

**BSC**

**Criteria/Basis Change Notice**

1. QA: QA  
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Complete only applicable items.

3. Document Identifier: 000-3DR-MGR0-00300-000		4. Rev.: 002	5. CBCN: 012
6a. Title: <i>Basis of Design for the TAD Canister-Based Repository Design Concept</i>		6b. Safety Classification of SSC: ITS / ITWI	
7. Reason for Change: A comprehensive review was conducted on 000-30R-MGR0-03500-000-000, <i>Preclosure Nuclear Safety Design Bases (NSDB)</i> , YMP/CM-0026, Rev. 2, <i>Monitored Geologic Repository Systems Requirements Document (MGR-RD)</i> and DOE/RW-0511, Rev. 4, <i>High-Level Radioactive Waste and U.S. Department of Energy and Naval Spent Nuclear Fuel to the Civilian Radioactive Waste Management System</i> , Volume 1 of <i>Integrated Interface Control Document (IICD)</i> .  The review was conducted as the result of an action item from CR-11983. The following sections of the BOD did not match specific criteria in the Preclosure NSDB and required updating. These sections are 10.2.3.1.8, 11.2.3.2.1, 12.2.3.1.1, 13.2.3.1.13, 13.2.3.1.27, 13.2.3.1.36 through 13.2.3.1.39, and 33.2.3.26. Several sections of the BOD contained editorial changes or text that did not align with the Preclosure NSDB, MGR-RD and IICD.  These changes are required to bring the BOD into alignment with the source documents listed above. Sections of the SAR that list the BOD as a visible reference are affected by this activity in that a new accession number associated with this CBCN will be added to the SAR reference citation. The proposed changes do not impact the text, tables, or figures in the SAR. Therefore, there are no technical impacts to this change.			

8. Supersedes Change Notice:	<input type="checkbox"/> Yes	If, Yes, Change Notice:	<input checked="" type="checkbox"/> No
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9. Disciplines/Organizations Affected by this Change:			
Nuclear Facilities Project Engr. <i>OB MAY 08</i>	Preclosure Safety Analysis Manager <i>T. Dunn 5/8/08</i>	LNS Document Review <i>5/8/08</i>	
Civil/Structural/Architectural Discipline Engr. Manager <i>5/8/08</i>	Mechanical Discipline Engr. Manager <i>5-08-2008</i>	Thermal/Structural Analysis Discipline Engr. Manager <i>5/8/08</i>	
Electrical/I&C Discipline Engr. Manager <i>5/8/08</i>		If 6b is ITS/ITWI, Quality Assurance: Quality Assurance <i>5/8/08</i>	

The changes are in bold and strikeout. Revise the criterion as follows:

**3.2.3.1.1 Structural Integrity**

The IHF structure shall be designed to maintain building structural integrity to protect ITS SSCs inside the building from external events and maintain building integrity to protect against building collapse onto waste containers (safety function).

- The mean frequency of building collapse due to:
  - ~~extreme~~ winds less than or equal to 120 mph shall not exceed  $1.0 \times 10^{-06}$ /yr.
  - volcanic ashfall less than or equal to a roof load of 21 lb/ft<sup>2</sup> shall not exceed  $1.0 \times 10^{-06}$ /yr.
  - the spectrum of seismic events shall be less than or equal to  $2.0 \times 10^{-06}$ /yr.

[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix B, Table B-1, Items IH.01, IH.02 and IH.04. However, TMRB-2007-011 (BSC 2007 [DIRS 182004]), TMRB Decision Proposal, Initial Handling Facility Seismic Design Basis, documented a project decision to design the facility to DBGM-2 to eliminate the need to obtain a source term for the naval SNF canister if the building structure collapsed onto the canister. It should be pointed out that the wind values provided here are different than the basic wind gust and tornado wind defined for ITS SSCs in Sections 6.1.3 and 6.1.4 of the PDC (BSC 2007 [DIRS 179641]). CBCN006 and CBCNxxx to Revision 002 provided this change.]

**3.2.3.1.6 Port Slide Gates**

The IHF cask port slide gate and waste package port slide gate shall be designed to protect against dropping a canister due to a spurious closure of the slide gate, protect against direct exposure to personnel, preclude canister breach and preclude canister drop onto floor (safety functions).

- The mean probability of a canister drop resulting from a spurious closure of the slide gate shall be less than or equal to:
  - $2.0 \times 10^{-06}$  per transfer for the cask port slide gate.
  - $4.0 \times 10^{-09}$  per transfer for the waste package port slide gate.
- The mean probability of inadvertent opening of a slide gate shall be less than or equal to:
  - $1.0 \times 10^{-09}$  per canister transfer for the cask port slide gate.
  - $2.0 \times 10^{-06}$  per transfer for the waste package port slide gate.

- Closure of the **cask port slide gate and waste package port slide gate** shall be incapable of breaching a canister.
- The waste package port slide gate shall be incapable of opening without a waste package transfer trolley **with** waste package in position to receive a canister.

*[Preclosure NSDB (BSC 2008 [DIRS 184200]) Appendix B, Table B-1, Items IH.HTC.01 through 07. CBCN006 and CBCNxxx to Revision 002 provided this change.]*

#### 4.2.3.1.1 Structural Integrity

The CRCFs' structures shall be designed to maintain building structural integrity to protect ITS SSCs inside the building from external events and to protect against building collapse onto waste containers (safety functions).

- The mean frequency of building collapse due to:
  - **extreme** winds less than or equal to 120 mph shall not exceed  $1.0 \times 10^{-06}/\text{yr}$ .
  - volcanic ashfall less than or equal to a roof load of 21 lb/ft<sup>2</sup> shall not exceed  $1.0 \times 10^{-06}/\text{yr}$ .
  - the spectrum of seismic events shall be less than or equal to  $2.0 \times 10^{-06}/\text{yr}$ .

*[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix C, Table C-1, Items CR.01, CR.02, and CR.04. CBCN006, and CBCN009, and CBCNxxx to Revision 002 provided this change.]*

#### 5.2.3.1.1 Structural Integrity

The WHF structure shall be designed to maintain building structural integrity to protect ITS SSCs inside the building from external events and protect against building collapse onto waste containers (safety functions).

- The mean frequency of building collapse of the WHF structure due to:
  - **extreme** winds less than or equal to 120 mph shall not exceed  $1.0 \times 10^{-06}/\text{yr}$ ,
  - volcanic ashfall less than or equal to a roof load of 21 lb/ft<sup>2</sup> shall not exceed  $1.0 \times 10^{-06}/\text{yr}$ .
  - the spectrum of seismic events shall be less than or equal to  $2.0 \times 10^{-06}/\text{yr}$ .

*[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix D, Table D-1, Items WH.01, WH.02, and WH.04. CBCN006, and CBCN009, and CBCNxxx to Revision 002 provided this change.]*

#### 6.2.3.1.1 Structural Integrity

The Receipt Facility structure shall be designed to maintain building structural integrity to protect ITS SSCs inside the building from external events, and protect against building collapse onto waste containers (safety functions).

- The mean frequency of building structural collapse due to:
  - **extreme** winds less than or equal to 120 mph shall not exceed  $1.0 \times 10^{-06}/\text{yr}$ .
  - volcanic ashfall less than or equal to a roof load of 21 lb/ft<sup>2</sup> shall not exceed  $1.0 \times 10^{-06}/\text{yr}$ .
  - the spectrum of seismic events shall be less than or equal to  $2.0 \times 10^{-06}/\text{yr}$ .

*[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix E, Table E-1, Items RF.01, RF.02 and RF.04. CBCN006, and CBCN009, and CBCNxxx to Revision 002 provided this change.]*

#### 10.2.3.1.4 Cask Tractor

The cask tractor, in conjunction with the cask transfer trailer, shall be designed to limit speed and preclude **fuel tank explosion cask breach** (safety functions).

- The speed of the cask tractor shall be limited to 2.5 mph.
- The cask tractor fuel tank shall preclude fuel tank explosions

*[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix E, Table E-1, Items AP.RF.HAT.07 and 08 for the Receipt Facility; Appendix D, Table D-1, Items AP.WHF.HAT.07 and 08 for the WHF; and Appendix F, Table F-1, Items AP.SB.HAT.01 and 02. These requirements are not listed for the CRCFs. CBCN004, and CBCN009, and CBCNxxx to Revision 002 provided this change.]*

#### 10.2.3.1.7 Cask Transfer Trailer

The cask transfer trailers, in conjunction with the cask tractor and transportation cask or horizontal STC, shall be designed to preclude fuel tank explosion, **limit speed**, reduce severity of a drop, and preclude puncture of a **canister and** cask (including due to impact) (safety functions).

- The cask transfer trailer fuel tank shall preclude fuel tank explosions.
- The cask transfer trailer shall preclude dropping a ~~horizontal transportation cask or horizontal STC~~ from a height greater than 6 ft measured from the equipment base.
- The cask transfer trailer shall preclude puncture of a ~~horizontal transportation casks or horizontal STC~~ due to collision.

## 10.2.3.1.7 (con't.)

- The cask transfer trailer shall preclude puncture of canister by the hydraulic ram.
- The speed of the cask transfer trailer shall be limited to 2.5 mph.
- The cask transfer trailer shall be designed to preclude puncture of a [horizontal] transportation casks and horizontal STCs due to the spectrum of seismic events.

[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix E, Table E-1, Items AP.RF.HAT.09 through 12; Appendix D, Table D-1, Items AP.WH.HAT.09 through 12 for the WHF; and Appendix F, Table F-1, Items AP.SB.HAT.03 through 08. CBCN004, ~~and~~ CBCN009, and CBCNxxx to Revision 002 provided this change.]

## 10.2.3.1.8 Aging Overpack

The AOs shall be designed to protect against direct exposure to personnel, protect against sliding of an AO, and protect against tipover of the AO (safety functions).

- The mean conditional probability of loss of shielding of the AO resulting from:
  - a drop shall be less than or equal to  $1.0 \times 10^{-05}$  per drop in the Receipt Facility ~~and~~
  - a drop shall be less than or equal to  $5.0 \times 10^{-06}$  per drop in the CRCFs, WHF, and Aging Facility
  - an impact or collision shall be less than or equal to  $1.0 \times 10^{-05}$  per impact
- The mean frequency of sliding of an AO (with a waste container) into another AO on the aging pad due to the spectrum of seismic events shall be less than or equal to  $5.0 \times 10^{-06}$ /yr, and
- The mean frequency of tipover of the AO ~~[with a waste container]~~ on the aging pad due to the spectrum of seismic events shall be less than or equal to  $5.0 \times 10^{-08}$ /yr.

[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix E, Table E-1, Items AP.RF.HAC.01 and 02 for the Receipt Facility; Appendix D, Table D-1, Items AP.WH.HACR.WHF.01 and 02 for the WHF CRCFs; Appendix C, Table C-1, Items AP.CR.HAC.01 and 02 for the CRCFs WHF; and Appendix F, Table F-1, Items AP.SB.HAC.06 through 09. The "protect against" safety function means either "reduce the probability of" or "reduce the frequency of". CBCN004, ~~and~~ CBCN009, and CBCNxxx to Revision 002 provided this change.]

## 11.2.3.2.1 DOE Standardized Canisters

To work in conjunction with the defense HLW/DOE SNF co-disposal waste package, the DOE standardized canisters shall be designed to provide containment (safety function).

- The mean conditional probability of breach of a DOE standardized canister in the CRCFs resulting from:
  - a drop of the canister shall be less than or equal to  $1.0 \times 10^{-05}$  per drop,
  - a drop of a load onto the canister shall be less than or equal to  $1.0 \times 10^{-5}$  per drop.
  - a side impact or collision shall be less than or equal to  $1.0 \times 10^{-08}$  per impact, and
  - the spectrum of fires while within a waste package shall be less than or equal to  $3.0 \times 10^{-04}$  per fire event.
- The mean conditional probability of breach of a DOE standardized canister, given the drop of an HLW canister onto the DOE standardized canister, shall be less than or equal to  $1.0 \times 10^{-05}$   ~~$3 \times 10^{-2}$~~  per drop.
- The mean conditional probability of breach of a DOE standardized canister, given the drop of another DOE standardized canister onto the first canister, shall be less than or equal to  $1.0 \times 10^{-05}$   ~~$3 \times 10^{-2}$~~  per drop.

[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix C, Table C-1, Items DS.CR.04 through 07, and items DS.CR.10 and DS.CR.11 for the CRCFs. Criteria for the DOE SNF canisters that are not related to the waste package are addressed in the mechanical handling requirements (see Chapter 13). CBCN007, ~~and~~ CBCN009, and CBCNxxx to Revision 002 provided this change.]

## 12.2.3.1.1 Waste Package Integrity

The naval SNF waste package shall be designed to provide containment (safety function).

- The mean conditional probability of breach of a sealed waste package resulting from:
  - a side impact shall be less than or equal to  $1.0 \times 10^{-08}$  per impact,
  - a drop of a load onto the waste package shall be less than or equal to  $1.0 \times 10^{-05}$  per drop, and
  - an end on impact or collision shall be less than or equal to:
    - $1.0 \times 10^{-05}$  per impact in the IHF and
    - $1.0 \times 10^{-08}$  per impact while in the TEV in the Subsurface Facility
- The mean conditional **probability** of breach of a canister inside a sealed waste package as a result of the spectrum of fires shall be less than or equal to  $1.0 \times 10^{-04}$   ~~$1.0 \times 10^{-05}$~~  per fire event in the Subsurface Facility.

[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix B, Table B-1, Items DN.IH.01 through 03 for the IHF; and Appendix G, Table G-1, Items DN.SS.01 through 04 for the Subsurface Facility. CBCN007 and CBCNxxx to Revision 002 provided this change.]

#### 13.2.3.1.4 Cask Transfer Trolleys

The cask transfer trolleys, ~~including and pedestals and seismic restraints,~~ in the IHF, CRCFs, Receipt Facility, and WHF shall be designed to (a) limit speed, (b) protect against spurious movement, and (c) protect against impact and inducing stress on the waste container **or the facility structure** (safety function).

- The speed of the cask transfer trolley shall be limited to 2.5 mi/hr ~~in the IHF, Receipt Facility, WHF and CRCFs.~~
- The mean probability of a spurious movement of the cask transfer trolley while a canister is being lifted by the canister transfer machine shall be less than or equal to  $1.0 \times 10^{-09}$  per transfer ~~in the IHF, Receipt Facility, WHF and CRCFs.~~
- The mean frequency of the sliding **impact** of ~~the~~ cask transfer trolley into a wall or structural column and inducing stresses that can breach the waste container due to the spectrum of seismic events shall be less than or equal to  $1.0 \times 10^{-06}$ /yr ~~in the IHF, Receipt Facility, WHF, and CRCFs.~~
- The mean frequency of a rocking impact of the cask transfer trolley into a wall or structural column and inducing stresses that can breach the waste container due to the spectrum of seismic events shall be less than or equal to  $1.0 \times 10^{-06}$ /yr ~~in the IHF, WHF, Receipt Facility, and CRCFs.~~

*[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix B, Table B-1, Items H.IH.HM.09 through 12 for the IHF; Appendix E, Table E-1, Items H.RF.HM.09 through 12 for the Receipt Facility; Appendix C, Table C-1, Items H.CR.HM.10 through 13 for the CRCFs; and Appendix D, Table D-1, Items H.WH.HM.12 through 15 for the WHF. CBCN005, CBCN009, and CBCNxxx to Revision 002 provided this change.]*

#### 13.2.3.1.9 Long Reach Grapple Adaptor

The long reach grapple adapter in the WHF shall be designed to protect against drop of a load (safety function).

- The long reach grapple adapter is an integral part of the load-bearing path. See ~~Cask Handling Auxiliary Pool~~ Crane requirements.

*[Preclosure NSDB (BSC 2008 [DIRS 184200]) Appendix D, Table D-1 Item H.WH.HMH.1107. CBCNxxx to Revision 002 provided this change.]*

#### 13.2.3.1.10 Spent Fuel Transfer Machine

The spent fuel transfer machine in the WHF shall be designed to protect against a drop of an SNF assembly, protect against lifting an SNF assembly above the safe limit for workers, protect against collapse of the spent fuel transfer machine ~~onto a waste container or an SNF assembly,~~ and to protect against an SNF assembly or heavy object drop from the **spent fuel transfer machine onto an SNF assembly** (safety function).

- The mean probability of dropping an SNF assembly due to a failure of **a any** piece of equipment within the load path ~~supporting the SNF assembly~~ shall be less than or equal to  $5.0 \times 10^{-06}$  per assembly **transfer lift**.
- The mean probability of lifting an SNF assembly **such that 10 CFR 63.111(a) limits are exceeded within 40 feet of the surface of the pool water** shall be less than or equal to  $7.0 \times 10^{-07}$  per assembly **transfer movement**.
- The mean frequency of collapse of the spent fuel transfer machine due to the spectrum of seismic events shall be less than or equal to  $2.0 \times 10^{-05}$ /yr.
- The mean frequency of a hoist system failure of the spent fuel transfer machine due to the spectrum of seismic events shall be less than or equal to  $2.0 \times 10^{-05}$ /yr.

*[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix D, Table D-1, Items H.WH.HTF.01 through 04. CBCN009 and CBCNxxx to Revision 002 provided this change.]*

#### 13.2.3.1.13 Canister Transfer Machines

The canister transfer machines shall be designed to (a) protect against drop, (b) limit drop height, (c) protect against a drop of a load onto a canister, (d) protect against a spurious movement, (e) limit speed, (f) preclude non-flat bottom drop of a DPC, TAD, or naval SNF canister, (g) protect against direct exposure to personnel, (h) maintain moderator control **in the WHF and CRCFs**, (i) preclude canister breach, (k) maintain DOE SNF canister separation in the CRCFs, (l) protect against collapse of the CTM, and (m) protect against a canister or heavy object drop from the CTM (safety functions).

- The mean probability of dropping a canister from below the two-block height due to the failure of a piece of equipment within the load-bearing **path** shall be less than or equal to:
  - $1.0 \times 10^{-05}$  per transfer ~~for each CTM in the Receipt Facility, WHF, and CRCFs~~
  - $2.0 \times 10^{-04}$  per transfer ~~for each CTM~~ (in the IHF **only**)
- The mean probability of a drop of a canister from the two-block height due to the failure of **a any** piece of equipment in the load-bearing path shall be less than or equal to  $3.0 \times 10^{-08}$  per ~~transfer for the CTM for the CRCFs and WHF, IHF, and the Receipt Facility.~~
- The two-block height drop shall not exceed 45 feet from the bottom of a canister to the **cavity** floor of the cask or aging overpack or waste package cavity in the Receipt Facility, WHF, and CRCFs and 40 feet in the IHF.

## 13.2.3.1.13 (con't.)

- The mean probability of dropping a load onto a canister shall be less than or equal to:  **$1.0 \times 10^{-05}$  per transfer**  
 ~~$1.0 \times 10^{-05}$  per transfer by CTM in the Receipt Facility, CRCFs, and WHF, and~~  
 ~~$1.0 \times 10^{-05}$  per transfer by the CTM for the IHF~~
- The mean probability of spurious movement of the CTM while a the canister is being lifted or lowered shall be less than or equal to:
  - $7.0 \times 10^{-09}$  per **transfer lift for each CTM in the CRCFs, IHF and WHF and**
  - $5.0 \times 10^{-09}$  per **transfer lift for each CTM (in the Receipt Facility only)**
- Closure of the CTM slide gate shall be incapable of breaching a canister.
- The CTM shall preclude non-flat bottom drops of naval SNF canisters, DPCs, or TADs
- The mean probability of inadvertent radiation streaming resulting from the inadvertent opening of the CTM slide gate, the inadvertent raising of the CTM shield skirt, or an inadvertent motion of the CTM away from an open port shall be less than or equal to:
  - $9.0 \times 10^{-06}$  per transfer in the CRCFs and the WHF
  - $1.0 \times 10^{-04}$  per transfer in the IHF
  - $1.0 \times 10^{-06}$  per transfer in the Receipt Facility.
- The speed of the CTM trolley and bridge shall be limited to 20 **ft/min fpm**.
- The mean frequency of collapse of the CTM due to the spectrum of a seismic events shall be less than or equal to  $1.0 \times 10^{-05}$ /yr.
- The mean frequency of a hoist system failure of the CTM due to spectrum of seismic events shall be less than or equal to  $2.0 \times 10^{-05}$ /yr.
- The mean probability of inadvertent introduction of an oil moderator into a canister ~~in the WHF and CRCFs~~ shall be less than or equal to  $9.0 \times 10^{-05}$  over a 720-hour period following breach of a canister (**in the WHF and CRCF**).
- The mean conditional probability of inadvertent placement of more than four DOE standardized canisters in a TAD waste package, TAD staging rack, or AO shall be less than or equal to  $3.0 \times 10^{-06}$  in the CRCFs.
- The mean frequency of drop by the CTM of the naval SNF canister resulting in breach of the canister shall be less than or equal to  $2 \times 10^{-05}$  over the preclosure period (**in the IHF only**).

*[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix B, Table B-1, Items H.IH.HTC.01 through 12 for the IHF; Appendix E, Table E-1, Items H.RF.HTC.02 through 12 for the Receipt Facility; Appendix C, Table C-1, Items H.CR.HTC.01 through 13 for the CRCFs; and Appendix D, Table D-1, Items H.WH.HTC.01 through 12 for the WHF. Some of the interlocks identified for the CTM may be satisfied from the slide gates in Chapter 4. CBCN005, CBCN009, CBCN010, CBCN011, and CBCNxxx to Revision 002 provided this change.]*

## 13.2.3.1.18 DOE Canister Staging Racks

The DOE canister staging racks (and thermal barrier) in the CRCFs shall be designed to protect against tipover/impact of a canister **and protect against canister breach** (safety function).

- The mean frequency of collapse of DOE canister staging racks (such that the spacing between the surface of adjacent DOE standardized canisters in a staging rack is less than 30 cm) due to the spectrum of seismic events shall be less than or equal to  $2.0 \times 10^{-06}$ .
- The mean conditional probability of breach of a DOE standardized canister contained within a staging rack resulting from the spectrum of fires shall be less than or equal to  $2.0 \times 10^{-06}$  per fire event.

*[Preclosure NSDB (BSC 2008 [DIRS 184200]) Appendix C, Table C-1, Item H.CR.HTC. 18 and H.CR.HTC.19. CBCN005, and CBCN009, and CBCNxxx to Revision 002 provided this change.]*

## 13.2.3.1.21 Waste Package Transfer Trolleys

The waste package transfer trolleys (including ~~P~~pedestals, ~~S~~seismic ~~R~~rail ~~R~~restraints, and ~~R~~rails) in the IHF and CRCFs shall (a) preclude rapid tilt-down, (b) limit speed, (c) protect against spurious movement, (d) protect against a tipover of the WPTT holding a loaded waste package, and (e) protect against rocking (which induces an impact into a wall) ~~with of~~ a WPTT holding a loaded waste package (safety function).

- The WPTT shall be designed to be incapable of rapid tilt-down.
- The speed of the WPTT shall be limited to 2.5 mi/hr.

## 13.2.3.1.21 (con't.)

- The mean probability of spurious movement of the WPTT while ~~the a~~ canister is being lowered **by the CTM** shall be less than or equal to  $1.0 \times 10^{-09}$  per transfer.
- The mean frequency of tipover of the ~~waste package transfer trolley~~ **WPTT** system due to the spectrum of seismic events shall be less than or equal to  $2.0 \times 10^{-06}$ /yr.
- The mean frequency of rocking impact of the ~~waste package transfer trolley~~ **WPTT** into a wall due to the spectrum of seismic events shall be less than or equal to  $2.0 \times 10^{-05}$ /yr **(for the CRCFs)**.
- **The mean frequency of rocking impact of the WPTT into a wall or column due to the spectrum of seismic events shall be less than or equal to  $2.0 \times 10^{-05}$ /yr (for the IHF).**

[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix B, Table B-1, Items H.IH.HL.02 through 06 for the IHF and Appendix C, Table C-1, Items H.CR.HL.02 through 06 for the CRCFs. CBCN005, ~~and~~ CBCN009, **and CBCNxxx** to Revision 002 provided this change.]

## 13.2.3.1.27 Transportation Cask and STC

Transportation casks (not provided by the repository) and the shielded transfer cask (both analyzed as representative casks) provide containment of radionuclides, protect against direct exposure to personnel and lid contact with canister (safety function).

- The mean conditional probability of a breach of a canister in a sealed cask resulting from:
  - a drop shall be less than or equal to  $1.0 \times 10^{-05}$  per drop,
  - a drop of a load onto the cask shall be less than or equal to  $1.0 \times 10^{-05}$  per drop, and
  - a side impact or collision shall be less than or equal to  $1.0 \times 10^{-08}$  per impact
- **The mean conditional probability of breach of a canister in a sealed cask on a railcar, truck trailer, or cask transfer tra resulting from a:**
  - **drop shall be less than or equal to  $1.0 \times 10^{-05}$  per drop,**
  - **drop of a load onto the cask shall be less than or equal to  $1.0 \times 10^{-05}$  per drop, and**
  - **side impact or collision shall be less than or equal to  $1.0 \times 10^{-08}$  per impact**
- The mean conditional probability of loss of cask gamma shielding resulting from:
  - a drop of a cask shall be less than or equal to:
    - $1.0 \times 10^{-05}$  per drop ~~for the IHF, WHF, and CRCFs~~
    - $1.0 \times 10^{-08}$  per drop **(for the Receipt Facility only)**
  - a collision or side impact to a cask shall be less than or equal to  $1.0 \times 10^{-08}$  per impact.
  - drop of a load onto a cask shall be less than or equal to:
    - $1.0 \times 10^{-05}$  per impact ~~for the IHF and CRCFs~~
    - $10 \times 10^{-08}$  per impact **(for the Receipt Facility-WHF only)**
- The mean conditional probability of breach of a sealed cask, **in the WHF**, containing uncanistered SNF resulting from
  - a drop of a cask shall be less than or equal to  $1.0 \times 10^{-05}$  per drop
  - a drop of a load onto the cask shall be less than or equal to  $1.0 \times 10^{-05}$  per drop
  - a side impact or collision shall be less than or equal to  $1.0 \times 10^{-08}$  per impact
  - **the spectrum of fires shall be less than or equal to  $5.0 \times 10^{-02}$  per fire event**
- The geometry of the transportation casks that carry HLW **in the IHF**, and **HLW and DOE** standardized canisters **in the CRCFs**, shall preclude lid contact with canisters following a drop of a cask lid.
- ~~The mean conditional probability of breach of a sealed cask containing uncanistered SNF resulting from the spectrum of fires shall be less than or equal to  $5.0 \times 10^{-02}$  per fire event.~~
- The mean conditional probability of breach of a sealed cask containing uncanistered commercial spent nuclear fuel ~~on a truck trailer~~ resulting from:
  - a collision, **while on a truck trailer**, followed by a rollover/drop shall be less than or equal to  $1.0 \times 10^{-08}$  per drop
  - a drop of a load onto the cask shall be less than or equal to  $1.0 \times 10^{-05}$  per drop

[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix B, Table B-1, Items H.IH.01 through 07 for the IHF; Appendix E, Table E-1, Items H.RF.01 through 06 for the Receipt Facility; Appendix C, Table C-1, Items H.CR.01 through 07; Appendix D, Table D-1, Items H.WH.01 through 10 for the WHF; and Appendix F, Table F-1, Items H.SB.01 through 08. The Preclosure NSDB state that "Only transportation casks may contain uncanistered SNF; STCs and transportation casks may contain canistered SNF". CBCN005, ~~and~~ CBCN009, **and CBCNxxx** to Revision 002 provided this change.]

## 13.2.3.1.28 Site Prime Mover

The site prime mover ~~(or equivalent), in conjunction with a transportation cask,~~ shall be designed to limit speed, and preclude fuel tank explosion (safety function).

- The speed of the site prime mover shall be limited to 9 mi/hr.
- The fuel tank of a site prime mover that enters the facility shall preclude fuel tank explosions

## 13.2.3.1.28 (con't.)

[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix B, Table B-1, Items H.IH.08 and H.IH.09 for the IHF, Appendix E, Table E-1, Items H.RF.07 through H.RF.08 for the Receipt Facility, Appendix C, Table C-1, items H.CR.08 and H.CR.09 for the CRCFs, Appendix D, Table D-1, Items H.WH.11 through H.WH.12 for the WHF, and Appendix F, Table F-1, Items H.SB.09 through 10. CBCN005, ~~and~~ CBCN009, and CBCNxxx to Revision 002 provided this change.]

## 13.2.3.1.36 DOE Standardized Canisters

Although these canisters are not provided by the repository, in conjunction with the mechanical handling system, the DOE standardized canister shall provide containment (safety function).

- The mean conditional probability of breach of a DOE standardized canister resulting from:
  - a drop of the canister shall be less than or equal to  $1.0 \times 10^{-05}$  per drop.
  - a drop of a load onto the canister shall be less than or equal to  $1.0 \times 10^{-05}$  per drop.
  - a side impact or collision shall be less than or equal to  $1.0 \times 10^{-08}$  per impact.
- The mean conditional probability of breach of a DOE standardized canister resulting from the spectrum of fires while:
  - contained within a waste package shall be less than or equal to  $3.0 \times 10^{-04}$  per fire event.
  - contained within a transportation cask or staging area shall be less than or equal to  $2.0 \times 10^{-06}$  per fire event.
  - located within the CTM Shield Bell shall be less than or equal to  $1.0 \times 10^{-04}$  per fire event.
- The mean conditional probability of breach of a DOE standardized canister:
  - given the drop of an HLW canister onto the DOE standardized canister, shall be less than or equal to  $1.0 \times 10^{-05}$   ~~$3.0 \times 10^{-02}$~~  per drop.
  - given the drop of another DOE standardized canister onto the first canister, shall be less than or equal to  $1.0 \times 10^{-05}$   ~~$3.0 \times 10^{-02}$~~  per drop.

[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix C, Table C-1, Items DS.CR.04 through 11; and Appendix F, Table F-1, Item DS.SB.01. This criterion also partially satisfies PO&PR (BSC 2008 [DIRS 185008]), Section 2.6.2. Although this criterion previously addressed the MCO, it has since been removed from the NSDB. HLW canisters were split out separately. CBCN005, ~~and~~ CBCN009, and CBCNxxx to Revision 002 provided this change.]

## 13.2.3.1.37 Dual Purpose Canister

Although DPCs are not provided by the repository, in conjunction with the mechanical handling system, the dual-purpose canister (analyzed as a representative canister) shall be designed to provide containment (safety functions).

- The mean conditional probability of breach of a canister resulting from a:
  - drop of the canister shall be less than or equal to  $1.0 \times 10^{-05}$  per drop.
  - drop of a load onto the canister shall be less than or equal to  $1.0 \times 10^{-05}$  per drop.
  - ~~slide-side~~ impact or collision shall be less than or equal to  $1.0 \times 10^{-08}$  per impact.
- The mean conditional probability of breach of a canister resulting from the spectrum of fires while:
  - contained within a transportation cask shall be less than or equal to  $2.0 \times 10^{-06}$  per fire event,
  - located within the CTM shield bell shall be less than or equal to  $1.0 \times 10^{-04}$  per fire event, and
  - contained within an aging overpack shall be less than or equal to  $1.0 \times 10^{-06}$  per fire event.
- The mean conditional probability of breach of a canister in a HAM resulting from:
  - a drop of a load onto a HAM shall be less than or equal to  $1.0 \times 10^{-05}$   ~~$4.0 \times 10^{-08}$~~  per drop
  - a collision or side impact shall be less than or equal to  $1.0 \times 10^{-08}$  per event
  - the spectrum of fires shall be less than or equal to  $1.0 \times 10^{-06}$  per fire event
- **The mean conditional probability of breach of a canister within an aging overpack following a drop shall be less than or equal to  $1.0 \times 10^{-05}$  per drop.**
- **The mean conditional probability of breach of a canister within an aging overpack resulting from a side impact or collision shall be less than or equal to  $1.0 \times 10^{-08}$  per event.**

[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix E, Table E-1, Items DS.RF.01 through 06 for the Receipt Facility; Appendix C, Table C-1, Items DS.CR.20 through 25 for the CRCFs; Appendix D, Table D-1, Items ~~DHDS~~.WH.01 through 06 for the WHF, and Appendix F, Table F-1, items DS.SB.03 through 09. CBCN005, ~~and~~ CBCN009, and CBCNxxx to Revision 002 provided this change.]

## 13.2.3.1.38 TAD Canister

The TAD canister shall be designed to provide for containment (safety functions).

- The mean conditional probability of breach of a canister resulting from a:
  - drop of the canister shall be less than or equal to  $1.0 \times 10^{-05}$  per drop,
  - drop of a load onto the canister shall be less than or equal to  $1.0 \times 10^{-05}$  per drop, and
  - ~~low-speed~~ **side** impact or collision shall be less than or equal to  $1.0 \times 10^{-08}$  per impact.

## 13.2.3.1.38 (con't.)

- The mean conditional probability of breach of a representative canister resulting from **a the spectrum of** fire while:
  - contained within a waste package ~~resulting from a fire~~ shall be less than or equal to  ~~$3.0 \times 10^{-06}$~~   **$3.0 \times 10^{-04}$**  per fire event **(in the CRCFs only)**,
  - contained within a cask [or STC] shall be less than or equal to  $2.0 \times 10^{-06}$  per fire event,
  - located within the CTM shield bell shall be less than or equal to  $1.0 \times 10^{-04}$  per fire event, and
  - contained within an AO shall be less than or equal to  $1.0 \times 10^{-06}$  per fire event.
- The mean conditional probability of breach of a canister in a HAM resulting from:
  - a drop of a load onto a HAM shall be less than or equal to  **$1.0 \times 10^{-05}$**   ~~$1.0 \times 10^{-08}$~~  per drop
  - a collision or side impact shall be less than or equal to  $1.0 \times 10^{-08}$  per event
  - the spectrum of fires shall be less than or equal to  $1.0 \times 10^{-06}$  per fire event.
- **The mean conditional probability of breach of a canister within an aging overpack following a drop shall be less than or equal to  $1.0 \times 10^{-05}$  per drop.**
- **The mean conditional probability of breach of a canister within an aging overpack resulting from a side impact or collision shall be less than or equal to  $1.0 \times 10^{-08}$  per event.**

[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix E, Table E-1, Items DS.RF.07 through 12 for Receipt Facility; Appendix C, Table C-1, Items DS.CR.26 through 32 for the CRCFs; Appendix D, Table D-1, Items DS.WH.07 through 12 for the WHF; and Appendix F, Table F-1, items DS.SB.03 through 09. CBCN005, ~~and~~ CBCN009, **and** CBCNxxx to Revision 002 provided this change.]

## 13.2.3.1.39 HLW Canisters

Although the HLW canisters are not provided by the repository, in conjunction with the mechanical handling system, the defense HLW canisters shall be designed to provide containment (safety function).

- The mean conditional probability of breach of HLW canister resulting from:
  - a drop of the canister shall be less than or equal to  $3.0 \times 10^{-02}$  per drop in the IHF and the CRCFs:
  - a side impact or collision shall be less than or equal to  $1.0 \times 10^{-08}$  per impact,
  - a drop of a load onto a ~~canister loaded cask~~ shall be less than or equal to  $3 \times 10^{-025}$  per **drop transfer**.
- The mean conditional probability of breach of a HLW **canister** resulting from the spectrum of fires while:
  - in a waste package shall be less than or equal to  $3.0 \times 10^{-04}$  per fire event,
  - in a transportation cask shall be less than or equal to  $2.0 \times 10^{-06}$  per fire event,
  - located within the CTM shield bell shall be less than or equal to  $1.0 \times 10^{-04}$  per fire event, and
- The mean conditional probability of breach of an HLW canister:
  - given the drop of a DOE standardized canister onto an HLW canister, shall be less than or equal to  $3.0 \times 10^{-02}$  per drop.
  - given the drop of another HLW canister onto the first canister, shall be less than or equal to  $3.0 \times 10^{-02}$  per drop.

[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix B, Table B-1, Items DS.IH.04 through 09 for the IHF; Appendix C, Table C-1, Items DS.CR.12 through 19 for the CRCFs; and Appendix F, Table F-1, Item DS.SB.02. CBCN005, ~~and~~ CBCN009, **and** CBCNxxx to Revision 002 provided this change.]

## 16.2.3.1.2 ITS Diesel Generators

The ITS diesel generators [A and B] (including their fuel oil, air start, jacket water cooling, lubricating oil, and air intake and exhaust systems) shall provide electrical power to the ITS surface nuclear confinement HVAC systems (safety function).

- The mean conditional probability for ITS electrical power failure, given the loss of offsite power, shall be less than or equal to  $3.0 \times 10^{-01}$  over a period of 720 hours following a radionuclide release.
- ~~In the WHF, following a cask overpressure or a cooling system line break, the mean conditional probability for ITS electrical power distribution shall be less than or equal to  $5.0 \times 10^{-02}$  over a period of 24 hours.~~

[Preclosure NSDB (BSC 2008 [DIRS 184200]), ~~Appendix E, Table E-1, Item EE.RF.02 for the Receipt Facility;~~ Appendix C, Table C-1, Item EE.CR.02 for the CRCFs; and Appendix D, Table D-1, Items ~~EE.WH03 and 04~~ for the WHF. Emergency changed to ITS in accordance with Repository System Codes (BSC 2007 [DIRS 184183]). CBCN007, ~~and~~ CBCN009, **and** CBCNxxx to Revision 002 provided this change.]

## 19.2.3.1.1 Confinement HVAC Availability

Portions of the surface nuclear confinement HVAC system that exhaust from areas with a potential for a breach in the CRCFs and WHF shall be designed to mitigate the consequences of radionuclide release (safety function).

- The mean probability that the surface nuclear confinement HVAC system (including HEPA filtration of exhaust air from the confinement areas) becomes unavailable during:
    - (for CRCF and WHF) a 30-day mission time following a radionuclide release shall be less than or equal to  $4.0 \times 10^{-02}$ .
- This parameter does not apply in the case of large fires, which may disable the HVAC system.**



## 19.2.3.1.1 (con't.)

- (for WHF only) a 1-day mission time following a radionuclide release from the cask sampling and cooling process shall be less than or equal to  $1.0 \times 10^{-03}$ .

[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix C, Table C-1, Item VC.CR.01 for the CRCFs; and Appendix D, Table D-1, Items VC.WH.01 and 02 for the WHF. These parameters do not apply in the case of large fires, which may disable the HVAC system. CBCN007, ~~and~~ CBCN009, and CBCNxxx to Revision 002 provided this change.]

## 33.2.3.26 Transportation Cask Personnel Protection

- drop shall be less than or equal to  $1.0 \times 10^{-05}$  per drop,
- drop of a load onto the cask shall be less than or equal to  $1.0 \times 10^{-05}$  per drop, and
- side impact or collision shall be less than or equal to  $1.0 \times 10^{-08}$  per impact.
- The mean conditional probability of loss of cask gamma shielding resulting from:
  - a drop of a cask shall be less than or equal to  $1.0 \times 10^{-05}$  per drop
  - a drop of a cask shall be less than or equal to  $1.0 \times 10^{-08}$  per drop (in the Receipt Facility only)
  - a collision or side impact to a cask shall be less than or equal to  $1.0 \times 10^{-08}$  per impact
  - drop of a load onto a cask shall be less than or equal to:
    - $1.0 \times 10^{-08}$  per impact (in the WHF **only**)
    - ~~$1.0 \times 10^{-06}$  per impact in the Receipt Facility~~
    - $1.0 \times 10^{-05}$  per impact in the IHF and CRCFs
- **The mean conditional probability of breach of a canister in a sealed cask on a railcar, truck trailer, or cask transfer trailer resulting from a:**
  - drop shall be less than or equal to  $1.0 \times 10^{-05}$  per drop,
  - drop of a load onto the cask shall be less than or equal to  $1.0 \times 10^{-05}$  per drop, and
  - side impact or collision shall be less than or equal to  $1.0 \times 10^{-08}$  per impact
- **The mean conditional probability of breach of a sealed cask containing uncanistered commercial SNF on a truck trailer resulting from a collision followed by a rollover/drop shall be less than or equal to  $1.0 \times 10^{-08}$  per drop.**
- **The mean conditional probability of breach of a sealed cask containing uncanistered commercial SNF resulting from a drop of a load onto the cask shall be less than or equal to  $1.0 \times 10^{-05}$  per drop.**

[Preclosure NSDB (BSC 2008 [DIRS 184200]), Appendix B, Table B-1, Items H.IH.01 through 07 for casks in the IHF; Appendix E, Table E-1, Items H.RF.01 through 06 for casks in the Receipt Facility; Appendix C, Table C-1, Items H.CR.01 through 07 for casks in the CRCFs; Appendix D, Table D-1, Items H.WH.01 through 10 for casks in the WHF; and Appendix F, Table F-1, Items H.SB.01 through 08 for casks in the Intra-Site Operations Areas. The Preclosure NSDB state that "Only transportation casks may contain uncanistered SNF; STCs and **transportation** casks may contain canistered SNF". CBCN007 ~~and~~ CBCN009, and CBCNxxx to Revision 002 provided this change.]

The following changes are made to align the BOD with the MGR-RD:

## 6.2.1.2 Annual Receipt Rates

The Receipt Facility shall be designed to receive the majority of the DPCs and TAD canisters that have thermal outputs at receipt of greater than 11.8 kW/canister. The Receipt Facility shall be capable of receiving 140 MTHM/year of DPCs with thermal outputs greater than 11.8 kW/canister and 1,000 MTHM/year of TAD canisters with thermal outputs greater than 11.8 kW/canister.

[CRD (DOE 2007 [DIRS 182960]), Sections 3.2.1B and 3.2.1C and MGR-RD [DIRS 184999], Sections ~~3.1.1.I~~ **3.1.1.J** and 3.1.1.K provide for repository annual receipt rates. The repository receipts place DPCs in the 10% non-TAD canister portion of the waste stream to be split with the WHF. The Receipt Facility also overlaps the CRCFs in capability to receive and pass canister to the Aging Facility. The allocations above were evaluated and selected in the Nuclear Facilities Receipt Rate Requirements Analysis Engineering Study (BSC 2007 [DIRS 181547]), Sections 2.1 and 5.7.3. This information also meets IICD Volume 2 (DOE 2007 [DIRS 176810]), Section 3.1.2.1 statements. CBCN003 to Revision 002 provided the update to the MGR-RD.]

## 11.2.2.3 Waste Package Dimensions

The commercial SNF waste package shall be designed to the TAD canister dimensions in accordance with the *Transportation, Aging and Disposal Canister System Performance Specification* (DOE 2007 [DIRS 181403]).

[MGR-RD [DIRS 184999], Section **3.1.2.G** ~~3.1.2.F~~ and *Transportation, Aging and Disposal Canister System Performance Specification* (DOE 2007 [DIRS 181403]). CBCN003, and CBCNxxx to Revision 002 provided the update to the MGR-RD.]

**12.2.1.1 Line Loading**

The naval SNF waste package design shall be capable of operating over a range of thermal conditions and, with the Subsurface Facility, shall not be emplaced in a seven waste package segment which contains another waste package in excess of 11.8 kW or has an emplacement drift line load (average linear thermal power) of greater than 1.45 kW/m.

*[MGR-RD [DIRS 184999], Sections 3.2.12.C and 3.2.12.D and Postclosure Modeling and Analysis Design Parameters, Table 1, item # 05-03, (BSC 2008 [DIRS 183627]). The MGR-RD sections cited ~~has~~ have been revised by CO Letter No. 08-007 (Peterson 2008 [DIRS 184939]) to provide for greater flexibility in the receipt and processing of the incoming commercial waste stream and yet maintain the conditions required for naval waste stream. CBCN003, and CBCNxxx to Revision 002 provided the update to the MGR-RD.]*

**The following changes are made to align the BOD with the IICD**

**4.2.1.9.14 HLW Canister Thermal Limit**

The CRCFs shall be designed to receive, transfer, and package canisters containing HLW or HLW and IPWF with a total heat generation rate not to exceed 1,500 watts per canister at the year of shipment. 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.

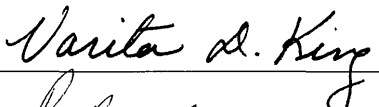
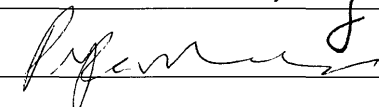
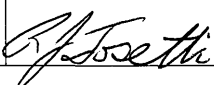
*[WASRD (DOE 2007 [DIRS 169992]), Section 4.8.13. IICD Volume 1 (DOE 2008 [DIRS 185213 495243]), Section 13 provides the temperature criterion. CBCN008 to Revision 002 provided the update to the IICD Volume 1.]*

**9.8.2.2.5 DBV, Semi-Trailer**

Road layouts and geometry of the access roads throughout the BOP facilities shall be designed for a tractor-trailer combination vehicle utilizing the American Association of State Highway and Transportation Officials (AASHTO) WB-67 interstate semi-trailer design vehicle while remaining on the finished surface of the roadway throughout performance of driving maneuvers.

*[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 75-ft maximum vehicle bay length, a WB-67 design basis vehicle is the closest AASHTO design vehicle that encompasses a ~~75~~ 79-ft total length. CBCN008, and CBCNxxx to Revision 002 provided this change.]*

**11. REVIEWS AND APPROVAL**

Printed Name	Title	Signature	Date
11a. Preparer: Varita D. King	Discipline Engineering Manager		5-8-2008
11b. Concurrence: Partha Parthasarthy	Manager of Discipline Engineering		5/8/2008
11c. Concurrence: N/A	Project Engineering Manager		
11d. Approved: Barbara Rusinko	Engineering Manager		5/8/2008