BSC

Criteria/Basis Change Notice

Complete only applicable items.

1. QA: ~~NA~~ QA
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FTB 7/10/08

3. Document Identifier:	4. Rev.:	5. CBCN:
000-3DR-MGR0-00100-000	007	013
6a. Title:	**6b. Safety Classification of SSC:**	
Project Design Criteria Document	ITS / ITWI	

7. Reason for Change:

Revise the Project Design Criteria (PDC) document as described below. (The changes to affected sections of the PDC are shown as strikeout **(in blue)** for deletions and bold **(red)** for additions or revisions.)

1. Incorporate DOE Technical Direction Letter CCU.20080515.0012, *Regarding LEED Certification of YMP Facilities.* Revise PDC Section 4.1.5.6
2. Incorporate Executive Order (EO) 13423, Environmental and Energy Management. Revise PDC Sections 4.1.3.1, 4.1.3.7, 4.1.5.1, 4.1.5.2, 4.1.5.5, 4.1.5.7, 4.1.5.8, 4.1.5.10, 4.1.5.12, 4.1.6, 4.9.2.1.1, 4.9.4.1.3, 4.9.6.1.7, and 4.9.6.2.3.
3. Incorporate DOE STD-1090-2007. This edition of the design criteria source document was mandated through Prime Contract, Section J, Appendix E (List B). Revise PDC Sections 4.8.1.1, 4.8.1.2.9, 4.8.1.2.11, and 5.3.1.2.
4. Incorporate resolution to CR-12050. The subject of CR-12050 is that The ASME B31.3-2004 (R2005) in the PDC is not consistent with 10 CFR 851 which mandates use of specific editions of some codes and standards. For example, 10 CFR 851 Appendix A Section 4 (b) requires that contractors conform to a group of codes and standards that include ASME B31.3-2002, *Process Piping*. Contrary to the above, PDC Section 4.9.5.1.1 states that pressure vessels, boilers, air receivers, and supporting piping systems shall conform to the applicable sections of ASME B31.3-2004 (R2005). The PDC Sections to be revised are 4.6.4.8.7, 4.6.4.9.2, 4.9.2.1.1, 4.9.2.3.2, 4.9.3.2, 4.9.3.3, 4.9.3.4, 4.9.4.1.23, 4.9.5.1.1, 4.9.5.5, 4.9.6.1.3, 4.9.7.5.7, 4.9.7.8, 4.9.9, 4.9.9.1, 4.12.3, and 6.1.13 to include the following statement in the *Rationale*: (e.g. "*Authorization has been granted to adopt the more stringent and restrictive requirements contained in ASME B31.3-2004. See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]).*")
5. ~~Delete reference to ASME B31.1, *Power Piping*. This code is not used at YMP. Revise PDC Section 4.6.4.9.2.~~
6. Add new Section 4.1.12 for hazards evaluation criterion based on MIL-STD-882D to maintain compliance with 10 CFR 851.22.
7. Revise PDC Sections 4.3.1.1.15, 4.3.1.1.16 and 4.3.1.1.18 to clarify the criteria for the 480 V load center and the use of adjustable speed drives.
8. Revise PDC Sections 4.2.11.2.1 and 4.2.11.4.4 to clarify the seismic design approach. Refer to CR-12241.
9. Correct typo in PDC Section 4.10.3.7, Table 4.10.3-2, Description for Classification C2 (Potential Contamination Area). Two C4 areas are described in the C2 areas. Change one of the C4 to C5.
10. Correct misspelled word in Sections 4.10.3.3.3 and 4.10.3.3.4, from "rerquirements" to "requirements".

Sections of the SAR list the PDC as a visible reference, however, the proposed changes to the PDC are not described in the SAR and do not impact the text, tables, or figures in the SAR. Accession numbers for CBCNs are not visible references in the SAR. Therefore, there are no technical impacts for these changes to the SAR. See Activity Screening (for Potential LA Effects) Forms #248, #306, and #320.

8. Supersedes Change Notice:	☐ Yes	If, Yes, Change Notice:	☒ No

9. Disciplines/Organizations Affected by this Change:

Civil/Structural/Architectural Discipline Engr. Manager 7/9/08	Thermal/Structural Analysis Discipline Engr. Manager Del Mecham for Mike Anderson	RPM Operations 7/9/08
Electrical/I&C Discipline Engr. Manager 7/9/08	BOP Project Engineer for R. Gowan	PQSA Manager for Mike Frank 7/9/08
Mechanical Discipline Engr. Manager 7/9/08	Nuclear Facilities Project Engineer 07.09.2008	Environmental Safety & Health 7/9/08
Mining Discipline Engr. Manager 7/9/08	Subsurface Project Engineer 07.09.2008	LMS Document Review 7/9/08
Nuclear & Radiological Discipline Engr. Manager 7/9/08	RPM Construction 07/09/08	If 6b is ITS/ITWI: Quality Assurance: Quality Assurance 7/9/08

10. Description of Changes:

Revision to the PDC to incorporate LEEDS Certification:

4.1.5.6 LEED Certification

The repository shall design facilities with a goal to reduce energy and water consumption. The repository shall use the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED™) Green Building Rating System® for New Construction **(LEED-NC)** as the basis of demonstrating the application of sustainable building design criteria. **The sustainable building design principles shall be applied to all repository facilities, both nuclear and non-nuclear. The Balance of Plant (BOP) Administration Building (Area 620) and the Fire, Rescue, and Medical Facility (Area 63A) shall be designed with a goal of having enough LEED rating system points to allow achieving the LEED Gold Level certification. The remainder of the BOP facilities shall be designed with a goal of having enough LEED rating system points to allow achieving the LEED Silver Level certification.** ~~All buildings and facilities shall apply sustainable building design criteria. Non-nuclear buildings and facilities shall be designed to achieve the LEED-NC Silver status.~~

NOTE: DOE will be responsible for obtaining the Gold and Silver Level certification from the U.S. Green Building Council.

[LEED-NC ~~for New Construction,~~ Reference Guide, Version 2.2, with Errata (U.S. Green Building Council 2005 [DIRS 176803]). This rating system is an industry standard and is appropriate to apply to certain repository facilities. ***The goal for Gold and Silver Level of certification is directed by DOE through Contracting Officer Direction Letter to BSC (Peterson, S.R. [DIRS 185528]). This criterion also complies with the applicable provisions of 72 FR 3919, Strengthening Federal Environmental, Energy, and Transportation Management, Executive Order 13423 [DIRS 185515], Section 2(f). CBCN013 to Revision 007 provided this change.****]*

Revision to the PDC to incorporate Executive Order 13423:

4.1.3.1 Building Design Requirement

The repository building design shall meet the goal of ~~minimizing~~ **improving** energy **efficiency and reduce greenhouse gas emissions** ~~consumption per gross square foot of facilities or gross square foot per unit for industrial and laboratory facilities~~. To meet the goals, the design shall comply with the applicable requirements of 10 CFR 433.4 and 10 CFR 433.5, Energy: *Energy Efficiency Standards for the Design and Construction of New Federal Commercial and Multi-Family High Rise Residential Buildings* [DIRS 181833]. Compliance with this code shall be identified and justified in the implementing documents.

[Although this criterion previously referenced 10 CFR 434, it has been replaced by 10 CFR 433. 10 CFR 433 is being mandated for buildings to be designed and constructed after January 2007 and 10 CFR 434 is for buildings designed and constructed prior to January 2007. ~~10 CFR 434 is subsequently a general and historical citation and does not require reference, therefore, the DIRS and reference are removed from this document~~. This criterion also satisfies ***72 FR 3919, Strengthening Federal Environmental, Energy, and Transportation Management, Executive Order 13423 [DIRS 185515], Sections 2(a) and 3(a) and*** *64 FR 30851, Greening the Government Through Efficient Energy Management, Executive Order 13123 [DIRS 104026], Sections 202 and 203.~~ ~~Although the executive order provides specific reduction goals, nuclear safety takes precedence over energy conservation and is, therefore, not specifically applied~~. *Although Executive Order 13123 was revoked, it is still on the BSC contract and still provides useful information.* ***CBCN013 to Revision 007 provided this change.****]*

4.1.3.7 Water Conservation

~~Through life-cycle cost-effective measures, agencies~~**The repository facilities** shall reduce water consumption and associated energy use in their facilities to reach the goals established by DOE. Where possible, water cost savings and associated energy cost savings shall be included in energy-savings performance contracts and other financing mechanisms.

[This criterion satisfies 72 FR 3919, Strengthening Federal Environmental, Energy, and Transportation Management, Executive Order 13423 [DIRS 185515], Section 2(c) and 3(a) and *64 FR 30851, Greening the Government Through Efficient Energy Management, Executive Order 13123 [DIRS 104026], Section 207.~~ ~~Section 503(f) requires DOE to establish goals~~. *Although Executive Order 13123 was revoked, it is still on the BSC contract and still provides useful information.* ***CBCN013 to Revision 007 provided this change.****]*

4.1.5.1 Application of Principles

The repository shall apply high performance sustainable design principles to new buildings and major building alterations. Compliance with 10 CFR 433, Energy: *Energy Efficiency Standards for the Design and Construction of New Federal Commercial and Multi-Family High Rise Residential Buildings* [DIRS 181833]; is mandatory for federal buildings, from conceptual sitting, design, and construction through commissioning.

[DOE O 413.3A [DIRS 181834], Contractor Requirement 14 and DOE O 430.2A [DIRS 158913] Contractor Requirement 2 d(5) specifically requires the use of these principles. As described in DOE O 450.1, [DIRS 176641] Attachment 3,"Green Buildings," this application is to optimize life cycle costs, reduce pollution, minimize energy consumption, conserve water, and enhance indoor air quality, worker safety, and productivity. Although an Administrative Change was made to DOE O 450.1, it has not

(4.1.5.1 Cont'd)

been placed on contract. This ***criterion*** *also satisfies* ***72 FR 3919, Strengthening Federal Environmental, Energy, and Transportation Management, Executive Order 13423 [DIRS 185515], Section 2(f) and*** *64 FR 30851, Executive Order 13123 [DIRS 104026], Section 403(d). Although Executive Order 13123 was revoked, it is still on the BSC contract and still provides useful information.* ~~*Although DOE O 430.2A calls for 10 CFR 434 (10 CFR 434 is for buildings designed and constructed prior to January 2007) for repository facilities based on the application date for starting detailed design, 10 CFR 433 has replaced it.*~~ ***CBCN013 to Revision 007 provided this change.****]*

4.1.5.2 Energy Star® Products

The repository shall select DOE/U.S. Environmental Protection Agency (EPA) Energy Star® products, including microcomputers and peripheral equipment where possible and reasonable, and insert them into guide specifications and acquisition systems. Where Energy Star® products are not available, select products that are in the upper 25 percent of energy efficiency.

[DOE O 430.2A [DIRS 158913] Contractor Requirement 2 d.(7). ~~*and*~~***This criterion also complies with 72 FR 3919, Strengthening Federal Environmental, Energy, and Transportation Management, Executive Order 13423 [DIRS 185515], Section 2(h) and*** *64 FR 30851, Executive Order 13123 [DIRS 104026], Sections 403.(b)(1 and 3) and 403.(d). Although Executive Order 13123 was revoked, it is still on the BSC contract and still provides useful information.* ***CBCN013 to Revision 007 provided this change.****]*

4.1.5.5 ~~Off-Grid~~ Distributed Generation

The repository shall ~~increase use of off-grid generation~~ implement distributed generation systems~~,~~ including **renewable systems such as** solar hot water, ~~and~~ solar electric, ~~supporting the million solar roofs initiative,~~ solar ~~outdoor~~ lighting, small wind turbines, **geothermal,** fuel cells, and other technologies, when such systems are life cycle cost effective and offer other benefits.

[DOE O 430.2A [DIRS 158913] Contractor Requirement 2 d.(13). ~~*and*~~ ***This criterion also complies with 72 FR 3919, Strengthening Federal Environmental, Energy, and Transportation Management, Executive Order 13423 [DIRS 185515], Section 2(b) and*** *64 FR 30851, Executive Order 13123 [DIRS 104026], Sections 205 and 206. Although Executive Order 13123 was revoked, it is still on the BSC contract and still provides useful information.* ***CBCN013 to Revision 007 provided this change.****]*

4.1.5.7 Greenhouse Gas Emissions

Facility design shall minimize greenhouse gas emissions attributed to facility energy use.

[This criterion complies with the applicable provisions of *64 FR 30851, Executive Order 13123 [DIRS 104026], Section 201* ***and 72 FR 3919, Strengthening Federal Environmental, Energy, and Transportation Management, Executive Order 13423 [DIRS 185515], Section 2(a).*** ~~*Although the executive order provides for numerical percentage reductions, DOE has not provided the specific criteria.*~~ ***Although Executive Order 13123 was revoked, it is still on the BSC contract and provides useful information. CBCN013 to Revision 007 provided this change.****]*

4.1.5.8 Ozone-Depleting Substances

Facilities and systems shall reduce or eliminate the generation of waste, the release of pollutants to the environment, and NOT use Class I ozone-depleting substances such as chloroflourocarbon based refrigerants. Facilities shall accomplish this through source reduction, reuse, segregation, and recycling, and by procuring recycled content materials and environmentally preferable products and services.

[DOE O 450.1 Change 2 [DIRS 176641] Contractor Requirement 2.(c) specifically provides the requirement text. ***This criterion also complies with the applicable provisions of 72 FR 3919, Strengthening Federal Environmental, Energy, and Transportation Management, Executive Order 13423 [DIRS 185515], Section 2(e). CBCN013 to Revision 007 provided this change.****]*

4.1.5.10 Eliminating Hazardous Substances

The repository shall substitute, reduce or eliminate toxic and hazardous substances in facilities, processes, and their surrounding environments.

[~~*Good engineering practice dictates these criteria to establish and implement a hazard prevention and abatement process to ensure that all identified and potential hazards are prevented.*~~***This criterion complies with the applicable provisions of 72 FR 3919, Strengthening Federal Environmental, Energy, and Transportation Management, Executive Order 13423 [DIRS 185515], Section 2(e). CBCN013 to Revision 007 provided this change.****]*

4.1.5.12 Using Recycled Materials

The repository shall increase the use of materials and products with recycled content and environmentally preferred products. This includes procurement of designated items composed of the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, considering such guidelines. Such items are not required if they are not reasonably available in a reasonable period of time, fail to meet reasonable performance standards, or are only available at an unreasonable price. Vehicular, construction, and transportation products are listed.

(4.1.5.12 Cont'd)

[40 CFR 247, Protection of Environment: Comprehensive Procurement Guideline for Products Containing Recovered Materials [DIRS 177839] Sections 2(d), 5(b) and 11 through 13. ***This criterion also complies with the applicable provisions of 72 FR 3919, Strengthening Federal Environmental, Energy, and Transportation Management, Executive Order 13423 [DIRS 185515], Section 2(d). CBCN013 to Revision 007 provided this change.****]*

4.1.6 Waste Prevention, Recycling, and Federal Acquisition

The repository facilities**, in acquisition of goods and services,** shall use the principles and concepts **of sustainable environmental practices, including acquisition of bio-based, environmentally preferable, energy efficient, water efficient, recycle-content products, and use of paper of at least 30 percent post-consumer fiber content.**~~in the EPA Guidance on Acquisition of Environmentally Preferable Products and Services, in addition to the lessons from pilot and demonstration projects, to the maximum extent practicable in identifying and purchasing environmentally preferable products and services.~~

[63 FR 49643, Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition, Executive Order 13101 [DIRS 104024], Section 503.(c) ***and 72 FR 3919, Strengthening Federal Environmental, Energy, and Transportation Management, Executive Order 13423 [DIRS 185515], Section 2(d)****. Although Executive Order* ***13101****~~13123~~ was revoked, it is still on the BSC contract and* ~~*still*~~ *provides useful information.* ***CBCN013 to Revision 007 provided this change.****]*

4.9.4.1.3 Minimize Generation of LLW

LLW processing systems and equipment shall consider minimizing the generation of LLW streams prior to recycling, treatment, and disposal.

[63 FR 49643, Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition, Executive Order 13101 [DIRS 104024]) requires, whenever feasible and cost effective, pollution prevention through source reduction prior to recycling, treatment, or disposal. ***72 FR 3919, Strengthening Federal Environmental, Energy, and Transportation Management, Executive Order 13423 [DIRS 185515], Section 2(e) requires to*** ~~*This is required to*~~ ***reduce the quantity of toxic and hazardous materials acquired, used, or disposed of by the repository. Although Executive Order 13101 was revoked, it is still on the BSC contract and provides useful information. CBCN013 to Revision 007 provided this change.*** ~~*be consistent with the demands of efficiency and cost effectiveness.*~~*]*

4.9.6.1.7 Energy Conservation

The plant heating and cooling systems and equipment shall be designed to conserve energy in accordance with

- ANSI/ASHRAE/IESNA Std 90.1-2004, *Energy Standard for Buildings Except Low-Rise Residential Buildings* [DIRS 174321] Section 6
- 64 FR 30851, Greening the Government Through Efficient Energy Management, Executive Order 13123 ~~(64 FR 30851)~~ [DIRS 104026]
- **72 FR 3919, Strengthening Federal Environmental, Energy, and Transportation Management, Executive Order 13423 [DIRS 185515]**

[ANSI/ASHRAE/IESNA Std 90.1-2004 is the industry standard applicable to this application ***and referenced in 10 CFR 433 [DIRS 181833]****.* ~~*Although this criterion previously referenced 10 CFR 434, it has been replaced by 10 CFR 433 [DIRS 181833], which directly imposes ASHRAE 90.1-2004.*~~ *10 CFR 433 and* ***the*** *Executive Order****s*** ~~*13123*~~ *are mandated through the contract.* ***CBCN013 to Revision 007 provided this change.****]*

4.9.6.2.3 Refrigerant Classification

The chilled water cooling system design shall utilize environmentally acceptable refrigerant (e.g., R-134a) and be equipped with protective devices to reduce refrigerant loss and minimize refrigerant emissions during service. The safety classification of refrigerants shall be in accordance with ANSI/ASHRAE Std 34-2004, *Designation and Safety Classification of Refrigerants* [DIRS 174323].

[This criterion complies with the applicable provisions of 65 FR 24595, Greening the Government Through Leadership in Environmental Management [DIRS 154538], Executive Order 13148 ***and 72 FR 3919, Strengthening Federal Environmental, Energy, and Transportation Management, Executive Order 13423 [DIRS 185515], Sections 2(e) and 3(a). Although Executive Order 13148 was revoked, it is still on the BSC contract and provides useful information. CBCN013 to Revision 007 provided this change.****]*

Revision to the PDC to incorporate DOE-STD-1090-2007:

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-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],
- 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],
- 10 CFR 71, Energy: Packaging and Transportation of Radioactive Material [DIRS 181967],
- 29 CFR 1910, Labor: Occupational Safety and Health Standards [DIRS 177507],
- DOE-STD-1090-**2007**~~2004~~ **Change Notice No. 1**, *Hoisting and Rigging* ~~*(Formerly Hoisting and Rigging Manual)*~~ [DIRS **185534**~~176661~~],
- 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 [DIRS177621], 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 (BSC2007 [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.

(4.8.1.1 Cont'd)

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. ***DOE-STD-1090-2007, Hoisting and Rigging [DIRS 185534], endorses ASME B30 standards and ASME NOG-1 that provides the criterion for the overhead and gantry cranes and lifting fixture design.*** *CBCN011* ***and CBCN013*** *to Revision 007 provided* ~~*this*~~***these*** *change*~~*s*~~*.]*

4.8.1.2.9 ITS Special Lifting Devices

ITS special lifting devices whose safety function is to prevent the drop of a waste form or prevent a load drop onto a waste form shall be designed and constructed per ANSI N14.6-1993, *American National Standard for Radioactive Materials - Special Lifting Devices for Shipping Containers Weighing 10000 Pounds (4500 kg) or More* [DIRS 102016], using design criteria for devices handling critical loads. Exceptions to this requirement are grapples such as those for fuel assemblies and DOE waste canisters that have been previously designed for other facilities and are being adopted for use at Yucca Mountain.

[ANSI N14.6-1993 is an industry standard for cranes with lifting devices. ***DOE-STD-1090-2007, Hoisting and Rigging [DIRS 185534], endorses ANSI N14.6 for special lifting devices used for radioactive materials. CBCN013 to Revision 007 provided this change.****]*

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. ***DOE-STD-1090-2007, Hoisting and Rigging [DIRS 185534], endorses ASME B30.10 that provides the criterion for hook design.*** *CBCN011* ***and CBCN013*** *to PDC Revision 007* ***provided these changes.*** ~~*added this criterion.*~~*]*

5.3.1.2 Remote Handling Equipment Design Criteria

Remote handling equipment design shall be compatible with ASME B30.20-2003, *Below-the-Hook Lifting Devices* [DIRS 171688], CMAA 70-2004, *Specifications for Top Running Bridge and Gantry Type Multiple Girder Electric Overhead Traveling Cranes* [DIRS 176257], and DOE-STD-1090-**2007**~~2004~~, *Hoisting and Rigging* ~~*(Formerly Hoisting and Rigging Manual)*~~ [DIRS **185534**~~176661~~].

*[Although a later version of ASME B30.20 is available, BSC has elected to utilize the above version. ASME B30.20-2003 provides the lifting device requirements for the design of the waste package closure cell. CMAA-70-2004 provides the crane and gantry requirements for the design of the waste package closure cell. DOE-STD-1090-****2007****~~2004~~* ***endorses ASME B30.20 and*** *provides the crane and gantry requirements for the design of the waste package closure cell.* ***CBCN013 to Revision 007 provided this change.****]*

Revision to the PDC to incorporate Resolution to CR-12050:

4.6.4.8.7 Maximum Noise Level

The permitted maximum noise level measured at 3 ft from the control valve body shall be 85 dBA in accordance with *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]).

[The referenced document is required by DOE O 440.1A, Worker Protection Management for DOE Federal and Contractor Employees [DIRS 102288]. Conformance ensures the occupational noise levels of 29 CFR 1910.95 [DIRS 177507] are achieved. ***Authorization has been granted to adopt the more stringent and restrictive requirements contained in ACGIH 2006. See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]). CBCN013 to PDC Revision 007 provided this change.****]*

4.6.4.9.2 Sizing

The rated capacity of the relief valves for inclusion in a datasheet shall be calculated in accordance with *2004 ASME Boiler and Pressure Vessel Code* (ASME 2004 [DIRS 171846], Section I, Paragraph PG-70, Section VIII, Paragraph UG-131). The allowable overpressure taken for this calculation shall be based on the allowable overpressure stated in the datasheet for the following applicable codes:

- ASME 2004, Section I, Power Boilers
- ASME 2004, Section VIII, Unfired Pressure Vessels
- ASME B31.1-2004, **2006.** *Power Piping* ***with Addenda, ASME B31.1a-2005*** [DIRS 177876]
- ASME B31.3-2004 (R2005), *Process Piping* [DIRS 176242]

*[**Authorization has been granted to adopt the more stringent and restrictive requirements contained in ASME B31.3-2004 (R2005) and ASME B31.1-2004, 2006. See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]).** Although ~~a~~ later versions of **ASME B31.1,** ASME B31.3 and ASME 2004 are available, the responsible DEM has elected to utilize the referenced versions. **CBCN013 to PDC Revision 007 provided this change.**]*

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],
- **72 FR 3919, Strengthening Federal Environmental, Energy, and Transportation Management, Executive Order 13423 [DIRS 185515]**
- 64 FR 30851, Greening the Government through Efficient Energy Management, **Executive Order 13123** [DIRS 104026],
- DOE O 430.2A, *Departmental Energy and Utilities Management* [DIRS 158913],
- 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 has 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. **Authorization has been granted to adopt the more stringent and restrictive requirements contained in ACGIH 2006. See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]).** CBCN011 **and CBCN013** to PDC Revision 007 **provided these changes.**~~added the AMCA 1999 standard.~~]*

4.9.2.3.2 Indoor Design Condition

Surface HVAC systems shall maintain an indoor environmental condition in accordance with:

- ANSI/ASHRAE Std 55-2004, *Thermal Environmental Conditions for Human Occupancy* [DIRS 174322]
- *2005 ASHRAE® Handbook, Fundamentals* (ASHRAE 2005 [DIRS 174692]), Chapter 8
- *2007 ASHRAE® Handbook, Heating, Ventilating, and Air-Conditioning Applications*, (ASHRAE 2007 [DIRS 182903]), Chapter 17 and 25)
- ANSI/ANS-57.7-1988 (R 1997), *American National Standard, Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type)* [DIRS 177851] Appendix E
- *Industrial Ventilation, A Manual of Recommended Practices* (ACGIH 2004 [DIRS 176297])
- *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]).

[This criterion is to provide appropriate thermal environmental conditions for human occupancy and the safety, health, and comfort of facility workers, as well as proper operation of SSCs. Although this criterion previously referenced 10 CFR 434, it has been replaced by 10 CFR 433 [DIRS 181833]. ***Authorization has been granted to adopt the more stringent and restrictive requirements contained in ACGIH 2006. See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements (Spence, D. 2008 [DIRS 185571]). CBCN013 to PDC Revision 007 provided this change.****]*

4.9.3.2 Contaminant Control

Whenever hazardous substances such as dusts, fumes, mists, vapors, or gases exist or are produced in the course of construction work, their concentrations shall not exceed the limits specified in *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]). When ventilation is used as an engineering control method, the system shall be installed and operated according to the requirements of this section. This shall be feasibly accomplished by accepted engineering control measures (for example, enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials). When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used pursuant to this section.

[This is to limit the concentration of hazardous substances and to provide acceptable working environmental conditions. Use of TLVs® and BEIs®, Based on the Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices is required by DOE O 440.1A [DIRS 102288], Section 4.1(1). In the control of those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective is to prevent breathing atmosphere contamination. ***Authorization has been granted to adopt the more stringent and restrictive requirements contained in ACGIH 2006. See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]). CBCN013 to PDC Revision 007 provided this change.****]*

4.9.3.3 Threshold Limit Value Limits

Employee exposure to inhalation, ingestion, skin absorption, or contact with any material or substance at a concentration above those specified in (ACGIH 2006 [DIRS 180457]), shall be avoided.

[This requirement protects the employees' health. Air pollutants may not be vented from the underground facilities without control if such a release will exceed any of the National Ambient Air Quality Standards for carbon monoxide, lead, nitrogen dioxide, ozone, sulfur oxides, and particulate matter in accordance with 40 CFR 50 [DIRS 177844] and DOE O 440.1A [DIRS 102288], Section 4.1(1). ***Authorization has been granted to adopt the more stringent and restrictive requirements contained in ACGIH 2006. See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]). CBCN013 to PDC Revision 007 provided this change.****]*

4.9.3.4 Underground Construction Ventilation Design Parameters

1. Ventilation - Fresh air shall be supplied to all underground work areas in sufficient quantities by means of mechanical ventilation, except when the employer can demonstrate that natural ventilation provides the necessary air quality through sufficient air volume and airflow. The direction of mechanical air flow shall be reversible.
2. Ventilation Volume Per Employee - A minimum of 200 cu ft/min of fresh air shall be supplied for each employee underground.
3. Drift Velocity - The linear velocity of air flow in the tunnel bore, shafts, and all other underground work areas shall be at least 30 ft/min where blasting or rock drilling is conducted or where other conditions likely to produce dust, fumes, mists, vapors, or gases in harmful or explosive quantities are present.
4. Blast Fume Clearing - Following blasting, ventilation systems shall exhaust smoke and fumes to the outside atmosphere before work is resumed in affected areas.
5. Ventilation Door Design - Ventilation doors shall be designed and installed so that they remain closed when not in use, regardless of the direction of the airflow.

(4.9.3.4 Cont'd)

6. Dust Control - When drilling rock or concrete, appropriate dust control measures shall be taken to maintain dust levels within limits set in the recent edition of (ACGIH 2006 [DIRS 180457]). Such measures may include, but are not limited to, wet drilling, the use of vacuum collectors, and water mix spray systems. Dust shall be controlled at muck piles, material transfer points, crushers, and on haulage roads where hazards to persons would be created as a result of impaired visibility.
7. Diesel Use - Internal combustion engines, except diesel-powered engines on mobile equipment, are prohibited underground: "Mobile diesel-powered equipment used underground in atmospheres other than gassy operations shall be either approved by the Federal Mine Safety and Health Act of 1977 (MSHA) [DIRS 131950] or demonstrated by the employer to be fully equivalent to such MSHA-approved equipment, and shall be operated in accordance with that part. Each brake horsepower of a diesel engine requires at least 100 cu ft/min of air for suitable operation in addition to the air requirements for personnel. Some engines may require a greater amount of air to ensure that the allowable levels of carbon monoxide, nitric oxide, and nitrogen dioxide are not exceeded."

[This criterion provides air quality standards and general ventilation requirements for the construction work area. The emplacement area is regulated by the NRC and does not require the reversibility of the ventilation system. The construction area will have reversibility in ventilation, as necessary, to comply with OSHA standards, 29 CFR 1926.800 [DIRS 177634]. Diesel use underground is restricted per 29 CFR 1926.800(k)(10) [DIRS 177634], 30 CFR 57 [DIRS 177661],and 30 CFR 36 [DIRS 177830]. ***Authorization has been granted to adopt the more stringent and restrictive requirements contained in ACGIH 2006. See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]). CBCN013 to PDC Revision 007 provided this change.****]*

4.9.4.1.23 Additional Codes and Standards

The LLW management system shall comply with these additional codes, standards, industry guides, regulatory guides, CFRs, and DOE orders and standards:

- *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]),
- ANSI/ANS-40.35-1991, *Volume Reduction of Low-Level Radioactive Waste or Mixed Waste* [DIRS 122381],
- ANSI/ANS-55.4-1993,*Gaseous Radioactive Waste Processing Systems for Light Water Reactor Plants*[DIRS 166935],
- ANSI/ANS-55.6-1993 (R 1999), *American National Standard for Liquid Radioactive Waste Processing System for Light Water Reactor Plants* [DIRS 177849],
- ANSI/ANS-57.7-1988 (R 1997), *American National Standard, Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type)* [DIRS 177851],
- ANSI/ANS-57.9-1992 (R2000), ***A****merican National Standard, Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)* [DIRS 176945],
- IESNA-RP-7-01-2004, *Recommended Practice for Industrial Lighting, with Errata* [DIRS 176343], IEEE Std 383-2003, *Standard for Qualifying Class 1E Electric Cables and Field Splices for Nuclear Power Generating Stations* [DIRS 171695],
- IEEE Std 142-1991, *IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems (with Erratum)* [DIRS 176545],
- IEEE Std 80-2000, *IEEE Guide for Safety in AC Substation Grounding* [DIRS 164256], NFPA 1144-2002, *Standard for Protection of Life and Property from Wildfire* [DIRS 160936],
- NFPA 70, *National Electrical Code, with Tentative Interim Amendment,* 2005 Edition [DIRS 177982],
- NFPA 780-2004, *Standard for the Installation of Lightning Protection Systems* [DIRS 173517],
- NFPA 801-2003, *Standard for Fire Protection for Facilities Handling Radioactive Materials* [DIRS 165077],
- *IESNA Lighting Handbook, Reference and Application, with Errata* (Rea 2005 [DIRS 176384]),
- UL 96A, *Installation Requirements for Lightning Protection Systems*
- Regulatory Guide 1.189 [DIRS 155040],
- 10 CFR 71 [DIRS 181967],
- 49 CFR 172 [DIRS 181974].

[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-000164 (BSC 2007 [DIRS ***184412****~~181799~~*]) *adopted Regulatory Guide 1.189. UL 96A 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 a later version of NFPA 70 is available, the responsible DEM has elected to utilize the referenced version.* ***Authorization has been granted to adopt the more stringent and restrictive requirements contained in ACGIH 2006. See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]). CBCN013 to PDC Revision 007 provided this change.****]*

4.9.5.1.1 Boiler and Pressure Vessel Safety

Pressure vessels, boilers, air receivers, and supporting piping systems shall conform to the applicable sections of the codes or standards:

1. *2004 ASME Boiler and Pressure Vessel Safety Code* [DIRS 171846] Sections I through X and Section XII including applicable Code Cases
2. ASME B31.3-2004 (R2005), *Process Piping* [DIRS 176242]
3. The strictest applicable state and local codes.

[DOE O 440.1A [DIRS 102288], Contractor Requirement 20.b. requires the use of ASME codes.–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. RGA REG-CRW-RG-000168, Regulatory Guidance Agreement, Regulatory Guide 1.193, Rev. 1 - ASME Code Cases Not Approved for Use (BSC 2007 [DIRS 183186]) has adopted Regulatory Guide 1.193 Rev 1 ,ASME Code Cases Not Approved for Use [DIRS 177622]. The Code Cases pertaining to ASME Section III listed therein shall not be used. ***Authorization has been granted to adopt the more stringent and restrictive requirements contained in ASME B31.3-2004 (R2005). See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]).*** *Although a later version of ASME B31.3 is available, the responsible DEM has elected to utilize the referenced version.* ***CBCN013 to PDC Revision 007 provided this change.****]*

4.9.5.5 Piping System

The plant services piping system shall be designed in accordance with ASME B31.3-2004 (R2005) [DIRS 176242] and piping flanges and fitting shall be in accordance with ASME B16.5-2003 [DIRS 169366] and ASME B16.5a-1998 [DIRS 164190].

[This criteria establishes the requirement in the design of water piping to support compliance with Regulatory Guide 1.143 [DIRS 157566], Table 1. RGA REG-CRW-RG-000121 (BSC 2007 [DIRS 181764]) has provided guidance for Regulatory Guide 1.143 to use the codes and standards listed in the Table 1(excluding footnotes) of the guide. These are appropriate industry standards for this application. ***Authorization has been granted to adopt the more stringent and restrictive requirements contained in ASME B31.3-2004 (R2005). See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]).*** *Although a later version of ASME B31.3 is available, the responsible DEM has elected to utilize the referenced version.* ***CBCN013 to PDC Revision 007 provided this change.****]*

4.9.6.1.3 Piping System

The plant heating and cooling water piping system shall be designed in accordance with ASME B31.3-2004 (R2005) [DIRS 176242].

[This criteria establishes the requirement in the design of water piping to support compliance with Regulatory Guide 1.143 [DIRS 157566], Table 1. RGA REG-CRW-RG-000121 (BSC 2007 [DIRS 181764]) has provided guidance for Regulatory Guide 1.143 to use the codes and standards listed in the Table 1(excluding footnotes) of the guide. ***Authorization has been granted to adopt the more stringent and restrictive requirements contained in ASME B31.3-2004 (R2005). See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]).*** *Although a later version of ASME B31.3 is available, the responsible DEM has elected to utilize the referenced version.* ***CBCN013 to PDC Revision 007 provided this change.****]*

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, *2004ASME 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. ***Authorization has been granted to adopt the more stringent and restrictive requirements contained in ASME B31.3-2004 (R2005). See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]).*** *CBCN011* ***and CBCN013*** *to Revision 007 provided* ~~*this*~~***these*** *changes.]*

4.9.7.8 Decontamination Water Treatment System

The design criteria for the decontamination water treatment system shall be as follows:

1. General design requirements for volume reduction of liquid LLW shall be in accordance with ANSI/ANS 40.35-1991 [DIRS 122381].
2. The system design shall provide for treatment of decontamination water, as appropriate, to ensure that the receiving system design limits are not exceeded. These design limits may include requirements for parameters such as pH, conductivity, pressure, temperature, total suspended solids, total organic components, and oil and grease concentration (ANSI/ANS 40.35-1991, Section 9.2).
3. The process and radiation monitoring devices shall be designed to provide continuous monitoring and recording of information about treated liquids (ANSI/ANS-55.6-1993 (R 1999) [DIRS 177849], Section 5.5).
4. The decontamination water treatment system piping (ASME B31.3-2004 (R2005) [DIRS 176242]) shall be designed to eliminate **crud** traps, loops and minimize flanges that might accumulate radioactive material (ANSI/ANS 57.7-1988 (R 1997) [DIRS 177851], Section 6.3.2.10).
5. The design shall avoid the use of built-in crud traps, such as flanged couplings, and dead legs. Construction materials and surface finishes shall be considered to minimize porosity, crevices, and rough machine marks to limit the possibility of tightly adherent contamination, criticality, and to facilitate ease of decontamination (ANSI/ANS 57.7-1988 (R 1997), Section 2.8).
6. The design shall provide for full draining of contaminated piping systems by including the installation of low-point drains, pump drains, tank vent systems, and drain systems and the elimination of dead legs between valves in system designs (ANSI/ANS 57.7-1988 (R 1997), Section 6.3.2.10).
7. System equipment and piping shall be designed, constructed, and tested in accordance with requirements in ANSI/ANS-55.6-1993 (R 1999), Table 1.
8. The design for the decontamination water treatment system shall have the ability through tank storage and processing rate to accommodate system liquid volumes (ANSI/ANS-55.6-1993 (R 1999), Section 4.9).
9. Collection tank volumes shall be designed to accommodate the maximum liquid input that occurs for that portion of the day when processing is not available as determined by ANSI/ANS-55.6-1993 (R 1999), Sections 4.7.3 (b) and (c). The final tank volumes shall contain an additional 20 % safety factor and 10 % freeboard (ANSI/ANS-55.6-1993 (R 1999), Section 4.8).
10. Dikes and retention basins for outdoor liquid storage shall be capable of preventing runoff in case of a tank overflow (ANSI/ANS-55.6-1993 (R 1999), Sections 4.2 and 5.2.1.1).
11. The system is not designed to process decontamination water containing excessive quantities of oil or other organic materials. Specific design measures shall be incorporated to prevent oil or other organic materials from entering the water stream and shall be provided with a means to detect and eliminate such materials from the system during operations (ANSI/ANS-55.6-1993 (R 1999), Section 5.1).
12. Equipment or components of the system shall be selected on the basis of performance requirements, ease of operations, reliability, and ease of maintenance or replacement of components in accordance with ANSI/ANS-55.6-1993 (R 1999), Section 5.1.1.
13. A tank design that eliminates crevices and pockets shall provide for complete drainage. Conical or sloped bottom tanks shall be used (ANSI/ANS 55.1-1992 (R 2000) [DIRS 177848], Section 5.2.2).
14. Sampling of effluent shall be in accordance with applicable provisions of ANSI/ANS-55.6-1993 (R 1999), Section 4.6.

[ANSI/ANS 40.35-1991, ANSI/ANS-55.6-1993 (R 1999), ANSI/ANS 57.7-1988 (R1997), and ASME B31.3-2004. ***Authorization has been granted to adopt the more stringent and restrictive requirements contained in ASME B31.3-2004 (R2005). See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]).*** *Although a later version of ASME B31.3 is available, the responsible DEM has elected to utilize the referenced version.* ***CBCN013 to PDC Revision 007 provided this change.****]*

4.9.9 ITS DIESEL GENERATOR SUPPORT SYSTEMS DESIGN CRITERIA

The design criteria for the electrical portion of the ITS diesel generator are discussed in Sections 4.3.1.1.29, 4.3.2.2, and 4.3.2.7. This section addresses the design criteria for the support systems for the ITS diesel generator (i.e., air start, fuel oil, lubricating oil, jacket water cooling, and combustion air intake/exhaust). Specific design criteria and guidance for each support system is provided in the following subsections.

4.9.9.1 Codes and Standards

~~The design criteria for the electrical portions of the ITS diesel generator itself is discussed in Sections 4.3.1.1.29, 4.3.2.2, and 4.3.2.7. This section addresses the design criteria for the support systems for the ITS diesel generator (i.e., air start, fuel oil, lubricating oil, jacket water cooling, and combustion air intake/exhaust).~~

(4.9.9.1 Cont'd)

The following are the codes, standards, industry guides, and regulatory guides that shall be applied in the design of the support systems for the ITS diesel generator:

- ASME B31.3-2004~~.~~ **(R**2005**)**, *Process Piping* [DIRS 176242]
- ASME 2004. *ASME Boiler and Pressure Vessel Code.* [DIRS 171846] Section VIII, Div. 1 or 2,
- Boner, G.L. and Hanners, H.W. 1979, *Enhancement of On-Site Emergency Diesel Generator Reliability #URD-TR-79-07.* NUREG/CR-0660. [DIRS 184522],
- Regulatory Guide 1.9, Rev. 3. 1993. *Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants.* [DIRS 146732]
- NFPA 70, *National Electrical Code* [DIRS 177982],
- NFPA 780, *Standard for the Installation of Lightning Protection Systems* [DIRS 173517],
- IEEE STD 323-2003, "Qualifying Class 1E Equipment for Nuclear Power Generating Stations" [DIRS 166907].
- IEEE Std 387-1995 (REAF 2001). 2001. *Standard Criteria for Diesel-Generator Units Applied as Standby Power Generating Stations,* with exception of reference to IEEE-344 [DIRS 178084].

~~*Specific design criteria and guidance for each support system is provided in the sections that follow. The specific criteria and guidance is in addition to the criteria listed above.*~~ *[**Authorization has been granted to adopt the more stringent and restrictive requirements contained in ASME B31.3-2004 (R2005). See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]). Although a later version of ASME B31.3 is available, the responsible DEM has elected to utilize the referenced version.** CBCN012 **and CBCN013** to Revision 007 **provided these changes.**~~**added this criterion.**~~]*

4.12.3 Piping Design Criteria

Piping design shall comply with ASME B31.3-2004 (R2005), *Process Piping* [DIRS 176242].

*[This standard provides for all the piping design needs. This industry standard is an acceptable source of design criteria. **Authorization has been granted to adopt the more stringent and restrictive requirements contained in ASME B31.3-2004 (R2005). See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]).** Although a later version of ASME B31.3 is available, the responsible DEM has elected to utilize the referenced version. **CBCN013 to PDC Revision 007 provided this change.**]*

6.1.13 Silica Dust

Respirable~~Airborne~~ exposures to crystalline silica shall not exceed the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit value (TLV) of 0.025 mg/m^3 for an eight-hour time-weighted average provided in, *TLVs® and BEIs®, Based on the Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices* (ACGIH 2006 [DIRS 180457]). The immediate danger to life and health limit for cristobolite and tridymite silica is 25 mg/m^3 and for quartz is 50 mg/m^3 in accordance with *National Institute for Occupational Safety and Health "Silica, Crystalline (as Respirable Dust)"* (NIOSH 1996 [DIRS 147940]).

*[Although **DOE O 440.1A**~~the requirement source~~ has been removed from the contract, it provided the basis for this **criterion**~~functional requirement that should still be applied to the system~~. These immediate danger to life and health limits are based on 500 times the 1989 OSHA permissible exposure limits of 0.05 mg/m^3 and 0.1 mg/m^3. This criterion invokes the ACGIH TLV requirements which are lower (more protective) than the OSHA permissible exposure limits for silica (0.1 mg/m^3) (NIOSH 1996 [DIRS 147940]) and represents a more protective work environment. **Authorization has been granted to adopt the more stringent and restrictive requirements contained in ACGIH 2006. See email dated June 12, 2008, "Response to CR-12050, 10 CFR 851.27 Requirements" (Spence, D. 2008 [DIRS 185571]).** CBCN012 **and CBCN013** to Revision 007 provided for ~~this~~**these** change**s**.]*

Revision to the PDC to add new criterion for Hazard Evaluation:

4.1.12 Hazards Evaluation

Hazard assessment of the design of SSCs shall be performed in accordance with MIL-STD-882D, *Standard Practice for System Safety* [DIRS 185551], Sections 4.2 and 4.3. The hazard assessment shall demonstrate that hazard prevention and abatement is in accordance with 10 CFR 851.22, *Energy: Worker Safety and Health Program* (Eff 02/09/07) [DIRS 182868]. The assessment shall include risks to public and worker health and safety, the environment, capital investment (property), and mission capability. Risk assessment shall be based on YMP tailored probability, consequence and relative risk tables. The assessment shall demonstrate that the selected design has a relative risk of Low or Very Low.

[Hazards analyses are required to maintain compliance with 10 CFR 851. MIL-STD-882D, Section 4.3 allows for specifying alternatives to the Risk Assessment tables as provided in Appendix A of MIL-STD-882D. CBCN013 to PDC Revision 007 added this criterion.]

Clarifications to the PDC regarding the use of Adjustable Speed Drives:

4.3.1.1.15 Load Center

The 480 V load center (switchgear) shall be used to **feed** ~~provide power to the downstream~~ motor control centers~~, and~~ motors larger than 150 hp up to 250 hp and static loads up to 400 kW. **Deviations from these limits are permissible for adjustable speed drives. However, in no case shall the load center capacity be exceeded.** The load center bus shall be sized to accommodate a minimum twenty-five percent load growth and have the space capacity to add a minimum twenty-five percent additional circuit breakers based on the number of circuit breakers at the time of procurement.

[This criterion is required to define the role of the 480 V load center and ensure safe operation of medium size 480V motors and other static loads. This is the commonly accepted industry practice. This practice will minimize the stress in electrical equipment. This will enable long-term equipment operation. The spare capacity is provided to allow sufficient margin for future load growth. ***CBCN013 to Revision 007 provided this change.****]*

4.3.1.1.16 Motor Control Center

The 480 V motor control center shall be used to provide alternating current (AC) power to induction motors rated 150 hp or below, but above 1/3 hp, miscellaneous branch circuits, and static loads up to 240 kW. **Deviations from these limits are permissible for adjustable speed drives. However, in no case shall the motor control center capacity be exceeded.** The motor control center bus shall be sized to accommodate a minimum twenty-five percent load growth and have the space capacity to add a minimum twenty-five percent additional circuit breakers based on the number of circuit breakers at the time of procurement.

[This criterion is required to define the role of the 480 V motor control center and for reliable and safe operation of low integral or fractional size motors and other static loads. This is the commonly accepted industry practice. This practice will facilitate easy installation and easy replacement of motors or static loads. The spare capacity is provided to allow sufficient margin for future load growth. ***CBCN013 to Revision 007 provided this change.****]*

4.3.1.1.18 Alternating Current Motors

In general, AC motors shall be squirrel-cage, induction type, and suitable for operation in accordance with IEEE Std 141-1993, *IEEE Recommended Practice for Electrical Power Distribution for Industrial Plants* [DIRS 122242] and ANSI C84.1-2006, *Electric Power Systems and Equipment - Voltage Ratings (60 Hz)* [DIRS 182858]. System supplies shall be as listed in Table 4.3.1-1.

Table 4.3.1-1. AC Motor Supplies*****

Motor Size	Utilization Voltage	System Supply
1/3 hp and smaller	115 V	120 V, 1-phase, 60 Hz
1/2 hp to 250 hp	460 V	480 V, 3-phase, 60 Hz
251 hp to 4,000 hp	4 kV	4.16 kV, 3-phase, 60 Hz
~~Adjustable speed reversing and two-speed motors~~	~~460 V~~	~~480 V, 3-phase, 60 Hz~~

*** Horsepower ranges may vary with the use of adjustable speed drives**

[This criterion is required to define the motor application voltages for reliable and safe operation. This is a commonly accepted industry practice. ***CBCN013 to Revision 007 provided this change.****]*

Revision to the PDC to resolve CR-12241:

4.2.11.2.1 Seismic Ground Motion for Surface ITS SSCs

Seismic analysis and design for ITS SSCs shall be assigned design basis ground motions (DBGMs) based on dose consequences of 10 CFR 63.111 [DIRS 180319], due to postulated Category 1 and Category 2 event sequences. For this purpose, three different levels of seismic ground motions are considered in terms of return periods:

- DBGM-1: Mean annual probability of exceedance of 1×10^{-3} (1,000-yr return period)
- DBGM-2: Mean annual probability of exceedance of 5×10^{-4} (2,000-yr return period)
- Beyond design basis ground motion (BDBGM): Mean annual probability of exceedance of 10^{-4} (10,000-yr return period)

ITS SSCs that are relied upon to prevent or mitigate seismic event sequences shall be designed for DBGM-2 ~~Seismic designs of ITS SSCs assigned either DBGM-1 or DBGM-2 shall be prepared~~ to meet the governing code allowable acceptance criteria. ~~Some ITS SSCs are not required following a seismic initiating event and their seismic design is governed by other repository requirements.~~ In addition, **ITS** SSCs ~~ITS designed for DBGM-2~~ **relied upon to prevent or mitigate seismic event sequences** will be evaluated ~~at BDBGM~~ to demonstrate the capacity of the ITS SSCs ~~ITS~~ to perform their intended safety

(4.2.11.2.1 Cont'd)

functions **and meet the controlling parameters and values,** consistent with the methods outlined in *Preclosure Seismic Design and Performance Demonstration Methodology for a Geologic Repository at Yucca Mountain Topical Report* (DOE 2007 [DIRS 181572])**, Section 4.4**.

Seismic design of ITS SSCs that are not relied upon to prevent or mitigate seismic event sequences are governed by other repository requirements.

The selection of damping values used in the analysis of ITS SSCs at Yucca Mountain is based on the industry values as provided in ASCE/SEI 43-05, *Seismic Design Criteria For Structures, Systems, and Components in Nuclear Facilities* [DIRS 173805], Section 3.4.3.

The site specific seismic hazard evaluation shall be performed in accordance with Regulatory Guide 1.165, *Identification and Characterization of Seismic Sources and Determination of Safe Shutdown Earthquake Ground Motion* [DIRS 119139].

[The Seismic Topical Report (DOE 2007 [DIRS 181572]) provides an accepted methodology for the repository preclosure period. ***The controlling parameters and values are defined as the safety and protection requirements in the BOD (BSC 2008 [DIRS 185025]).*** *RGA REG-CRW-RG-000050 Rev 01, Agreement for Regulatory Guide 1.61, Rev. 1 - Damping Values for Seismic Design of Nuclear Power Plants (BSC 2007 [DIRS 182802]) indicated that ASCE/SEI 43-05 is an acceptable alternative to Regulatory Guide 1.61, Rev 1 [DIRS 182003], which will not be used. RGA REG-CRW-RG-000140, Agreement for Regulatory Guide 1.165, Rev. 0, Identification and Characterization of Seismic Sources and Determination of Safe Shutdown Earthquake Ground Motion (BSC 2007 [DIRS 181813]) provided agreement to use Regulatory Guide 1.165 with clarifications.* ***RGA REG-CRW-RG-000393 (BSC 2007 [DIRS 181823]) has indicated that Regulatory Guide 1.165 is an acceptable alternative to Regulatory Guide 1.208, A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion.*** *The site-specific seismic hazard evaluation and development of the site-specific ground motion for seismic design and evaluation is contained in a variety of project-developed documents. The process followed, methodology and data utilized, and results obtained shall be considered appropriate for the YMP repository. The risk-informed performance-based process forms the basis for seismic design and evaluation of SSCs.* ***CBCN013 to PDC Revision 007 provided this change.****]*

4.2.11.4.4 Load Factors, Load Combinations, and Acceptance Criteria

Notations:

A = Ash load
D = Dead load
L = Live load
L_r = Roof live load
S_N = Snow load
E = Earthquake (seismic) load resulting from **design basis ground motion defined in Section 4.2.11.2.1**~~DBGM-1, DBGM-2, and BDBGM seismic level definition~~
H = Lateral earth pressure load
T_a = Thermal loads during accident condition
T_o = Thermal loads during normal operating conditions
F = Fluid load
F' = Buoyant force of design basis flood
R_o = Operating pipe reaction load
S = Allowable stress per allowable stress design (ASD) method
U = Required strength per strength design method
W = Wind load
W_t = Tornado load (This includes effects from tornado wind pressure, tornado-created differential pressure, and tornado-generated missiles.)
Y_m= Missile impact equivalent static load on structure generated by drop load and including appropriate dynamic load factor to account for the dynamic nature of the load. (In determining an appropriate static load for Y_m, elasto-plastic behavior may be assumed with appropriate ductility ratios, provided excessive deflection will not result in loss of function of any SSCs ITS.)

(4.2.11.4.4 Cont'd)

In the load combinations provided in this section, the following conditions shall be considered:

A. Where the structural effects of differential settlement, creep, or shrinkage may be significant, they shall be included with the dead load D in all the load combinations. Estimation of these effects shall be based on a realistic assessment of such effects occurring in service.

B. Where any load reduces the effect of other loads, the corresponding coefficient for that load shall be taken as 0.9 if it can be demonstrated that the load is always present or occurs simultaneously with other loads. Otherwise, the coefficient for that load shall be taken as zero.

C. In the load combinations that include Y_m, appropriate dynamic load factor should be used unless a time-history analysis is performed to justify otherwise.

D. In the load combinations that include W_t or Y_m, the corresponding acceptance limits (U, 1.6S, or 1.7S) should be satisfied first without a tornado missile load of W_t, or without Y_m. When considering these concentrated missile loads, local section strength capabilities may be exceeded provided there would be no loss of function of any SSCs ITS system.

[Definitions given are standard structural definitions. Conditions listed are to be used with load combinations are good engineering practice. Load combination are derived in part from ACI 349-01/349R-01 [DIRS 181670], E_{ss} of Section 9.2, and ANSI/AISC N690-1994 [DIRS 158835], E_{ss} of Table Q1.5.7.1, p.22. RGA REG-CDR-RG-000120 (BSC 2007 [DIRS 181746]) adopted RG-1.142 [DIRS 177654] that supports using ACI 349. The RGA specifies using the version listed. ***CBCN013 to PDC Revision 007 provided this change.****]*

Revision to the PDC to correct typographical error:

4.10.3.7 Classification of Radiation and Contamination Zones

Table 4.10.3-2 – Classification of Contamination Zones

Classification	Removable Surface Contamination Limit (dpm/100 cm^2)	Average airborne Radioactivity	Verification System Correlation	Description	Radiation Protection Controls[3] (Dosimetry based on radiation zone requirement)
C1 (Non-Contaminated Area)	$\beta\gamma \leq 1{,}000$ $\alpha \leq 20$	N/A	Industrial Grade Ventilation	C1 areas are maintained to have no contamination. This includes areas outside of surface waste processing facilities. For waste processing facilities, these areas include: • Control rooms • Break and rest rooms • Stairways, elevators, and elevator vestibules	No contamination control, and no training are needed. Minimal surveys, exit walk-through monitors
C2 (Potential Contamination Area)	$\beta\gamma \leq 1{,}000$ $\alpha \leq 20$	N/A	Tertiary Ventilation System	C2 areas are the operational areas of the repository facilities and have their interfaces with contaminated areas (C3, C4, and C5~~C4~~ areas), and have the potential to be contaminated. C2 areas include: • Operating galleries • Subsurface access main (portions)	Routine surveys, exit monitoring of personnel and equipment, Radiation Worker Training (RWT), general RWP
C3 (Contamination Area)	$1{,}000 < \beta\gamma \leq 100{,}000$ $> 10{,}000$ H3 $20 < \alpha \leq 2{,}000$	[Air]≤0.1 DAC (Normally expected ≤0.01 DAC, i.e., <50 mrem/yr)]	Secondary Ventilation System	C3 areas are the process areas where the direct contact with the radioactive material and/or contaminated system components exists. C3 areas include: • Some equipment maintenance areas • Laboratory fume hoods • Subsurface emplacement drift (turnout area)	Routine surveys, exit monitoring (at step-off pads-SOP) for personnel/ equipment, PPE, potential for respiratory protection, RWT, specific sampling
C4 (High Contamination Area)	$\beta\gamma > 100{,}000$ $\alpha > 2{,}000$	0.1 DAC<[Air] ≤ 1 DAC	Primary Ventilation System	C4 areas are highly contaminated areas that potentially require confinement control and include: • Primary Ventilation System HEPA filter rooms	Surveys, as needed, exit monitoring, decontamination as needed, RWT, specific sampling, PPE, respiratory protection as needed.
C5 (Airborne Radioactivity Area)	$\beta\gamma > 500{,}000$ $\alpha > 10{,}000$	Air> 1 DAC	Primary Ventilation System	C5 areas are airborne radioactivity areas that require total confinement. C5 areas include: • Bare-fuel transfer rooms/cells • DPC cutting/WP remediation	Access to C5 normally not permitted. High-Integrity protective clothing, respirator and monitoring, specific RWP, RWT, decontamination and survey as needed

Notes:
1. Levels based on accepted industry practice (NRC and DOE) and DOE Radiological Control Manual.
2. Generally, areas >~200,000 DPM/100cm^2 are measured with dose rate instrument and values recorded in mrad/hr
3. Types and layering PPE and types of respiratory protection are dependent on levels of contamination and specific airborne contamination levels.

[The Classification of Radiation Zones is being added per TMRB 2004-051, Technical Management Review Board (TMRB) Decision Proposal [DIRS 174877]. At the direction of the Discipline Engineering Manager of Nuclear and Radiological, the Classification of Contamination Zones is being added. ~~CBCN010 to Revision 6 added these classifications.~~ ***CBCN013 provided this change.****]*

Add the following reference in PDC Section 8.1:

[DIRS 185528]
Peterson, S.R. 2008. "Direction Letter to Bechtel SAIC Company, LLC (BSC) Regarding Leadership in Energy and Environmental Design (LEED) Certification of Yucca Mountain Project (YMP) Facilities, Contract Number DE-AC28-01RW12101." Letter from S.R. Peterson (DOE/OCRWM) to D.J. Schlismann (BSC), May 15, 2008, 0515083172, OCE:HKE-0720, YD-200800182. ACC: CCU.20080515.0012.

[DIRS 185571]
Spence, D. 2008. "Response to CR-12050, 10 CFR 851.27 Requirements". E-mail from Dick Spence to Tim Rotert, June 12, 2008. ACC: RPM.20080619.0026.

Add the following references in PDC Section 8.2:

[DIRS 181823]
BSC (Bechtel SAIC Company) 2007. *Regulatory Guidance Agreement, Agreement for Regulatory Guide 1.208, Rev. 0, A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion.* REG-CRW-RG-000393 REV 00. Las Vegas, Nevada: Bechtel SAIC Company. ACC: DOC.20070611.0004.

[DIRS 185515]
72 FR 3919. *Strengthening Federal Environmental, Energy, and Transportation Management.* Executive Order 13423. ACC: Internet Accessible.

[DIRS 185534]
DOE-STD-1090-2007 Change Notice No. 1. 2007. *Hoisting and Rigging.* Washington, D.C.: U.S. Department of Energy. Internet Accessible.

[DIRS 185551]
MIL-STD-882D. 2000. *Standard Practice for System Safety.* [Washington, D.C.]: U. S. Department of Defense. ACC: RPM.20080609.0018

[DIRS 184412]
BSC (Bechtel SAIC Company) 2007. *Regulatory Guidance Agreement, Agreement for Regulatory Guide 1.189, Rev. 0 - Fire Protection for Operating Nuclear Power Plants.* REG-CRW-RG-000164 REV 01. Las Vegas, Nevada: Bechtel SAIC Company. ACC: DOC.20070911.0005.

Delete the following references in PDC Section 8.2:

~~[DIRS 176661]~~
~~DOE-STD-1090-2004. 2004. *Hoisting and Rigging (Formerly Hoisting and Rigging Manual).* Washington, D.C.: U.S. Department of Energy. ACC: ENG.20060407.0002.~~

~~[DIRS 181799]~~
~~BSC (Bechtel SAIC Company) 2007. *Regulatory Guidance Agreement, Agreement for Regulatory Guide 1.189, Rev. 0 - Fire Protection for Operating Nuclear Power Plants.* REG-CRW-RG-000164 REV 00. Las Vegas, Nevada: Bechtel SAIC Company. ACC: DOC.20070130.0004.~~

11.	REVIEWS AND APPROVAL		
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11b. Concurrence: Partha Parthasarthy	Manager of Discipline Engineering	P Parthasarthy	7/9/08
11c. Concurrence: N/A	Project Engineering Manager	N/A	N/A
11d. Approved: Barbara Rusinko	Engineering Manager	R C Klemic For B.E. Rusinko	09 JULY 2008