4 include the information requested in the RAI.

**Impact:**

No change as a result of this RAI.

**RAI NP-E-3:**

Provide design details for the lifting yoke used for moving the transfer cask in WCS CISF SAR Section E.4.1.3, "Transfer Cask."

The lifting yoke as an ancillary component for transfer cask lifting is not part of the design approval review for the NAC-MPC SAR. As such, it must be evaluated for the WCS CISF site. [Note: This request applies also to Section E.4.2.3 for the MPC-LACBWR storage system.]

This information is necessary to assure compliance with 10 CFR 72.24(c)(3) and 72.24(d)(1) and (2).

**Response to RAI NP-E-3:**

SAR Sections E.4.1.3 and E.4.2.3 have been updated to clarify information relating to lifting yoke design and qualification criteria.

**Impact:**

SAR Sections E.4.1.3 and E.4.2.3 have been updated as described in the response.

**RAI NP-E-4:**

Provide safety classifications of the SSCs discussed in WCS CISF SAR Section E.4.1.4, "Auxiliary Equipment," for the WCS CISF operation.

Section E.3.1.2, "Safety Protection Systems," presents safety classifications for the NAC-MPC storage system focusing only on the cask system components for the general license approval. Auxiliary equipment needed for the site-specific operation is not addressed. As such, safety classification must also be identified for the Auxiliary Equipment used at the WCS CISF site. [Note: The request also applies to Section E.4.2.4 for MPC-LACBWR.]

This information is needed to determine compliance with 10 CFR 72.24(c)(3) and 72.24(d)(1) and (2).

**Response to RAI NP-E-4:**

SAR Sections E.3.1.2.1 and E.3.2.2.1 have been updated to reference new Table E.3-2, which provides the generic safety classifications for the auxiliary equipment. SAR Sections E.4.1.4 and E.4.2.4 have also been revised to reference Sections 7.5.1 and 7.5.2 for CTS and VCT design and analysis.

**Impact:**

SAR Section E.3.1.2.1, E.3.2.2.1, E.4.1.4, and E.4.2.4 have been revised as described in the response. Table E.3-2 has been added as described in the response.

**RAI NP-E-5:**

Revise, as appropriate, the WCS CISF SAR Section E.4.1.4.2, "Rigging and Slings," description by identifying the specific rigging attachments and corresponding load paths rating criteria for which the ANSI N14.6, special lifting device, standard applies. [Note: The request also applies to Section E.4.2.4.3 for MPC-LACBWR.]

The staff notes that ANSI N14.6 and NUREG-0612 are cited as the standards for the ITS rigging attachments; however, the rigging attachments cited in the section appear to be of commercial "off the shelf" items. If the rigging attachments are configured as special lifting devices, they need to be designed, fabricated, operated, tested, inspected, and maintained per the ANSI N14.6 standard accordingly.

This information is necessary to assure compliance with 10 CFR 72.24(c)(3) and 72.24(d)(1) and (2).

**Response to RAI NP-E-5:**

SAR Sections E.4.1.4.3 and E.4.2.4.3 have been updated to provide more detail regarding lifting rig assemblies, including specific lifting components and the standards used in the design.

**Impact:**

SAR Sections E.4.1.4.3 and E.4.2.4.3 have been revised as described in the response.

**RAI NP-E-6:**

Provide a rationale for the Section E.7.1, "Yankee Rowe MPC and Connecticut Yankee MPC," lead paragraph statement:

"Finally, bounding evaluations in Section E.7.1.11 are referenced to demonstrate that the confinement boundaries for the Yankee-MPC and CY- MPC canisters do not exceed ASME B&PV Subsection NB Article NB-3200 (Level A allowables) during normal conditions of transport to provide reasonable assurance that the confinement boundary is not adversely impacted by transport to the WCS CISF."

The canister structural performance has already been certified by the NRC for the NCT under Docket 71-9235 and there appears no need to reevaluate the canister confinement boundary further for transport; however, if deemed necessary, revise, as appropriate, the evaluation in WCS CISF SAR Section E.7.1.11, "Structural Evaluation of Yankee-MPC and CY-MPC Canister Confinement Boundaries under Normal Conditions of Transport."

The NRC staff notes that WCS CISF SAR Section E.7.1.11 refers to the confinement boundary evaluation of the NAC-STC with canisters as contents. The NAC-STC package has been certified for meeting the 10 CFR Part 71.71 requirements for Normal Conditions of Transport (Docket 71-7235). As such, it's unclear why it is necessary to re-evaluate the canister confinement boundaries for transport of spent nuclear fuel to the WCS site. However, if the Normal Conditions of Transport are considered to address certain handling and transfer operations upon canister receipt at the site, specific descriptions must be provided in the SAR to justify their applicability. [Note: The request also applies to Section E.7.2 and Section E.7.2.11 for LACBWR-MPC.]

This information is needed to determine compliance with 10 CFR 72.24(c)(3) and 72.24(d)(1) and (2).

**Response to RAI NP-E-6:**

The observation is correct that the canister structural performance has already been certified by the NRC for the normal conditions of transport (NCT) under Docket 71-9235 and there is no need to reevaluate the canister confinement boundary. It is also a correct observation that the NAC-STC does meet the requirements of 10 CFR 71.71 for the NCT and is relied on as the confinement boundary during transport to the WCS CISF and does not need to be reevaluated. ISP included the descriptions and references to the supporting sections of the corresponding transportation SAR to demonstrate that during NCT that the confinement boundary is not adversely impacted by transport to the WCS CISF and that the confinement boundary will continue to perform its safety function when placed back into storage at the WCS CISF.

SAR Sections E.7.1.11 and E.7.2.11 have been revised to clarify that the evaluation of canister boundaries for NCT is only to provide reasonable assurance that the confinement boundary is not adversely impacted by transport to the WCS CISF.

**Impact:**

SAR Sections E.7.1.11 and E.7.2.11 have been revised as described in the response.

**RAI NP-E-7:**

Provide for staff review NAC Calculation 30039-2010, Rev 0, "Concrete Cask Tip-Over Evaluation WCS," including any computer based analyses input/output files, for the site-specific non-mechanistic tip-over analysis.

The calculation and input/output files are necessary for reviewing the summary discussion of the cask tip-over modeling approach, its implementation, and calculated cask decelerations of Section E.12.1.3, "Concrete Cask Non- Mechanistic Tip-Over Analysis". [This request also applies to NAC Calculation 30039-2015, Rev 0, "Tip-Over DLF Calculation for WCS," as applied to Section E-12.2.3 for LACBWR MPC].

This information is needed to determine compliance with 10 CFR 72.24(c), 72.24(d)(1) and (2), and 72.122(b)(1).

**Response to RAI NP-E-7:**

NAC Calculation 30039-2010, Revision 0 and NAC Calculation 30039-2015, Revision 0 were provided in Enclosure 10 of submittal WCS-CISF-16-002 dated November 16, 2016. The Input/Output files associated with Calculation 30039-2010 have been included in Enclosure 10 of this RAI response package. The tip-over evaluations for the NAC systems are not incorporated by reference (IBR), rather are specific to WCS CISF site and documented in the applicable SAR appendices. The methodology used is the same for all three system designs. ISP chose to use the latest methodology approved by the NRC in the reference licenses instead of three different legacy approaches. Because it is not an incorporation by reference analysis, NRC approval is required.

**Impact:**

No change as a result of this RAI.

**SAR Appendix F, “NAC-UMS”**

**RAI NP-F-3:**

Provide design details for the lifting yoke used for moving the transfer cask in WCS CISF SAR Section F.4.1.3, “Transfer Cask.”

The lifting yoke as an ancillary component for transfer cask lifting is not part of the design approval review for the NAC-UMS SAR. As such, it must be evaluated for the WCS CISF site.

This information is needed to determine compliance with 10 CFR 72.24(c)(3) and 72.24(d)(1) and (2).

**Response to RAI NP-F-3:**

SAR Section F.4.1.4.3 has been updated to provide more detail regarding lifting rig assemblies, including specific lifting components and the standards used in the design.

**Impact:**

SAR Sections F.4.1.4.3 has been revised as described in the response.

**RAI NP-F-4:**

Provide safety classifications of the SSCs discussed in WCS CISF SAR Section F.4.1.4, "Auxiliary Equipment," for the WCS CISF operation.

Section F.3.1.2, "Safety Protection Systems," presents safety classifications for the NAC-UMS storage system focusing only on the cask system components for the general license approval. Auxiliary equipment needed for the site-specific operation is not addressed. As such, safety classification must also be identified for the Auxiliary Equipment used at the WCS CISF site.

This information is needed to determine compliance with 10 CFR 72.24(c)(3) and 72.24(d)(1) and (2).

**Response to RAI NP-F-4:**

SAR Section F.3.1.2.1 has been updated to reference Table E.3-2 (added in response to RAI NP-E-4), which provides the generic safety classifications for the auxiliary equipment.

**Impact:**

SAR Section F.3.1.2.1 has been revised as described in the response.

**RAI NP-F-5:**

Provide a rationale for the WCS CISF SAR Section F.7.1, "Maine Yankee," lead paragraph statement:

"Finally, bounding evaluations in Section F.7.1.11 are referenced to demonstrate that the confinement boundaries for the NAC-UMS canisters do not exceed ASME B&PV Subsection NB Article NB-3200 (Level A allowables) during normal conditions of transport to provide reasonable assurance that the confinement boundary is not adversely impacted by transport to the WCS CISF."

The canister structural performance has already been certified by the NRC for NCT under Docket 71-9270 and there appears no need to reevaluate the canister confinement boundary further for transport; however, if deemed necessary, revise, as appropriate, the evaluation in Section F.7.1.11, "Structural Evaluation of NAC-UMS Canister Confinement Boundaries under Normal Conditions of Transport."

The staff notes that Section F.7.1.11 refers to the confinement boundaries evaluation of the NAC-UMS Transport cask canisters as contents. The NAC-UMS package has been certified for meeting the 10 CFR Part 71.71 requirements for Normal Conditions of Transport (Docket 71-7290). As such, it's unclear why it is necessary to evaluate the canister confinement boundaries for transport of spent nuclear fuel to the WCS site. However, if the Normal Conditions of Transport need to be considered to address certain handling and transfer operations upon canister receipt at the site, specific descriptions must be provided in the SAR to justify their applicability. [Note: The request is similar to that discussed previously for the NAC-MPC cask system]

This information is needed to determine compliance with 10 CFR 72.24(c)(3) and 72.24(d)(1) and (2).

**Response to RAI NP-F-5:**

The observation is correct that the canister structural performance has already been certified by the NRC for the Normal Conditions of Transport (NCT) under Docket 71-9270 and there is no need to reevaluate the canister confinement boundary. It is also a correct observation that the NAC-UMS Transport Cask meets the requirements of 10 CFR 71.71 for the NCT and is relied on as the confinement boundary during transport to the WCS CISF, and therefore does not need to be reevaluated. ISP included the descriptions and references to the supporting sections of the corresponding transportation SAR to demonstrate that during NCT that the confinement boundary is not adversely impacted by transport to the WCS CISF, and that the confinement boundary will continue to perform its safety function when placed back into storage at the WCS CISF.

SAR Section F.7.11 has been revised to clarify that the evaluation of canister boundaries for normal conditions of transport (NCT) is only to provide reasonable assurance that the confinement boundary is not adversely impacted by transport to the WCS CISF. Because similar evaluations are also conducted for the MAGNASTOR system in Appendix G, SAR Section G.7.9 has also been revised to clarify that the evaluation of canister boundaries for NCT is only to provide reasonable assurance that the confinement boundary for the canisters associated with MAGNASTOR are not adversely impacted by transport to the WCS CISF.

**Impact:**

SAR Sections F.7.11 and G.7.9 have been revised as described in the response.

**RAI NP-F-8:**

Verify that the wording, "Reference 4," is correctly cited for the WCS CISF SAR page F.12-13 statement, "The acceleration used in the basket and canister evaluations for the UMS system in Reference 4 was 40g's."

"Reference 4" cannot be located in Section F.12.2, "References."

This information is needed to determine compliance with 10 CFR 72.24(c), 72.24(d)(1) and (2), and 72.122(b)(1).

**Response to RAI NP-F-8:**

The reference in Section F.12.1.3.12.2 (page F.12-13) is incorrect it should be Reference F.12.2-1. The WCS SAR has been updated to correct this error.

**Impact:**

SAR Section F.12.1.3.12.2 has been revised as described in the response.

**SAR Appendix G, “NAC-MAGNASTOR”****RAI NP-G-2:**

Provide safety classifications of the SSCs discussed in WCS CISF SAR Section G.4.1.7, “Auxiliary Equipment,” for the WCS CISF operation.

WCS CISF SAR Sections G.3.1.2, “Safety Protection Systems,” presents safety classifications for the MAGNASTOR storage system focusing only on the cask system components for general license approval. Auxiliary equipment needed for the site-specific operation is not addressed. As such, safety classification must also be identified for the Auxiliary Equipment used at the WCS CISF site.

This information is needed to determine compliance with 10 CFR 72.24(c)(3) and 72.24(d)(1) and (2).

**Response to RAI NP-G-2:**

SAR Section G.3.1.2.1 has been updated to reference Table E.3-2 (added in response to RAI NP-E-4), which provides the Generic Safety Classifications for the Auxiliary Equipment.

**Impact:**

SAR Section G.3.1.2.1 has been revised as described in the response.

**RAI NP-G-3:**

Provide a rationale for the WCS CISF SAR Section G.7.1, "Undamaged and Damaged PWR Fuel," lead paragraph statement:

"Finally, bounding evaluations in Section G.7.1.9 are referenced to demonstrate that the confinement boundaries for the NAC-UMS canisters do not exceed ASME B&PV Subsection NB Article NB-3200 (Level A allowables) during normal conditions of transport to provide reasonable assurance that the confinement boundary is not adversely impacted by transport to the WCS CISF."

The canister structural performance has already been certified by the NRC for NCT under Docket 71-9356 and there appears no need to reevaluate the canister confinement boundary further for transport; however, if deemed necessary, revise, as appropriate, the evaluation in Section G.7.1.9, "Structural Evaluation of NAC-MAGNASTOR Canister Confinement Boundaries under Normal Conditions of Transport."

The NRC staff notes that Section G.7.1.9 refers to the confinement boundaries evaluation of the NAC MAGNATRAN Transport cask canisters as content. The NAC-MAGNATRAN package has been certified for meeting the 10 CFR Part 71.71 requirements for Normal Conditions of Transport (Docket 71-9395). As such, it's unclear why it is necessary to evaluate the canister confinement boundaries for transport of spent nuclear fuel to the WCS site. However, if the Normal Conditions of Transport need to be considered to address certain handling and transfer operations upon canister receipt at the site, specific descriptions must be provided in the SAR to justify their applicability.

This information is needed to determine compliance with 10 CFR 72.24(c)(3) and 72.24(d)(1) and (2).

**Response to RAI NP-G-3:**

The observation is correct that the canister structural performance has already been certified by the NRC for the Normal Conditions of Transport (NCT) under Docket 71-9356 and there is no need to reevaluate the canister confinement boundary. The observation is also correct that the NAC-MAGNATRAN meets the requirements of 10 CFR 71.71 for the NCT and will be relied on as the confinement boundary during transport to the WCS CISF, and therefore does not need to be reevaluated. ISP included the descriptions and references to the supporting sections of the corresponding transportation SAR to demonstrate that during NCT that the confinement boundary is not adversely impacted by transport to the WCS CISF, and that the confinement boundary will continue to perform its safety function when placed back into storage at the WCS CISF.

**Impact:**

No change as a result of this RAI.

**RAI NP-G-6:**

Verify that the wording, "Reference 5," is correctly cited for the WCS CISF SAR page F.12-14 statement, "The acceleration used in the basket and canister evaluations for the MAGNASTOR system in Reference 5 was 35g's."

"Reference 5" cannot be located in Section G.12.2, "References."

This information is needed to determine compliance with 10 CFR 72.24(c), 72.24(d)(1) and (2), and 72.122(b)(1).

**Response to RAI NP-G-6:**

The reference in Section G.12.1.3.12.2 (page G.12-14) is incorrect it should be Reference G.12-1. The WCS SAR has been updated to correct this error.

**Impact:**

SAR Section G.12.1.3.12.2 has been revised as described in the response.

**SAR Appendix H, “Canisterized GTCC Waste,” H.1., “Introduction and General Description of Installation”****RAI NP-H-1:**

Revise WCS CISF SAR Appendix H.1 to address whether the confinement boundary of the GTCC canister does not exceed ASME B&PV Subsection NB Article NB-3200 (Level A allowables) during normal conditions of transport to provide reasonable assurance that the confinement boundary is not adversely impacted by transport to the WCS CISF.

The applicant made a similar statement in WCS CISF SAR Sections A.3.4.4, E.7.1, F.7.1 and G.7.1 to confirm that the canisters, received at WCS CISF, do not exceed ASME B&PV Subsection NB Article NB-3200 (Level A allowables) during normal conditions of transport to provide reasonable assurance that the confinement boundary is not adversely impacted by transport to the WCS CISF.

The applicant should add a similar statement (underlined above) in the WCS CISF SAR Appendix H if the confinement boundary of the GTCC canister does not exceed ASME B&PV Subsection NB Article NB-3200 (Level A allowables) during normal conditions of transport to provide reasonable assurance that the confinement boundary is not adversely impacted by transport to the WCS CISF.

This information is needed to determine compliance with 10 CFR 72.120(a).

**Response to RAI NP-H-1:**

ISP has added SAR Section H.8.3, “Structural Evaluation of Canister Confinement Boundary under Normal Conditions of Transport,” to point to the evaluations demonstrating that the greater than Class C (GTCC) Waste canisters do not exceed American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Subsection NB Article NB-3200 (Level A allowables) during normal conditions of transport, which provides reasonable assurance that the confinement boundary is not adversely impacted by transport to the WCS CISF.

The addition of new SAR Section H.8.3 has caused the reference section for Appendix H.8.3 to become Section H.8.4.

**Impact:**

SAR Section H.8.3 has been added and Section H.8.4 has been revised as described in the response.

Proprietary Information on Pages 93 through 99  
Withheld Pursuant to 10 CFR 2.390