

Criteria/Basis Change Notice

Complete only applicable items.

3. Document Identifier: 000-3DR-MGR0-00300-000	ENG. 20080317.0002	4. Rev.: 002	5. CBCN: 008
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6a. Title: <i>Basis of Design for the TAD Canister-Based Repository Design Concept</i>	6b. Safety Classification of SSC: ITS / Non-ITWI
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7. Reason for Change:

The *Basis of Design for the TAD Canister-Based Repository Design Concept* (BOD), 000-3DR-MGR0-00300-000, criteria must be changed to recently issued "High-Level Radioactive Waste and U.S. Department of Energy and Naval Spent Nuclear Fuel to the Civilian Radioactive Waste Management System," Volume 1 of *Integrated Interface Control Document* (IICD) (DOE 2008 [DIRS 185213]), DOE/RW-0511, Revision 4. Specific changes include assumptions from the Naval Nuclear Propulsion Program (NNPP) and changes in interface figures. The strategy for the interface figures previously depicting an external and a repository component has changed to just identification of the external component (without the repository side of the interface shown on figures). Interface parameters from the previous figures are represented in tables in the IICD. Otherwise, only the reference revision is changed. Interface parameters with dimensions from IICD Volume 1 Table A-1 are identified in criteria.

Impacts of this are minimal. The NNPP assumptions are already being considered in analyses and the external components are already known, only the figures themselves have changed.

8. Supersedes Change Notice: Yes If, Yes, Change Notice: _____ No

9. Disciplines/Organizations Affected by this Change:

Nuclear Facilities Project Engr. <i>12 MAR 08</i>	Balance of Plant Facilities Project Engr. <i>03-12-2008</i>	Subsurface Facilities Project Engr. <i>03/12/08</i>
Civil/Structural/Architectural Discipline Engr. Manager <i>3/12/08</i>	Electrical/I&C Discipline Engr. Manager <i>3-12-08</i>	Mechanical Discipline Engr. Manager <i>3/12/08</i>
Nuclear & Radiological Discipline Engr. Manager <i>3/12/08</i>	Thermal/Structural Analysis Discipline Engr. Manager <i>3-12-08</i>	ES&H Review Coordinator <i>3/12/08</i>
LNS Document Review <i>3/12/08</i>	PreClosure Safety Analysis Manager <i>3/12/08</i>	If 6b is ITS/ITWI: Quality Assurance <i>3/12/08</i>

10. Description of Change:

Since the information from the IICD used in the following sections remains unchanged, revise the citations to the IICD for the following **criteria text** sections to read "...IICD Volume 1 (DOE 2008 [DIRS 185213])...". These changes do not require section or figure citation changes.

- | | | | | | | |
|------------|-------------|----------|-----------|------------|-----------|---------|
| 1.4.3 | 3.2.2.5 | 4.2.2.7 | 5.2.1.1.1 | 5.2.2.3 | 5.2.2.3.8 | 6.2.2.2 |
| 9.10.2.1.3 | 9.10.2.2.10 | 11.2.2.2 | 12.2.1.2 | 13.2.1.2.6 | 13.2.2.1 | |

Since the information from the IICD used in the following sections remains unchanged, revise the citations to the IICD in the **rationale statement** for the following sections to read "...IICD Volume 1 (DOE 2008 [DIRS 185213])...". These changes do not require section or figure citation changes.

- | | | | | | | |
|-------------|-------------|--------------|-------------|-------------|------------|------------|
| 3.2.1.4 | 4.2.1.6.1 | 5.2.1.1.1 | 6.2.1.3 | 9.9.2.1.2 | 11.2.2.8.1 | 13.2.1.2.7 |
| 3.2.1.7 | 4.2.1.9.9 | 5.2.1.1.2 | 6.2.1.3.1 | 9.9.2.1.3 | 11.2.2.22 | 13.2.2.7-9 |
| 3.2.1.7.1 | 4.2.1.9.14 | 5.2.1.5 | 6.2.2.2.3-5 | 9.9.2.2.3 | | 13.2.4.2 |
| 3.2.1.7.2 | 4.2.1.9.15 | 5.2.1.6 | | 9.10.2.2.10 | | 13.2.4.2.1 |
| 3.2.1.9.5 | 4.2.1.10-12 | 5.2.2.3.2 | | | | 13.2.4.2.2 |
| 3.2.1.10-12 | 4.2.2.7.8 | 5.2.2.3.4 | | | | 13.2.1.2.4 |
| 3.2.2.5.16 | 4.2.2.7.19 | 5.2.2.3.8-12 | | | | |
| | 4.2.2.7.21 | 5.2.1.5.1 | | | | |
| | 4.2.2.7.23 | | | | | |

The following criteria require more than just a document reference update. Revise the document reference **and the figures and section references** in the rationale statements for the IICD in the following sections:

3.2.1.2 Annual Receipt Rates

...[...IICD Volume 1 (DOE 2008 [DIRS 185213]) *Specific Assumption 5.2 #2 specifies...*]

3.2.1.3 Receive Transportation Casks

...[... *Dimensions of M-290 naval shipping cask are found on Figure C-2 of IICD Volume 1 (DOE 2008 [DIRS 185213])...*]

3.2.1.9.16 Railroad Shipments

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Appendix B Figure B-2 and Appendix C, Figure C-1. The IICD has an incorrect value for the 8-axle railcar weight.....*]

3.2.1.9.17 Truck Dimensions

...[...IICD Volume 1 (DOE 2008 [DIRS 185213]), *Section Specific Assumption 5.2 #1. ...*]

3.2.2.5.1 Transportation Cask Handling

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Basic Assumption 5.1 #1. ...*]

3.2.2.5.4 Disposable Canister Acceptance

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Specific Assumption 5.2 #15.*]

3.2.2.5.5 No Handling Canister Contents

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Specific Assumption 5.2 #6 and Section 10.3.1.]*

3.2.2.5.6 Canister Disposability Evaluations

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Specific Assumption 5.2 #8 and*

4.2.1.3.1 MCO Waste Forms

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Section Specific Assumption 5.2 #12 provides for the Shippingport SNF. ...*]

4.2.1.3.2 DOE Standardized SNF Canister Waste Forms

... [IICD Volume 1 (DOE 2008 [DIRS 185213]), *Sections Specific Assumptions 5.2 #s 9, 5-10, 5-13 and 5-14.*]

4.2.1.6 Transportation Cask Return to Service

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Sections 9.2 and 9.2.1;...*]

4.2.1.9.10 HLW Canister Size

... [...*This dimension also happens to be different than the waste package interface cavity length documented in Criterion 11.2.2.7 citation to on Figure C-25 7 through C-9 and Table A-1, I-25 through I-27 and I-33 of the IICD Volume 1 (DOE 2008 [DIRS 185213]). ...*]

4.2.1.9.17 Cask Sizes

...[...IICD Volume 1 (DOE 2008 [DIRS 185213]), *Section 7.2 provided DOE SNF and HLW cask characteristics. ...*]

4.2.1.9.21 Truck Dimensions

...[*Heavy-haul vehicles have been eliminated IICD Volume 1 (DOE 2008 [DIRS 185213]), Section Specific Assumption 5.2 #1.]*

4.2.2.7.1 Dimensions

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Section Basic Assumption 5.1 #1....*]

4.2.2.7.2 Transportation Cask Handling

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Section Basic Assumption 5.1 #2.a....*]

4.2.2.7.3 Skid Handling

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Specific Assumption 5.2 #3 and Section 7.4,...*]

Revise the document reference and the figures and section references in the rationale statements (continued)

4.2.2.7.4 Disposable Canister Acceptance

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Specific Assumptions 5.2 #s 4 and 5-15.*]

4.2.2.7.5 No Handling Canister Contents

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Specific Assumption 5.2 #6.*]

4.2.2.7.6 Canister Disposability Evaluations

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Specific Assumption 5.2 #13 only mentions disposable canister....*]

5.2.1.1.5 Transportation Cask Handling

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Basic Assumptions 5.1 #s 2.a. and 5.2.b.*]

5.2.1.1.6 Skid Handling

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Specific Assumption 5.2 # 3 and Section 7.4, which discusses transportation skids,...*]

5.2.2.3.1 Dimensions

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Basic Assumption 5.1 #1. ...*]

5.2.2.3.5 DOE SNF Acceptance

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Specific Assumption 5.2 #11.*]

6.2.2.2.1 Transportation Cask Handling

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), *Basic Assumption 5.1 #2a.*]

6.2.2.2.2 Skid Handling

...[Although IICD Volume 1 (DOE 2008 [DIRS 185213]), *Specific Assumption 5.2 # 3 and Section 7.4,...*]

9.8.2.2.10 Truck Dimensions

...[...Heavy-haul vehicles have been eliminated (IICD Volume 1 (DOE 2008 [DIRS 185213]), *Section Specific Assumption 5.2 #1).*...]

11.2.2.7 Waste Package/HLW Canister Interface

...[... The HLW canister characteristics are obtained from IICD Volume 1 (DOE 2008 [DIRS 185213]), Sections 13.1-13.4, and Figures ~~C-20, C-21, and C-29~~ C-7 through C-9. Figures ~~C-24, C-25, and C-26~~ IICD Table A-1, Items I-25 through I-27 and I-33 also show waste package interfaces.]

11.2.2.8 Waste Package/DOE SNF Canister Sizing

...[... The DOE SNF canister characteristics are obtained from IICD Volume 1 (DOE 2008 [DIRS 185213]), Sections 10.1 and 10.2, and Figures C-3 and C-4, ~~and C-5~~ for SNF canister characteristics, ~~and C-7 and C-8~~ for waste package interfaces, and C-15 5 for MCO characteristics. Interface parameters are shown on IICD Table A-1, Items I-6, I-7, I-10, I-11, and I-15.]

11.2.2.19 HLW Canister Characteristics

...[...Criterion 11.2.2.7 citation to Figures ~~C-25~~ 7 through C-9 of the IICD Volume 1 (DOE 2008 [DIRS 185213])....]

13.2.1.2.5 Cask Sizes

...[...IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 7.2 and Figures B-4 ~~and C-3.~~]

Revise the document reference and the figures and section references in the rationale statements (continued)

13.2.1.2.28 HLW Canister Size

...[... This dimension also happens to be different than the waste package interface cavity length documented in Criterion 11.2.2.7 citation to ~~Figure C-25~~ **Table A-1** of the IICD Volume 1 (DOE 2008 [DIRS 185213])....]

13.2.2.2 Dimensions

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), **Basic Assumption 5.1 #1**....]

13.2.2.3 Horizontal Cask Receipt and Vertical Handling

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), **Basic Assumptions 5.1 #s 2.a. and 5-2.b.**]

13.2.2.5 Disposability Requirement

...[IICD Volume 1 (DOE 2008 [DIRS 185213]), **Specific Assumptions 5.2 #s 4 and 5-15.**]

13.2.2.6 No Handling Canister Contents

... [IICD Volume 1 (DOE 2008 [DIRS 185213]), **Specific Assumption 5.2 #6.**

Since these changes are **more extensive** than just a reference or section or figure number change, revise the following criteria as follows:

3.2.1.9.2 Cask Hook Weight

The IHF shall be designed for the maximum hook weight for any lift of the loaded rail cask of 600,000 lbs.

[Naval transportation cask weight is the primary driver for this requirement. As specified in the IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 7.2 and Figure B-4 identifies 200 tons for HLW and DOE SNF casks and Figure C-2 identifies 295 short tons for the naval casks (including cask rigging). While preliminary weights of the M-290 cask are 295 tons, this requirement has been set at 300 tons (changed to lbs).]

3.2.1.9.4 Naval Canister Thermal Limit

The IHF shall be designed for naval SNF canisters with a maximum thermal power of 11.8 kW ($4.03 \times 10^{+04}$ BTU/hr) at the time of acceptance into the repository. The IHF design and operational controls (such as limiting combustion sources, natural or artificial cooling, and proximity to other heat sources) shall ensure that naval spent nuclear fuel time at temperature conditions (~~to be determined~~) are not exceeded as follows:

- **Once the naval transportation cask is open, the naval SNF canister external surface temperature:**
 - shall not exceed 400°F during a loss of ventilation event lasting no more than 30 days and
 - shall be kept below 320°F for all normal operations.
- **The mean frequency of breaching a naval SNF canister due to a fire event is less than 1 in 10,000 over the preclosure period.**

[WASRD (DOE 2007 [DIRS 169992]), Section 4.4.9. This requirement is allocated only to the IHF and the waste package design. IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 10.3.2.2 provides the new criterion text on time at temperature conditions.]

3.2.1.9.6 HLW Canister Size

The IHF shall be designed to accommodate the HLW form that can stand upright without support on a flat horizontal surface and fit without forcing into a right-circular, cylindrical cavity 25 in (64 cm) diameter and 9.88 ft (3.01 m) length.

[WASRD (DOE 2007 [DIRS 169992]), Section 4.8.3. Although the canisters are nominally referred to as 10 ft and 15 ft long canisters, the actual dimensions are less than 10 ft and 15 ft, respectively. Although the WASRD Section 4.8.3 identifies a free-standing HLW canister height as 4.51 m, this is distinctly different than the nominal height of 4.57 m that is identified in Criterion 11.2.2.7. Note that the nominal height is actually larger than the allowable free standing height. This dimension also happens to be different than the waste package interface cavity length documented in Criterion 11.2.2.7 citation to Figure C-25 7 (for DWPF) of the IICD Volume 1 (DOE 2008 [DIRS 185213]) document canister dimensions smaller than the cavity. CBCN004 to Revision 001 provided this change. TMRB-2007-069 (BSC 2007 [DIRS 184140]) provides project direction to eliminate the long HLW canisters from the IHF to address lift height restrictions in Criterion 3.2.1.9.9. Long HLW canisters are handled in the CRCFs.]

3.2.1.9.7 HLW Canister Weight

The IHF shall be designed to receive and handle filled HLW canisters with a weight not to exceed ~~9,260 lb (4,200 kg)~~ **5,512 lb**.

[WASRD (DOE 2007 [DIRS 169992]), Section 4.8.4. IICD Volume 1 (DOE 2008 [DIRS 185213]), Table A-1 provides the weight for the short HLW canisters. TMRB-2007-069 (BSC 2007 [DIRS 184140]) provides project direction to eliminate the long HLW canisters from the IHF to address lift height restrictions in Criterion 3.2.1.9.9. Long HLW canisters are handled in the CRCFs.]

More extensive changes (continued)

3.2.1.9.14 Cask Sizes

The IHF shall be designed to receive casks having dimensions that do not exceed the following:

1. Rail casks for HLW
 - a. With impact limiters attached: 340 in. long by 144 in. diameter
 - b. With impact limiters removed but with trunnions attached: ~~234~~ **240** in. long by 108 in. diameter (at the trunnions)
 - c. If the trunnions are removable, the maximum diameter of the cask body: ~~100~~ **103.05** in.
2. Truck casks for HLW
 - a. With impact limiters attached: 245 in. long by 96 in. diameter
 - b. With impact limiters removed: 200 in. long by 48 in. diameter (at the trunnions).
3. Rail Casks for naval M-290 Casks
 - a. With impact limiters attached: 375 in. long by 128 in. diameter
 - b. With impact limiters removed (Cask unloading length): 345 in. long
 - e. ~~Cask body: 128 in.~~
 - d. Cask body **with or** without trunnions: 108 in.
 - e. Shipping clearance envelope: AAR Plate F
 - f. Crane hook weight: 590,000 lbs.

[IICD Volume 1 (DOE 2008 [DIRS 185213]), ~~Section 7.2 and~~ Figures B-4 for DOE HLW casks and C-2 for naval casks. Designing for 340 in. long DOE casks with impact limiters ensures meeting the 336 in. specified on IICD Figure B-4. The IICD does not currently provide dimensions for the truck casks in Section 7.2 or figures. Therefore, previous numbers will remain.]

3.2.1.9.15 Rail Carrier Size

The IHF shall be designed to receive **only flatbed or drop-center** rail cars with dimensions less than or equal to those of Association of American Railroads (AAR) Plate F dimensions. **Railcar design will meet the following maximum values:**

- **Railcar width of 128 in. (AAR Plate F),**
- **Railcar outside length (estimated) of 90 ft, and**
- **Railcar deck height above rails of (not currently available).**

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 7.3, ~~and Table 1,~~ Appendix B Figure B-2 and Appendix C Figure C-1. While the railcar must conform to the AAR Plate F dimensions (AAR 2004 [DIRS 169910]), the IHF shall also comply with the largest diameter transportation cask for naval SNF, as specified in the IICD Section 7.6 and Appendix C Figure C-3.]

3.2.2.5.2 Transportation Cask Handling

The IHF shall be designed to receive transportation system casks in a horizontal orientation, rotate the casks to a vertical orientation, (**either** while still on their conveyance **or after removal from their conveyance**) and then handle the casks while in the vertical orientation. After removing the transportation cask from the transporter, the vertical-handling concept includes moving and lifting transportation casks, removing canisters from transportation casks, and loading canisters into waste packages.

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Basis Assumption 5.1 #2a.]

3.2.2.5.3 No Skid Removal

The IHF shall be designed to handle rail or LWT transportation systems directly. Potential interfaces, including generic buildings and gates at the IHF, are provided in the IICD Volume 1 (DOE 2008 [DIRS 185213]). **Rail casks acquired by DOE will be delivered on intermodal handling skids.** Truck casks will be delivered without handling skids.

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Specific Assumption 5.2 #3 and Section 7.4. IICD Volume 2 (DOE 2007 [DIRS 176810]), Section 3.1.11.1 & 2 provides the statement that truck casks will not have skids.]

3.2.2.5.8 Cask Responsibilities

The IHF shall be designed to accommodate the DOE HLW and naval SNF casks as specified in Figures B-4 and C-2 of the IICD Volume 1 (DOE 2008 [DIRS 185213]), respectively.

[IICD Volume 1, Section 9.1....IICD Figure B-4 now provides for an interface at the DOE-EM sites with the potential CRWMS transportation system cask and provides some inputs for development of the IHF and Figure C-2 provides for the naval cask.]

More extensive changes (continued)

3.2.2.5.9 Naval SNF Canister Integrity

The IHF design and operational controls (such as minimizing the probability and consequences of a drop and protection from external event sequences) shall ensure that any event sequence affecting the structural integrity of a naval SNF canister will meet the requirements of 10 CFR 63.111(b)(2) [DIRS 180319] identified in Criterion 2.2.3.1.6. **The design and operational controls will allow demonstration that the mean frequency of breaching a naval SNF canister is less than 1 in 10,000 for each preclosure initiating event over the preclosure period, including the following:**

- A flat-bottom drop of the naval SNF canister into the open transportation cask or waste package from no more than 40 ft.
- A drop of a canister lift adapter weighing no more than 5 tons onto the top surface of the naval SNF canister in an open transportation cask or waste package from no more than 10 ft.
- A drop of a transportation cask containment cover or restraint onto the naval SNF canister inside an open transportation cask from no more than 40 ft.
- A drop of a waste package inner vessel lid weighing no more than 2 tons onto the naval SNF canister inside an open waste package from no more than 40 ft.
- A collision of a naval SNF canister against the inside surface of the canister transfer machine during horizontal transit of no more than 75 ft/min.
- An IHF building collapse affecting the naval SNF canister or transportation cask.
- Lightning strikes, tornadoes, missile impacts, high winds, and aircraft impacts affecting the naval SNF canister or transportation cask while in the IHF.
- Any explosion, owing to any failure mode, which causes a breach of the naval SNF canister while in the IHF.

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 10.3.2.3 provides this criterion text. The subsurface criterion is applied in Chapter 8. OCRWM will demonstrate that the last three items are expected to occur at a frequency of less than 1 in 10,000 over the preclosure period.]

3.2.2.5.10 Naval Canisters

The IHF shall be designed to handle and **insert into a waste package** both the long and short naval SNF canisters as specified in the IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 10.3.1 and Figures C-18 and C-19 6, respectively.

[IICD Volume 1, Section 10.3.1 and Figures C-18 and C-19 6.]

3.2.2.5.11 Naval SNF Canister Handling

The IHF shall be designed to handle the naval SNF canister with the lifting fixtures shown on Figure C-17 on the IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 10.3.1. The IHF shall be designed to lift and transfer the naval SNF canisters from the transportation cask directly to the waste package without any intermediary staging or storage.

[IICD, Volume 1 (DOE 2008 [DIRS 185213]), Section 10.3.1 and Figure C-17.]

3.2.2.5.14 HLW Canisters

...See IICD Volume 1 (DOE 2008 [DIRS 185213]), Figures C-20 7. All systems designed to handle HLW canisters, during normal operations, shall ensure that the maximum temperature of the vitrified glass does not exceed 400°C.

[IICD Volume 1, Section 13 and Figures C-20 7. Compliance....]

3.2.2.5.15 DWPF HLW Canister Interface

The IHF shall be designed to receive and handle DWPF HLW canisters as specified in IICD Volume 1 (DOE 2008 [DIRS 185213]), Figure C-22 7.

[IICD Volume 1, Section 13.1. Figure C-22 7 and Table A-1, I-23 illustrates the dimensional interfaces for the DWPF HLW canister and small-canister staging rack.]

More extensive changes (continued)

3.2.2.5.13 Deleted Naval Canister Surface Radiation

The IHF design shall utilize the gamma and neutron fluxes on the surface of the naval SNF canister presented in IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 10.3.2.4 and its Tables 4 and 5. The maximum on-contact total (gamma and neutron) radiation levels at the top of the canister shall not exceed 100 mrem/hr.

[IICD Volume 1, Section 10.3.2.4, Tables 4 and 5, and Appendix C Figure C-6. This criterion was deleted per TMRB 2007-069 (BSC 2007 [DIRS 184140]), which provided project direction to eliminate the long HLW canisters from the IHF to address lift height restrictions in Criterion 3.2.1.9.9. Long HLW canisters are handled in the CRCFs.]

3.2.2.5.17 WVDP HLW Canisters

The IHF shall be designed to receive and handle West Valley Demonstration Project (WVDP) HLW canisters as specified on IICD Volume 1 (DOE 2008 [DIRS 185213]), Figures C-29 and C-30 9.

[IICD Volume 1, Section 13.4 and Figures C-29 and C-30 9. IICD Table A-1, I-32 illustrates dimensional interfaces for the WVDP HLW canister and the small canister staging rack. The HLW from the West Valley Demonstration Project (WVDP) is contained in canisters similar in gross external dimensions to the DWPF HLW canisters....]

3.2.3.1.3 Moderator Control

Although there are no moderator control requirements necessary for the IHF specified in the ~~Pre~~closure NSDB (BSC 2008 [DIRS 184200]) Appendix B, Table B-1-~~7~~, the following constraints will be applied at the repository:

- All areas that will handle bare naval SNF canisters or naval SNF canisters contained in an unsealed overpack (either waste package of transportation cask) will have sufficient moderator controls in place such that no event sequence with a mean probability of occurrence of at least 1 in 10,000 during the preclosure period will result in the accumulation of moderator within a breached naval SNF canister.
- Controls shall be incorporated so the only liquid neutron moderator materials present in any part of the IHF, where handling of naval SNF canisters either bare or contained in an unsealed overpack occurs, are water or other hydrogenous materials that are less effective moderators than water in the criticality calculations. As an alternative, the presence of hydrogenous materials that are effective moderators is only allowed when design features or administrative controls are implemented such that no event sequence with a mean probability of occurrence of at least 1 in 10,000 during the preclosure period will result in the accumulation of these hydrogenous materials in a breached naval SNF canister.

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 10.3.2.1.]

3.2.3.1.9 Reflector Materials

The IHF design and operations will ensure that the only reflector materials that will be in close proximity to the naval SNF canister are:

- Concrete or steel alloy material of any thickness,
- Up to 5 in. of depleted uranium and 12 in. of polyethylene-based neutron shielding in close proximity to the naval SNF canister, and
- Five HLW canisters or one additional naval SNF canister.

The IHF design will ensure that:

- Any changes that introduce lead into the IHF design, to include parts fabricated of lead or lead-glass, or requiring shielding windows of any kind, shall be coordinated with the NNPP,
- During normal operations, no more than 2 naval SNF canisters will be present at a time in each IHF handling area, and
- The presence of more than 2 naval SNF canisters in the same building handling area has a probability of less than 1 in 10,000 during the preclosure period.

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 10.3.2.1. The subsurface emplacement area criterion is in Chapter 8.]

3.2.3.1.9 10 Non-ITS SSCs Interactions with ITS-SSCs

(no change to the criterion – only the number)

More extensive changes (continued)

4.2.1.9.19 Rail Carrier Size

The CRCFs shall be designed to receive **only flatbed and drop-center** rail transportation cask/carriers with dimensions less than or equal to those of AAR Plate F dimensions. ~~This is shown as interfaces on IICD Volume 1 (DOE 2008 [DIRS 185213]) Figure C-1.~~

Railcar design will meet the following maximum values:

- **Railcar width of 128 in. (AAR Plate F),**
- **Railcar outside length (estimated) of 90 ft, and**
- **Railcar deck height above rails of (not currently available).**

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Sections 7.3 and 7.6, Table 1, Appendix B Figure B-2 and Appendix C, Figure C-1. The IICD Volume 1 constrains this to Plate F (AAR 2004 [DIRS 169910]). Repository auxiliary equipment and parking area interfaces are currently bounded by the repository designs for the potential generic building doors and setbacks and are not shown separately.]

4.2.2.7.11 Standardized Canister Interfaces

The CRCFs shall be designed to receive, unload, and package DOE SNF standardized canisters with interfaces shown on IICD Volume 1 (DOE 2008 [DIRS 185213]), Figures C-4 3 through and C-14 4. **Interface parameters are shown in IICD Table A-1, Items I-4 through I-11 and I-13.**

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 10.1.2 and Figures C-3 and C-4 and C-5 provide interfaces for the 18-in. diameter standardized SNF canisters illustrated in the IICD. The maximum canister handling fixture envelope for the 18-in. diameter standardized canisters (both lengths having the same handling interface) is shown in Figure C-6. Figures C-7 and C-8 provide the dimensional interfaces for the 18-in. diameter standardized SNF canisters and the waste package. Figures C-9 and C-10 provide interfaces for the 24-in. diameter standardized SNF canisters, respectively. The maximum canister handling fixture envelope is shown in Figure C-11 for the 24-in. diameter standardized SNF canisters (both lengths having the same handling interface). Figures C-12 and C-13 for the dimensional interfaces for the 24-in. diameter standardized SNF canisters and the waste package are placeholders.]

The National Spent Nuclear Fuel Program (NSNFP) standardized canisters must fit within various repository surface facility envelopes and handling equipment parameters as well as into the envelope in the appropriate disposal container. The facility envelopes are primarily the small canister staging racks. The staging rack positions or cells are uniform and have the same dimensions. The length and diameter of the 24-in. diameter standardized canisters and other canisters bound the length of the 18-in. diameter by 15-ft long standardized canisters; therefore, their interface with the staging rack is not shown.

The largest diameter canister interface with the staging rack is the MCO identified in Section 10.2 and shown on Figure C-14 5 and in Table A-1. The smallest SNF canister interface with the small canister staging rack is with the 18-in. diameter by 10-ft long canister and is shown on Figure C-14. Weight restrictions for each of the NSNFP standardized canisters are identified on the corresponding figures. Although DOE-EM provided handling details of the NSNFP standardized canister (i.e., skirt and lifting ring dimensions), mechanical details for the handling fixture have not been provided for either the 18-in. diameter or the 24-in. diameter canisters. The lifting fixtures, however, are constrained to operate within the nominal diameter of the canister.]

4.2.2.7.12 Hanford MCO

The CRCFs shall be designed to receive, unload, and package the Hanford MCO with interfaces shown on IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 10.2.1 and Figures C-15 and C-16 5. **Interface parameters are shown in IICD Table A-1, Items I-12, I-14, and I-15.**

[IICD Volume 1, Section 10.2.1. The Hanford MCO, consists of a stainless steel shell, a shield plug, and five or six fuel baskets for DOE-EM-owned SNF. The MCO shall be received with its welded cover installed that would contribute to the canister's disposability (Specific Assumption 5.2 #7). Permanent labeling or markings will not exceed the maximum canister envelope dimensions (i.e., manufacturing tolerances). The MCO dimensions after being filled and stood vertically on a flat surface is a right-circular cylinder with the dimensions given on Figure C-15 5. The maximum weight of the MCO is shown on Figures C-15 and C-16 5. MCO center of gravity constraints and details of an associated MCO shipping cask are not available. The Hanford MCO fits into the 2 MCO/2 DHLW waste package configuration.]

More extensive changes (continued)

4.2.2.7.13 Hanford MCO/Rack Interface

The CRCFs shall be designed to lift, rack and stage, and package the MCO canisters as specified in IICD Volume 1 (DOE 2008 [DIRS 185213]) Section 10.2.2 and Figures C-14 and C-15. **Interface parameters are shown in IICD Table A-1, Item I-12.**

[IICD Volume 1, Section 10.2.2. Limited staging for the MCO shall be provided in the CRCFs. The MCO canisters bound the diameters of the other DOE-EM SNF canisters, including the standardized canisters, and provide the largest potential interface for DOE EM owned SNF and the small canister staging rack in the CRCFs as shown on Figure C-14 5. The MCO handling interface is a lifting ring on the cover. The canister cover is an integrally machined axisymmetric lifting ring designed to support a 12-ton load when gripped with six equally spaced grippers. Each gripper must have a 50-mm (1.97-in.) tangential arc length and a 16.75-mm (0.66-in.) radial engagement length. MCO canister cap details that would interface with the repository lifting fixtures are illustrated in Figure C-15 5. In addition, the canister-handling fixture will operate within the nominal diameter of the canister cover. MCO canister interfaces with the 2 MCO/2 DHLW waste package design are identified on Figure C-16 Table A-1, Item I-12.]

4.2.2.7.17 DWPF HLW Canister/Rack Interfaces

The CRCFs shall be designed to receive and handle DWPF HLW canisters as specified in IICD Volume 1 (DOE 2008 [DIRS 185213]) Figure C-22 7. **See IICD Table A-1, Items I-23** for the small canister staging rack **interfaces**.

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 13.1. Figure C-22 7. Table A-1, Item I-23 illustrates the dimensional interfaces for the DWPF HLW canister and small canister staging rack.]

4.2.2.7.18 Hanford HLW Canister/Rack Interface

The CRCFs shall be designed to receive and handle Hanford HLW canisters as specified in IICD Volume 1 (DOE 2008 [DIRS 185213]) Figure C-23 8. **See IICD Table A-1, Items I-22 and I-24** (for the small canister staging rack **interfaces**).

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 13.2, Figure C-23 8. Table A-1, Items I-22 and I-24 illustrates the dimensional interfaces for the Hanford HLW canister and small canister staging rack.]

4.2.2.7.20 WVDP HLW Canisters

The CRCFs shall be designed to receive and handle WVDP HLW canisters as specified on IICD Volume 1 (DOE 2008 [DIRS 185213]), Figures C-29 and C-30 9. **See IICD Table A-1, Item I-31** for interfaces.

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 13.4....]

4.2.2.7.22 Thermal Design of SSCs for the DOE Standardized Canisters

All systems designed to handle DOE standardized SNF canisters, during normal operations, shall ensure that canister wall temperatures will not exceed 315.5°C (600°F) in enclosed environments and 148.9°C (300°F) in open (air) environments.

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 10.1.3.

5.2.2.3.13 Assembly Interfaces

DOE SNF of commercial-origin...

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Sections 12.1 and 12.2. The disposable DOE standardized canister interfaces with the repository have already been addressed (see Figures C 4 through C 14) of IICD. Figures C 27 and C 28 are included as placeholders for interface information between DOE SNF of commercial origin and the TAD canister. Figure C 27 will provide the interfaces between General Electric BWR/4 assemblies owned by DOE and the TAD canister. BWR fuel assembly interfaces shall encompass all assembly sizes except for Big Rock Point fuel assemblies. Figures C 28 provide the interfaces between Westinghouse PWR assemblies (e.g., 17 × 17) owned by DOE and the TAD canister. The PWR fuel assembly interfaces shall be shown for all DOE PWR assembly sizes. Specific interfaces for other DOE SNF assembly types have not been specified at this time. The IICD represents the interfaces with the waste package. The IICD has not been modified to represent the TAD canister interfaces. The clearances for the disposal container are considered to be applicable to the TAD canister. Assembly characteristics are in Characteristics of Potential Repository Wastes (DOE 2002 [DIRS 102588]). These assemblies do not constitute the entire list of commercial SNF to be received in the WHF, only the DOE-owned assemblies.]

More extensive changes (continued)

8.2.1.23 Naval Waste Package Fault Standoff Distance

The Subsurface Facility shall provide for an 8.2-ft (2.5-m) minimum emplacement standoff distance for naval SNF waste packages from mapped faults with vertical displacements of greater than 6.5 ft (2 m).

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 10.3.2.1 provides this criterion. The correct foot dimensions are provided here. CO Letter No. 07-032 (Peterson 2007 [DIRS 184255]) provided direction to incorporate this criterion in advance of a change to a DOE interface control requirements document. The requirement is to ensure that a seismic event does not create a condition for naval SNF that is outside the bounds of the current performance assessment. The specifics of this particular waste stream that drive this standoff distance do not apply to other portions of the waste stream being emplaced, i.e., DOE co-disposal waste packages and commercial SNF waste packages. Although the IICD CO Letter does not contain the information on annual exceedance frequencies, Section 6.11.3 and Table 6-61 (as well as Appendix D) of the letter IICD's reference discusses the frequencies in terms of fault movement. CBCN003 to Revision 001 provided this change. Although the CBCN provided additional text corresponding to the CO letter's referenced abstraction, this additional text did not provide for the full agreement between DOE and NNPP provided in CO letter 07-032. This additional text is therefore removed.]

8.2.3.1.1 Reflector Materials

The subsurface emplacement area design and operations will ensure that the only reflector materials that will be in close proximity to the naval SNF canister are:

- Concrete or steel alloy material of any thickness,
- Up to 5 in. of depleted uranium and 12 in. of polyethylene-based neutron shielding in close proximity to the naval SNF canister,
- Five HLW canisters or one additional naval SNF canister, except in the emplacement drift, where a waste package will be placed on either end of the naval SNF canister, and
- Tuff in the emplacement drift.

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Section 10.3.2.1. The IHF criterion is in Chapter 3.]

8.2.3.1.4 2 Non-ITS SSCs Interactions with ITS SSCs

(no change to the criterion – only the number)

9.8.2.2.5 DBV, Semi-Trailer

...[A Policy on Geometric Design of Highways and Streets (AASHTO 2004 [DIRS 175834]) provides for a total maximum length of the WB-67 Interstate Semi-trailer Design Vehicle of 75.5 ft. Although the IICD Volume 1 (DOE 2008 [DIRS 185213]) Figure B-1 indicates a 70-75-ft maximum vehicle bay length, legal-weight-truck-length, a WB-67 design basis vehicle is the closest AASHTO design vehicle that encompasses a 70-ft total length.]

12.2.1.2 IICD Compliance

...[MGR-RD [DIRS 177491], Section 3.1.2.B as flowed down from the CRD (DOE 2007 [DIRS 182960]), Section 3.2.1H. Naval SNF canister interfaces with the waste packages are shown in IICD Table A-1, Items I-17 and I-18.]

13.2.1.2.3 Railroad Shipments

The mechanical handling system shall be able to receive and accommodate rail shipments with the following characteristics:

1. Railroad shipments made under the AAR standard of unrestricted interchange.
2. The transportation cask system, including impact limiters, tie-downs, and other related transportation equipment, will be compatible with AAR Plate F dimensions.
3. The combined railcar/cask carrier (gross railcar, cask, skid, and impact limiters) not exceeding 65,750 lb gross weight per axle (e.g., 263,000 lb gross weight for a 4-axle railcar, 394,500 lb for a 6-axle railcar, or 526,000 lb for an 8-axle railcar) (except for naval shipments).
4. The maximum combined railcar/cask carrier weight for shipments of naval SNF will not exceed 789,000 lb.
5. Cask railcars having a maximum width of 128 in.
6. Cask railcars having a maximum length of 90 ft.
7. Cask railcars having a coupler-to-coupler distance of 93 ft 4 in. (based on a review of rail industry rolling stock)

[IICD Volume 1 (DOE 2008 [DIRS 185213]), Appendix C, Figure C-1. IICD Volume 2 (DOE 2007 [DIRS 176810]), Section 3.1.10 provides Items 5-7. Although IICD Volume 2 refers to a 1992 version of AAR, the repository will utilize AAR 2004. AAR 2004 [DIRS 169910] provides for a restricted interchange and plate.]

More extensive changes (continued)

13.2.1.2.13 Handling DOE SNF Standardized Canisters

The mechanical handling system within the CRCFs shall handle DOE SNF standardized canisters with interfaces shown on IICD Volume 1 (DOE 2008 [DIRS 185213]), Figures C-3 and C-4 through C-14.

[IICD Volume 1, Section 10.1.2 and Figures C-3 and C-4 and C-5 provide interfaces for the 18-in. diameter standardized SNF canisters illustrated in the IICD. The maximum canister handling fixture envelope for the 18-in. diameter standardized canisters (both lengths having the same handling interface) is shown in Figure C-6. Figures C-7 and C-8 provide the dimensional interfaces for the 18-in. diameter standardized SNF canisters and the waste package. Figures C-9 and C-10 provide interfaces for the 24-in. diameter standardized SNF canisters. The maximum canister handling fixture envelope is shown in Figure C-11 for the 24-in. diameter standardized SNF canisters (both lengths having the same handling interface). Figures C-12 and C-13 for the dimensional interfaces for the 24-in. diameter standardized SNF canisters and the waste package are placeholders.]

The National Spent Nuclear Fuel Program (NSNFP) standardized canisters must fit within various repository surface facility envelopes and handling equipment parameters as well as into the envelope in the appropriate disposal container. The facility envelopes are primarily the small canister staging racks. The staging rack positions or cells are uniform and have the same dimensions. The length and diameter of the 24-in. diameter standardized canisters and other canisters bound the length of the 18-in. diameter by 15-ft long standardized canisters; therefore, their interface with the staging rack is not shown.

The largest diameter canister interface with the staging rack is the MCO identified in Section 10.2 and shown on Figure C-14 5. The smallest SNF canister interface with the small canister staging rack is with the 18-in. diameter by 10-ft long canister and is shown on Figure C-14. Weight restrictions for each of the NSNFP standardized canisters are identified on the corresponding figures. Although DOE-EM provided handling details of the NSNFP standardized canister (i.e., skirt and lifting ring dimensions), mechanical details for the handling fixture have not been provided for either the 18-in. diameter or the 24-in. diameter canisters. The lifting fixtures, however, are constrained to operate within the nominal diameter of the canister.]

Although out of sequences, the following criteria must also be revised:

3.2.2.5.12 Naval Canister Criticality Control

The IHF design and operational controls (such as nuclear isolation from other waste forms, moderator controls, and minimizing neutron reflection) shall ensure that the naval spent fuel canister criticality potential preclosure requirement identified in Section 4.4.A 10.A of the WASRD (DOE 2007 [DIRS 169992]) *Naval Nuclear Propulsion Program Technical Baseline Document, Revision 2 S5G Only (NNPP 2006 [DIRS 178258])*, is met.

[IICD Volume 1 (DOE 2008 [DIRS 185213]) Section 10.3.2.1 provided this new criterion. HCD Volume 1 has an incorrect citation to the WASRD section—it should be the current WASRD Section 4.4.8 instead of 4.4.13. Changes were made to the text to correct the reference to the Naval Nuclear Propulsion Program Technical Baseline Document. This criterion also partially satisfies PO&PR (BSC 2008 [DIRS 185008]), Section 2.6.2.]

Revise the Conformance Verification tables to match criteria changes as follows:

Table 3-1

Change 3.2.2.5.15 Deleted to 3.2.2.5.13 Naval Canister Surface Radiation,
 Renumber existing 3.2.2.5.13 and 14 as 3.2.2.5.14 and 15,
 Add new 3.2.3.1.9 Reflector Materials, and
 Renumber existing 3.2.3.1.9 to 3.2.3.1.10 Non-ITS SSCs Interactions with ITS SSCs.

Table 8-1

Add new 8.2.3.1.1 Reflector Materials, and
 Renumber existing 8.2.3.1.1 to 8.2.3.1.2 Non-ITS SSCs Interactions with ITS SSCs.

Table 11-1

Change title of 11.2.2.7 to Waste Package/HLW Canister Interface
 Change title of 11.2.2.8 to Waste Package/DOE SNF Canister Sizing

Revise the reference list as follows:

[DIRS ~~178792~~ 185213]

DOE (U.S. Department of Energy) 2007 2008. "High-Level Radioactive Waste and U.S. Department of Energy and Naval Spent Nuclear Fuel to the Civilian Radioactive Waste Management System." Volume 1 of Integrated Interface Control Document. DOE/RW-0511, Rev. 3 4. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: ~~DOC.20070425.0002~~ DOC.20080307.0017.

[DIRS 178258]

NNPP (Naval Nuclear Propulsion Program) 2006. Naval Nuclear Propulsion Program Technical Baseline Document, Revision 2 S5G Only. B-ESH(EA)SFA-19. [Washington, D.C.]: Naval Nuclear Propulsion Program. ACC: MOV.20061010.0001.

11. REVIEWS AND APPROVAL			
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