

# Criteria/Basis Change Notice

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1. QA: ~~DNA~~ ~~SK~~  
2. Page 1 of 8 3/5/08

Complete only applicable items.

ENG. 20080306.0009

3. Document Identifier: 000-3DR-MGR0-00100-000		4. Rev.: 007	5. CBCN: 011
6a. Title: <i>Project Design Criteria Document</i>		6b. Safety Classification of SSC: ITS & Non-ITWI	
7. Reason for Change: <p>During implementation of Fire Protection Program (FPP) requirements, it was identified that PDC Criterion 4.9.1.1.5 implemented more than one NAC 477 requirements without citing each paragraph source. Although NAC 477 was referenced, a clarification of the multiple sections would provide a better rationale.</p> <p>Additionally, several codes are listed in multiple sections, creating a potential for mismatching codes for different purposes, and should be consolidated only into Nuclear &amp; Radiological section 4.10. L&amp;NS issued a change to Regulatory Guidance Agreement (RGA) REG-CRW-RG-000058 to clarify the Regulatory Source RG-1.69 guidance:</p> <ul style="list-style-type: none"> <li>Mechanical Handling 4.8.1.1 and Nuclear &amp; Radiological 4.10.1.5 both refer to ANSI/ANS-6.1.1 for fluence-to-dose factors. This code should only be utilized in the Nuclear &amp; Radiological section as Mechanical does not conduct these analyses.</li> <li>Mechanical Handling 4.8.1.1 and Nuclear &amp; Radiological 4.10.1.7 both refer to ANSI/ANS-6.4 for concrete radiation shielding. This code should only be utilized in the Nuclear &amp; Radiological section as Mechanical doesn't conduct these analyses or provide the specifications for the shielding material constituents, Nuclear &amp; Radiological does.</li> <li>Civil/Structural/Architectural 4.2.11.12, Mechanical Handling 4.8.1.1, and Nuclear &amp; Radiological 4.10.1.1.1 all refer to ANSI/ANS-6.4.2-1985. Neither Civil nor Mechanical conduct analyses using this code, only Nuclear &amp; Radiological does.</li> </ul> <p>While revising 4.2.11.12, separate out the human engineering/ergonomic criteria to highlight the need to provide space for maintenance activities. Create a new criterion 4.2.11.13 for this purpose. Similarly with mechanical handling criteria 4.8.1.1 and 4.8.1.2.3.</p> <p>During development of a specification for shield windows, it was identified that a couple of new standards needed to be added to the PDC and a separate section should be provided to address them. These are being added as Section 4.8.1.4.</p> <p>During a review of cancelled or superseded documents, it was noticed that PDC criterion 4.2.13.1.3 referred to the <i>Postclosure Modeling and Analyses Design Parameters (PMADP)</i> document. This duplicates the <i>Basis of Design for the TAD Canister-Based Repository Design Concept (BOD)</i>, Criterion 8.2.1.18. The PMADP should not be referenced in the PDC. This CBCN removes the reference.</p> <p>During review of requirements, it was determined that <b>following additional Standards needed to be added to the PDC:</b></p> <ol style="list-style-type: none"> <li>Changes to Section 4.8.1.2.4, 4.8.1.2.8 and the addition of 4.8.1.2.10 and 4.8.1.2.11 are to clarify requirements relevant to NSDB requirements,</li> <li>ASME B30.10-2005, <i>Hooks</i>, is used as a design code for lifting equipment that does not have an industry standard,</li> <li>AMCA Publication 99, <i>Standards Handbook</i> is an industry standard for the design and sizing of fans,</li> </ol> <p>Section 4.2.11.2.5 was revised to clarify the design requirements for ITS and Non-ITS SSCs. Revised section 4.9.7.1 description and made editorial changes. Added new section 4.9.7.5.7 to include Cask Cooling Utilizing Borated Water System.</p> <p>Section 4.9.2.2.13 revised to include additional sections to existing codes/standards. Section 4.9.2.2.13 revised to add new codes and additional sections to existing codes/standards.</p> <p>The above changes are provided as clarifications. There is no technical impact resulting from these changes.</p>			
8. Supersedes Change Notice:		<input type="checkbox"/> Yes    If, Yes, Change Notice: _____ <input checked="" type="checkbox"/> No	
9. Disciplines/Organizations Affected by this Change:			
Mechanical Discipline Engineering Manager <i>W</i> <u>3/5/08</u>	Nuclear & Radiological Discipline Engineering Manager <i>DYSD</i> <u>3/5/08</u>	Civil/Structural/Architectural Discipline Engineering Manager <i>LRB</i> <u>3/5/08</u>	
L&NS Document Review <i>W</i> <u>3/5/08</u>	ES&H Review Coordinator <i>W</i> <u>3/5/08</u>	IOC Integration Manager <i>LRB</i> <u>3/5/08</u>	
		If 6b is ITS/ITWI: Quality Assurance: Quality Assurance <i>DOT</i> <u>3/5/2008</u>	

DAN Tunney

10. Description of Change:

Revised the following existing criteria:

#### 4.2.11.12 Additional Structural Codes and Standards

In addition to those codes and standards previously identified, the following shall apply to repository structural designs:

- ACI 201.2R-01, *Guide to Durable Concrete* [DIRS 158830]
- ACI 301-99, *Specifications for Structural Concrete* [DIRS 158831]
- ACI 530-02/ASCE 5-02/TMS 402-02, *Building Code Requirements for Masonry Structures* [DIRS 158925]
- AISC 303-05, *Code of Standard Practice for Steel Buildings and Bridges* [DIRS 176238]
- ANSI/ANS-57.7-1988 (Reaffirmed 1997), *American National Standard, Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type)* [DIRS 177851]
- ANSI/ANS-57.9-1992 (Reaffirmed 2000), *Design Criteria for an Independent Spent Fuel Storage Installation* [DIRS 176945]
- ~~ANSI/ANS 6.4.2-1985 (R1997, R2004), *Specification for Radiation Shielding Materials* [DIRS 177856]~~
- ~~MIL-STD-1472F Notice 1, *Department of Defense Design Criteria Standard, Human Engineering* [DIRS 170418]~~
- 29 CFR 1910, Labor: Occupational Safety and Health Standards [DIRS 177507] (parts not already cited)
- DOE-STD-1020-2002, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities* [DIRS 159258]

~~DOE-HDBK-1140-2001, *Human Factors/Ergonomics Handbook for the Design for Ease of Maintenance* [DIRS 170491]~~

*[ANSI/ANS-6.4.2 is included in Section 4.10.1.7 to reflect which discipline conducts the appropriate analyses. Human engineering and ergonomic criteria are listed separately in 4.2.11.13.]*

Add the following new criterion (split from 4.2.11.12):

#### 4.2.11.13 Human Engineering/Ergonomic Standards

The design of structures shall provide for human factors or human engineering and ergonomic considerations in accordance with the following standards:

- MIL-STD-1472F Notice 1, *Department of Defense Design Criteria Standard, Human Engineering* [DIRS 170418]
- DOE-HDBK-1140-2001, *Human Factors/Ergonomics Handbook for the Design for Ease of Maintenance* [DIRS 170491]

*[Human engineering and ergonomics provide for ease of maintenance, accessibility to equipment, abilities of maintenance workers in available spaces. Both the MIL-STD and the DOE-HDBK provide guidance in overlapping areas, but concentrate on different areas.]*

Revised the following existing criteria:

#### 4.8.1.1 Mechanical Handling Codes and Standards

- ACI 349-01/349R-01, *Code Requirements for Nuclear Safety Related Concrete Structures (ACI 349-01) and Commentary (ACI 349R-01)* [DIRS 181670],
- AISC 1997, *Manual of Steel Construction, Allowable Stress* [DIRS 107063],
- ANSI/AISC N690-1994, *Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities* [DIRS 158835],
- ~~ANSI/ANS 6.1.1-1991, *American National Standard for Neutron and Gamma-Ray Fluence to Dose Factors* [DIRS 107719];~~
- ~~ANSI/ANS 6.4 1997 (REAF 2004), *Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants* [DIRS 177855];~~
- ~~ANSI/ANS 6.4.2-1985, *Specification for Radiation Shielding Materials* [DIRS 117482];~~
- ANSI/ANS-57.1-1992 (R 2005), *Design Requirements for Light Water Reactor Fuel Handling Systems* [DIRS 177850],
- ANSI/ANS-57.2-1983, *Design Requirements for Light Water Reactor Spent Fuel Storage Facilities at Nuclear Power Plants* [DIRS 111337],
- ANSI/ANS-57.7-1988 (R1997), *Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type)* [DIRS 177851],
- ANSI/ANS-57.9-1992, *Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)* [DIRS 176945],
- ANSI/ITSDF B56.8-2006, *Safety Standard for Personnel and Burden Carriers* [DIRS 183402],
- ANSI/ITSDF B56.9-2006, *Safety Standard for Operator Controlled Industrial Tow Tractors* [DIRS 183403],
- ANSI N14.30-1992, *Semi-Trailers Employed in the Highway Transport of Weight-Concentrated Radioactive Loads - Design, Fabrication, and Maintenance* [DIRS 161196],
- ASCE 4-98, *Seismic Analysis of Safety-Related Nuclear Structures and Commentary* [DIRS 159618],
- ASCE/SEI 43-05, *Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities* [DIRS 173805],
- 2004 ASME Boiler and Pressure Vessel Code (ASME 2004 [DIRS 171846]), Section III, Division I, Subsection NC,
- 2004 ASME Boiler and Pressure Vessel Code (ASME 2004 [DIRS 176963]), Section III, Division I, Subsection NF,
- ASME B30.20-2003, *Below-the-Hook Lifting Devices* [DIRS 171688],
- ASME B30.5-2004, *Mobile and Locomotive Cranes* [DIRS 176396],
- ASME B30.9-2003, *Slings* [DIRS 171686],
- ASME B30.10-2005, *Hooks* [DIRS 176395]
- ASME NOG-1-2004, *Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)* [DIRS 176239],
- ASME NQA-1-2000, *Quality Assurance Requirements for Nuclear Facility Applications* [DIRS 159544], Subparts 2.2, 2.8 and 2.15,
- ASTM C 992-06, *Standard Specification for Boron-Based Neutron Absorbing Material Systems for Use in Nuclear Spent Fuel Storage Racks* [DIRS 177901],
- ~~ASTM C 1572-04, *Standard Guide for Dry-Lead-Glass and Oil-Filled-Lead-Glass Radiation Shielding Window Components for Remotely-Operated Facilities* [DIRS 173069];~~
- CMAA-70-2004, *Specifications for Top Running Bridge and Gantry Type Multiple Girder Electric Overhead Traveling Cranes* [DIRS 176257],
- CMAA-74-2004, *Specifications for Top Running and Under Running Single Girder Electric Traveling Cranes Utilizing Under Running Trolley Hoist* [DIRS 176258],

## 4.8.1.1 (continued)

- NUREG-0700, *Human-System-Interface-Design-Review-Guidelines*, (O'Hara et al. 2002 [DIRS 170780]),
- 10 CFR 71, Energy: Packaging and Transportation of Radioactive Material [DIRS 181967],
- 29 CFR 1910, Labor: Occupational Safety and Health Standards [DIRS 177507],
- DOE-HDBK-1140-2001, *Human Factors/Ergonomics Handbook for the Design for Ease of Maintenance* [DIRS 170491],
- DOE-STD-1090-2004, *Hoisting and Rigging (Formerly Hoisting and Rigging Manual)* [DIRS 176661],
- MIL-STD-1472F, Notice 1, 2003, *Department of Defense Design Criteria Standard, Human Engineering* [DIRS 170418],
- Regulatory Guide 1.13, Rev. 2, 2007, *Spent Fuel Storage Facility Design Basis* [DIRS 183088],
- Regulatory Guide 1.84, *Design, Fabrication, and Materials Code Case Acceptability, ASME Section III*, (NRC [DIRS 177621]),
- Regulatory Guide 1.100, *Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants* [DIRS 110810],
- Regulatory Guide 1.193, *ASME Code Cases Not Approved for Use* (NRC [DIRS 177622]).

*[Applicable sections of the above codes and standards, DOE directives and handbook, and level of conformance with regulatory positions in the regulatory guide will be determined during the design process and in the development of design products. RGA REG-CRW-RG-000011, Agreement for Regulatory Guide 1.13, Rev. 2 - Spent Fuel Storage Facility Design Basis (BSC 2007 [DIRS 183182]). RGA REG-CRW-RG-000071, Agreement for Regulatory Guide 1.84, Rev. 33 - Design, Fabrication, and Materials Code Case Acceptability, ASME Section III (BSC 2006 [DIRS 181679]) has adopted Regulatory Guide 1.84 [DIRS 177621], to allow the option of using NRC approved ASME Section III code cases. RGA REG-CRW-RG-000084, Agreement for Regulatory Guide 1.100, Rev. 2 - Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants (BSC 2007 [DIRS 181689]) has provided guidance for Regulatory Guide 1.100. This regulatory guide describes a methodology acceptable to the NRC staff for satisfying NRC regulations pertaining to the seismic qualification of electrical and mechanical equipment. RGA REG-CRW-RG-000168, Agreement for Regulatory Guide 1.193, Rev. 1 - ASME Code Cases Not Approved for Use (BSC 2007 [DIRS 183186]) has adopted Regulatory Guide 1.193 [DIRS 177622]. The Code Cases listed therein shall not be used.*

*RGA REG-CRW-RG-000442 [DIRS 182847] allows NUREG-0700 to be used as a reference. Although a 2007 version of ASME 2004, 2006 version of ANSI/ANS-6.4, and 2004 version of ANSI/ANS-6.4.2 is available, the responsible DEM has elected to utilize the versions cited in the criterion. RGA REG-CRW-RG-000033, Agreement for Regulatory Guide 1.38, Rev. 2 - Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants (BSC 2007 [DIRS 182071]) provides agreement that ASME NQA-1-2000, Quality Assurance Requirements for Nuclear Facility Applications [DIRS 159544], Subpart 2.2 is an acceptable alternate to Regulatory Guide 1.38 Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants. Although a later version of the ASME NQA-1 is available (2004), BSC has elected to utilize the 2000 version. ANSI/ANS-6.4 and 6.4.2 have been eliminated here to prevent duplication with 4.10.1.1.1 and 4.10.1.7. Human engineering and ergonomic standards have been moved to 4.8.1.2.3 to provide a separate criterion with higher visibility to the designers. Shield window criteria are moved to 4.8.1.4.]*

Revise the following existing criterion to provide a separate criterion for human engineering/ergonomics:

## 4.8.1.2.3 Deleted Human Engineering/Ergonomics

The design of structures shall provide for human factors or human engineering and ergonomic considerations in accordance with the following standards:

- MIL-STD-1472F Notice 1, *Department of Defense Design Criteria Standard, Human Engineering* [DIRS 170418],
- DOE-HDBK-1140-2001, *Human Factors/Ergonomics Handbook for the Design for Ease of Maintenance* [DIRS 170491], and
- NUREG-0700, *Human-System Interface Design Review Guidelines*, (O'Hara et al. 2002 [DIRS 170780]).

*[This criterion for waste package damage has been deleted. It is addressed in the BOD Section 13.2.3.1.35, Handling of Waste Forms and Waste Packages and BOD Section 13.2.3.1.37, Waste Package Surface Defects. Human engineering and ergonomics provide for ease of maintenance, accessibility to equipment, abilities of maintenance workers in available spaces, and the ability to easily read and operate equipment. Both the MIL-STD and the DOE-HDBK provide guidance in overlapping areas, but concentrate on different areas. RGA REG-CRW-RG-000442 [DIRS 184423] allows NUREG-0700 to be used as a reference.]*

Revise the following criteria to provide better clarification:

## 4.8.1.2.4 IFS Cranes to Prevent Load Drop

IFS Cranes and canister transfer machines whose safety function is that are required to prevent the drop of a waste form or prevent a load drop onto a waste form shall be designed and constructed per ASME NOG-1-2004, *Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)* [DIRS 176239], Type I or ASME NUM-1-2004, *Rules for Construction of Cranes, Monorails, and Hoists (with Bridge or Trolley or Hoist of the Underhung Type)* [DIRS 180437], Type I as applicable.

*[ASME NOG-1-2004 is an industry standard for cranes. CBCN013 to PDC Revision 6 added ASME NUM-1-2004.]*

## 4.8.1.2.8 Cranes to Withstand Seismic Event

ITS or non-ITS Cranes that are not required to be ASME NOG-1, Type I but are required not to whose safety function is to avoid collapse during due to a seismic event (but which are not required to retain their load) shall be designed and constructed per ASME NOG-1-2004 [DIRS 176239] Type II or ASME NUM-1-2004, *Rules for Construction of Cranes, Monorails, and Hoists (with Bridge or Trolley or Hoist of the Underhung Type)* [DIRS 180437], Type II as applicable.

*[ASME NOG-1-2004 is an industry standard for cranes. CBCN013 to PDC Revision 6 added ASME NUM-1-2004.]*

Add the following criteria:

#### 4.8.1.2.10 Other Cranes

Cranes that are not required to be ASME NOG-1 Type I or Type II, or ASME NUM-I Type I or Type II shall be designed and constructed per ASME NOG-1-2004 [DIRS 176239] Type III, or ASME NUM-I-2004 [DIRS 180437], Type III, as applicable.

*[ASME NOG-1-2004 and ASME NUM-I-2004 are industry standards for cranes. Although ASME NOG-1-2004 defers to the 2000 version of CMAA-70 for design, fabrication, welding, inspection, testing etc., of Type III cranes, the project has decided to use CMAA-70-2004 [DIRS 176257] instead. CBCN013 to PDC Revision 6 added ASME NUM-I-2004.]*

Add the following new criterion:

#### 4.8.1.2.11 Hooks

Hooks that are not associated with lifting equipment that is required to be designed to ASME NOG-1-2004 [DIRS 176239] shall be designed per ASME B30.10-2005, *Hooks*. [DIRS 176395]

*[ASME B30.10-2005 is an industry standard for hooks. Although ASME NOG-1-2004 references ASME B30.10-2004 for hooks purchased as an integral part of lifting equipment, this criterion applies to hooks designed/purchased separate from lifting equipment. The project has decided that ASME B30.10-2005 will be used for hooks purchased separately.]*

Revise the following existing criterion for the extra requirement trace:

#### 4.9.1.1.5 Equipment Qualification or Listing

All devices or components of any fire system shall be approved, labeled, or listed by Underwriters Laboratories Inc., Underwriters' Laboratories of Canada, FM Global Technologies, LLC, or any other testing laboratory approved by the State Fire Marshal as being qualified to test such systems or devices. *[NAC 477.350.1 and 477.455 1 [DIRS 182445] specifically provides this requirement.]*

Revise the following existing criteria:

#### 4.10.1.1 Nuclear Engineering Codes and Standards

##### 4.10.1.1.1 Codes and Standards

The following are the codes, standards, industry guides, regulatory guides, CFRs, and DOE orders and standards that should be applied in Nuclear Engineering Design:

- ANSI N13.8-1973, *American National Standard Radiati on Protection in Uranium Mines* [DIRS 124614],
- ANSI N305-1975, *Design Objectives for Highly Radioactive Solid Material Handling and Storage Facilities in a Reprocessing Plant* [DIRS 108309],
- ANSI/ANS-57.1-1992 (R 2005), *American National Standard, Design Requirements for Light Water Reactor Fuel Handling Systems* [DIRS 177850],
- ANSI/ANS-59.3-1992 (R 2002), *American National Standard, Nuclear Safety Criteria for Control Air Systems* [DIRS 177854],
- ANSI/ANS-6.4.2-1985 (R2004), *American National Standard Specification for Radiation Shielding Materials* [DIRS 177856],
- ASTM C 1217-00 (R 2006), *Standard Guide for Design of Equipment for Processing Nuclear and Radioactive Materials* [DIRS 177899],
- Regulatory Guide 8.38 [DIRS 177548],
- Regulatory Guide 8.8 [DIRS 103312],
- 10 CFR 61 [DIRS 181966],
- 10 CFR 71 [DIRS 181967],
- 49 CFR 173 [DIRS 181975],
- DOE-HDBK-1169-2003 [DIRS 167097]

*[These regulatory guides have been determined to be useful to the development of design products for the preliminary design. The level of conformance with regulatory positions in the regulatory guides will be determined during the design process and in the development of design products that are affected by these regulatory guides. Applicable sections of these documents will be determined during the design process and in the development of design products. RGA REG-CRW-RG-000338 (BSC 2007 [DIRS 181778]) has adopted Regulatory Guide 8.8 with all sections in the RGA designated for engineering action will be complied with in the design, except Section C.1.d, which is not appropriate to the design criteria. RGA REG-CRW-RG-000364, Agreement for Regulatory Guide 8.38, Revision 1 - Control of Access to High and Very High Radiation Areas of Nuclear Plants (BSC 2007 [DIRS 181631]) has adopted requirements of Regulatory Guide 8.38. Although ANSI N13.8-1973 is inactive and was reaffirmed in 1989, the text of this version is still appropriate for use.]*

Revised the following existing criterion to restore the RGA adopted version:

#### 4.10.1.7 Concrete Shielding Design

Concrete shielding shall be analyzed and designed in accordance with ANSI/ANS-6.4-2006, *Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants* (ANSI 2006 [DIRS 181669]).

*[RGA REG-CRW-RG-000058, Agreement For Regulatory Guide 1.69, Rev. 0- Concrete Radiation Shields for Nuclear Power Plants (BSC 2007 [DIRS 181671]) has provided guidance for ANSI/ANS-6.4-2006 and ACI 349-01(ACI 2001[DIRS 181670]), as acceptable alternatives to Regulatory Guide 1.69 [DIRS 158959]. These are ~~an~~ industry standards. Although the repository is not a power plant, the design standards for shielding apply to the design.]*

Add a new criterion specifically for shield windows:

#### 4.8.1.4 Mechanical Handling Shield Window Penetrations

Shield windows, if provided, shall be designed in accordance with the following codes and standards:

- ASTM C 1572-04, *Standard Guide for Dry Lead Glass and Oil-Filled Lead Glass Radiation Shielding Window Components for Remotely Operated Facilities* [DIRS 173069],
- ANSI/ANS-6.4.2-1985 (R2004), *American National Standard Specification for Radiation Shielding Materials* [DIRS 177856],
- ASME NQA-1-2000, *Quality Assurance Requirements for Nuclear Facility Applications* [DIRS 159544], Subparts 2.2, 2.8 and 2.15.

*ASTM C 1572 is the industry standard for the shield windows. The appropriate QA requirements also apply to shield windows. Analysis of shield window performance is conducted in accordance with the standards listed in Sections 4.10.1.1.1 and 4.10.1.7. RGA REG-CRW-RG-000033, Agreement for Regulatory Guide 1.38, Rev. 2 - Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants (BSC 2007 [DIRS 182071]) provides agreement that ASME NQA-1-2000, Quality Assurance Requirements for Nuclear Facility Applications [DIRS 159544], Subpart 2.2 is an acceptable alternate to Regulatory Guide 1.38 Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants. Although a later version of the ASME NQA-1 is available (2004), BSC has elected to utilize the 2000 version.]*

Revise the following existing criterion to remove reference to the *Postclosure Modeling and Analyses Design Parameters* document:

#### 4.2.13.1.3 Groundwater

The water table is estimated to be over 1,000 ft below the North Portal and repository horizon. Although local and perched water may be encountered, the environmental design conditions for the drifts and shafts is that they shall be maintained are dry.

*[The water table is determined based on site investigations per ~~Postclosure Modeling and Analyses Design Parameters~~ (BSC 2007 [DIRS 179342]), Table 1, item #01-04 that resulted in BOD (BSC 2007 [DIRS 182131]), Criterion 8.2.1.18.]*

Revise the following:

#### 4.9.2.1.1 Codes and Standards

The following are the codes, standards, industry guides, regulatory guides, CFRs, and DOE orders and standards that could be applied in the design of the surface HVAC systems:

- TLVs® and BEIs®, *Based on the Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices* (ACGIH 2006 [DIRS 180457]),
- AMCA (Air Movement and Control Association) 1999. *Standards Handbook. Publication 99-86 (R 1998)*. [DIRS 153081]
- ANSI/AMCA 210-99, *Laboratory Methods of Testing Fans for Aerodynamic Performance Rating* [DIRS 153079],
- ANSI/ASHRAE 33-2000, *Method of Testing Forced Circulation Air Cooling and Air Heating Coils* [DIRS 169815],
- ANSI/ASHRAE 52.1-1992, *Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter* [DIRS 164197],
- ASME N509-2002, *Nuclear Power Plant Air-Cleaning Units and Components* [DIRS 176247],
- ASME N510-1989 (R 1995), *Testing of Nuclear Air Treatment Systems, with Errata* [DIRS 177879],
- International Mechanical Code 2006 (ICC 2006 [DIRS 179998]),
- IEEE Std 603-1998, *IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations* [DIRS 125916],
- NFPA 90A-2005 [DIRS 176267],
- NFPA 90B-2005 [DIRS 177857],
- HVAC Air Duct Leakage Test Manual (SMACNA 1985 [DIRS 161833]),
- HVAC Duct Construction Standards Metal and Flexible (SMACNA 1995 [DIRS 158927]),
- UL-555-2006, *Fire Dampers* [DIRS 177868],
- UL 900-2004, *Air Filter Units* [DIRS 178047],
- NUREG-0800, *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, LWR Edition, Draft Report for Comment* [DIRS 177328],
- 10 CFR 73, *Energy: Physical Protection of Plants and Materials* [DIRS 181969],
- 64 FR 30851, *Greening the Government through Efficient Energy Management* [DIRS 104026],

## 4.9.2.1.1 (Continued)

- DOE O 450.1 Change 2, *Environmental Protection Program* [DIRS 176641],
- DOE-STD-1027-92 Change Notice No. 1, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports* [DIRS 177919],

*[Applicable sections of these codes, standards and industry guides will be determined during the design process and in the development of the design products. The regulatory guide have been determined to be applicable to the design of the surface nuclear confinement HVAC system. The level of conformance with the regulatory position will be determined during the design process and in the development of the design products.]*

## 4.9.2.2.13 Controls and Instrumentation

The confinement HVAC system shall be provided with all the necessary instrumentation and control hardware in accordance with the recommendation of DOE-HDBK-1169-2003 (DOE 2003 [DIRS 167097]) Section 5.6, **ASHRAE DG-1-1993 [DIRS 124644]**, and ASME AG-1a-2004 (ASME 2004 [DIRS 177029]) Section IA, and non-mandatory Appendix IA-C, Section 3.3 of Regulatory Guide 1.140 [DIRS 158855] **Section 3.3**, and Section 3.7 of Regulatory Guide 1.52 [DIRS 171692] **Section 3.7**.

*[This criterion provide means to control, monitor, and limit the spread or release of radioactive contaminants. It facilitates prompt termination of operations and permits an evacuation of personnel during an emergency. RGA REG-CRW-RG-000043 (BSC 2007 [DIRS 182079]) has provided guidance for Regulatory Guide 1.52. RGA REG-CRW-RG-000118 (BSC 2007 [DIRS 181751]) has provided guidance for Regulatory Guide 1.140.]*

## 4.9.2.2.19 Equipment Design and Environmental Qualification

The ITS confinement HVAC system components shall be designed and environmentally qualified in accordance with IEEE Std 323-2003 [DIRS 166907], endorsed by Regulatory Guide 1.89 [DIRS 102609]. Regulatory Guide 1.52 [DIRS 171692], Sections C.2, C.3.5, and C.3.8, and C.4 requires ITS components to be **designed and** environmentally qualified within environmental limits established for their location, including, but not limited to, temperature, humidity, and radiation levels.

*[These regulatory guides provide appropriate guidance for the design and environmental qualification of ITS equipment. RGA REG-CRW-RG-000074 (BSC 2007 [DIRS 181952]) has adopted Regulatory Guide 1.89 with clarification that IEEE Std 323-2003 be used instead of IEEE Std 1974. RGA REG-CRW-RG-000043 (BSC 2007 [DIRS 182079]) has provided guidance for Regulatory Guide 1.52.]*

## 4.2.11.2.5 Seismic Design for Surface SSCs

Seismic design and structure response for ITS SSCs that are not relied upon to prevent or mitigate seismic event sequences and non-ITS SSCs shall be in accordance with *International Building Code 2000, with Errata to the 2000 International Building Code* (ICC 2003 [DIRS 173525]). Seismic analysis for ITS SSCs **relied upon to prevent or mitigate seismic event sequences** shall be in accordance with ASCE 4-98, *Seismic Analysis of Safety-Related Nuclear Structures and Commentary* [DIRS 159618]. The seismic response methodology for combination of modal responses and spatial components shall be in accordance with ASCE 4-98. Development of in-structure response spectra in seismic response and analysis will be performed in accordance with ASCE 4-98, Section 3.4, as further clarified in *Seismic Analysis and Design Approach Document* (BSC 20072006 [DIRS 184494180531]) Section 7.3.2.2.

*[RGA REG-CRW-RG-000077, Agreement for Regulatory Guide 1.92, Rev. 42 - Combining Modal Responses and Spatial Components in Seismic Response Analysis (BSC 2007 [DIRS 182087184396]) has accepted ASCE 4-98 as an alternative to the guidance provided in Regulatory Guide 1.92 [DIRS 151403178007]. Although Rev. 2 of the Guide has been issued, the repository has not adopted it. RGA REG-CRW-RG-000101, Agreement for Regulatory Guide 1.122, Rev.1 - Development of Floor Design Response Spectra for Seismic Design of Floor-Supported Equipment or Components (BSC 2007 [DIRS 182781]) supports using ASCE 4-98 instead of the Guide [DIRS 151404]. Note that the non-ITS Emergency Diesel Generator Facility is also designed to the applicable portions of ASCE 4-98.]*

## 4.9.7.1 Additional Codes and Standards

The following are the additional codes, standards, industry guides, regulatory guides, CFRs, and DOE orders and standards that should also be applied in the design of the Cask/TAD/Waste Package and Pool Water Treatment and Cooling Systems. LLW management system:

- ANSI/ISA-S84.01-1996, *Application of Safety Instrumented Systems for the Process Industries* [DIRS 112340],
- ASME 2004 [DIRS 171846] Section II; **Section III**, Section VIII, Div. 1 or 2; and Section IX, ~~and Section III~~,
- IEEE Std 383-2003 [DIRS 171695],
- NFPA 55-2006, *Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks, with Errata* [DIRS 177980],
- NFPA 70 [DIRS 177982],

## 4.9.7.1 (continued)

- UL 96A,
- 10 CFR 63 [DIRS 180319],
- 29 CFR 1910 [DIRS 177507],
- 49 CFR 172 [DIRS 181974],
- DOE O 420.1A [DIRS 159450],
- DOE O 450.1 Change 2 [DIRS 176641]

*[Applicable sections of these codes and standards will be determined during the design process and in the development of design products. The regulatory guides have been determined to be useful to the development of design products for the preliminary design, and the level of conformance will be determined during the design process and in the development of design products. RGA REG-CRW-RG-000071, Regulatory Guidance Agreement, Regulatory Guide 1.84, Rev. 33 - Design, Fabrication, and Materials Code Case Acceptability, ASME Section III (BSC 2006 [DIRS 181679]) has adopted Regulatory Guide 1.84 Rev 33, Design, Fabrication, and Materials Code Case Acceptability, ASME Section III, Division I [DIRS 177621], to allow the option of using NRC approved ASME Section III code cases.*

*REG-CRW-RG-000168 (BSC 2007 [DIRS 183186]) has adopted Regulatory Guide 1.193 Rev 1 [DIRS 177622], ASME Code Cases Not Approved for Use. The Code Cases listed therein shall not be used. UL 96A-2005 is a constraint and not input requiring referencing. The latest version should be utilized. UL 96A has been removed from the reference list (Section 8.2, Codes, Standards and Regulations) and move to Section 8.4 (Output Constraint) of this document. Although 2007 version of ASME 2004 is available, the responsible DEM has elected to utilize the 2004 version. Although a later version of NFPA 70 is available, the responsible DEM has elected to utilize the referenced version.]*

**Add the following section****4.9.7.5.7 Cask Cooling Utilizing Borated Water System**

The cask cooling system, utilizing borated water, shall be designed to provide for cooling, filling and flushing of transportation cask, dual purpose canister and shielded transfer cask cavities as required, for the subsequent emplacement of casks and canisters into the Wet Handling Facility pool in accordance with ANSI/ANS 57.7-1988 (R1997) [DIRS 177851], Section 6.4.2.3 and ANSI/ANS 57.9-1992 (R2000) [DIRS 176945], Sections 5.1.4.3 and 6.1.4.1.3. The components of the cask cooling system, utilizing borated water, shall also comply with the following codes and standards as applicable:

- ASME 2004, *2004 ASME Boiler and Pressure Vessel Code*, Section III, Subsection ND, Class 3, [DIRS 171846]
- ASME 2004, *2004 ASME Boiler and Pressure Vessel Code*, Section VIII, Div. 1 or 2, [DIRS 171846]
- ASME B31.3-2004 (R2005), *Process Piping* [DIRS 176242]

*[These codes and standards provide appropriate guidance for the design of borated water systems]*

Add the following references to sections 8.1 and 8.2

[DIRS 176395]

ASME B30.10-2005. *Hooks*. New York, New York: American Society of Mechanical Engineers. TIC: 258674.

[DIRS 153081]

AMCA (Air Movement and Control Association) 1999. *Standards Handbook*. Publication 99-86 (R 1998). Arlington Heights, Illinois: Air Movement and Control Association International. TIC: 249170.

[DIRS 184423]

BSC (Bechtel SAIC Company) 2007. *Regulatory Guidance Agreement, Agreement for NUREG-0700, May 2002, Human-System Interface Design Review Guidelines*. REG-CRW-RG-000442 REV 01. Las Vegas, Nevada: Bechtel SAIC Company ACC: DOC.20071120.0003.

[DIRS 184494]

BSC (Bechtel SAIC Company) 2007. *Seismic Analysis and Design Approach Document*. 000-30R-MGR0-02000-000-001. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20071220.0029.

[DIRS 184396]

BSC (Bechtel SAIC Company) 2007. *Regulatory Guidance Agreement, Agreement for Regulatory Guide 1.92, Rev. 2 - Combining Modal Responses and Spatial Components in Seismic Response Analysis*. REG-CRW-RG-000077 REV 01. Las Vegas, Nevada: Bechtel SAIC Company. ACC: DOC.20071130.0003

[DIRS 178007]

Regulatory Guide 1.92, Rev. 2. 2006. *Combining Modal Responses and Spatial Components in Seismic Response Analysis*. Washington, D.C.: U.S. Nuclear Regulatory Commission. ACC: MOL.20070926.0184.

Delete the following references from sections 8.1 and 8.2:

[DIRS 107719]

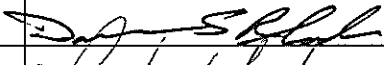
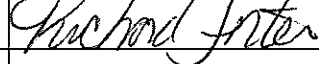
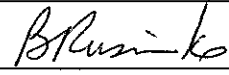
ANSI/ANS-6.1.1-1991. 1992. *American National Standard for Neutron and Gamma-Ray Fluence-to-Dose Factors*. La Grange Park, Illinois: American Nuclear Society. TIC: 236033.

[DIRS 177855]

ANSI/ANS-6.4-1997 (REAF 2004). 2004. *Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants*. La Grange Park, Illinois: American Nuclear Society. TIC: 257554.

[DIRS 182847]

BSC (Bechtel SAIC Company) 2007. *Regulatory Guidance Agreement, Agreement for NUREG-0700, May 2002, Human-System Interface Design Review Guidelines*. REG-CRW-RG-000442 REV 00. Las Vegas, Nevada: Bechtel SAIC Company. ACC: DOC.20070322.0003.

11. REVIEWS AND APPROVAL			
Printed Name	Title	Signature	Date
11a. Preparer: David S. Rhodes	Discipline Engineering Manager		3-6-08
11b. Concurrence: Richard Foster (Acting)	Manager of Discipline Engineering		3-6-08
11c. Concurrence: N/A	Project Engineering Manager	N/A	N/A
11d. Approved: Barbara Rusinko	Engineering Manager		3/6/08