
IMPLEMENTATION OF DOE-STD-1189 APPENDICES A, B, AND C

**Energy Facility Contractors Group
2008 Safety Analysis Workshop
Richland, Washington
May 3-8, 2008**

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DNFSB February 22, 2008 Letter

- Concurred with issue of standard with two remaining issues
- First issue is that DOE needs to revise existing guidance to be consistent with DOE-STD-1189
- Second issue is that Appendix B and C are not mandatory and in addition, the design criteria derived by applying these appendices do not provide the requisite system and component reliability, e.g., separation and redundancy needed for the protection of the public
- Requires DOE within 60 days of receipt of letter to (1) provide a report identifying DOE directives that require revision along with a schedule, and (2) provide a briefing describing the technical basis for the safety and design criteria provided in Appendices B and C



DOE Interim Guidance for Design for NPH

- Until DOE O 420.1B, G 420.1-2, and the 1020 series of DOE NPH standards are revised, the following guidance is provided for projects implementing DOE-STD-1189
- Following standards should be used for seismic criteria

Subject	Applicable Standard
Seismic Design and Evaluation Criteria	ASCE/SEI 43-05
Seismic Performance Categorization for SSCs	ANSI/ANS 2.26-2004 as modified by DOE-STD-1189
Seismic Site Characterization Criteria	DOE-STD-1022-94
Seismic Assessment Criteria	DOE-STD-1023-95



DOE Interim Guidance for Design for NPH

- Existing DOE 1020 series remain in use in their entirety for natural phenomena hazards other than seismic
- Following categorization criteria should be utilized for other NP events, consistent with the methodology described in Appendix A

Unmitigated Consequence of SSC Failure		
Category	Collocated Worker	Public
PC-1	Dose < 5 rem	Not applicable
PC-2	5 rem < dose < 100 rem	5 rem < dose < 25 rem
PC-3	100 rem < dose	25 rem < dose



DOE Interim Guidance for Design for NPH

- SSCs that prevent or mitigate criticality accidents, chemical explosions, or other events with the potential for a prompt in-facility worker fatality, immediate life-threatening injuries and/or permanently disabling injuries caused by NP events should be SDC-3 and or PC-3
- SSCs that prevent or mitigate the release of hazardous chemicals outside a facility that would exceed AEGL-3/ERPG-3/TEEL-3 at 100 m (collocated worker) or the emergency response boundary (whichever is closer) should be SDC-3 and or PC-3
- When safety analyses determine that local confinement of high hazard materials is required in the case of wind or flooding caused accidents, SSCs required for protection of an in-facility worker who is required to remain in the facility for safe shutdown or other safety related purpose should be PC-3
- For SSCs that must be designed for seismic and wind or flood loads, such as external building structures, there will be a need to resolve the differences in design requirements identified by the seismic SDC categorizations and the PC resulting from the wind and flood loads. This resolution should always be done conservatively, i.e. the design must achieve the desired protection for the applicable loads.



NNSA YSO Guidance for the Uranium Processing Facility

- UPF structure will be designed and constructed as SDC-3 and PC-3
- All SSCs credited in the safety basis documents to prevent a nuclear criticality accident will be designed and constructed as SDC-3/PC-3
- All SSCs credited in the safety basis documents as safety class or safety significant for protection of the public will be designed and constructed as SDC-3/PC-3
- All SSCs that are credited for facility worker protection only (except nuclear criticality accidents), will be designed and constructed as SDC-2/PC-2. SDC-3/PC-3 designation for these SSCs may be appropriate for natural phenomena events with the potential for a prompt worker fatality, immediately life-threatening injuries and/or permanently disabling injuries
- All SSCs preventing or mitigating the release of hazardous materials exceeding ERPG-3 (emergency response planning guideline) at the emergency response boundary will be designed and constructed as SDC-3/PC-3
- All other SSCs will follow the direction in draft DOE-STD-1189 (3/1/07) for determining the SDC
- Preliminary limit states for each of the credited SSCs will be defined in accordance with ANS 2.26 and draft DOE-STD-1189



Application of Limit States for UPF

Seismic Design Category (SDC)	Limit State			
	A	B	C	D
	Large Permanent Distortion	Medium Permanent Distortion	Limited Permanent Distortion	Essentially Elastic Behavior
1	ASCE 7-05 Occupancy Category I or II ($I=1.0$) ¹ $R_a=R$ ¹	ASCE 7-05 Occupancy Category I or II ($I=1.0$) ¹ $R_a=0.80R$ ¹ but $R_a \geq 1.0$	ASCE 7-05 Occupancy Category I or II ($I=1.0$) ¹ $R_a=0.67R$ ¹ but $R_a \geq 1.0$	ASCE 7-05 Occupancy Category I or II ($I=1.0$) ^{1,3} Use $R_a=1.0$
2	ASCE 7-05 Occupancy Category III or IV ² $R_a=R$ ¹	ASCE 7-05 Occupancy Category III or IV ² $R_a=0.80R$ ¹ but $R_a \geq 1.0$	ASCE 7-05 Occupancy Category III or IV ^{2,3} $R_a=0.67R$ ¹ but $R_a \geq 1.0$	ASCE 7-05 Occupancy Category III or IV ^{2,3} Use $R_a=1.0$
3	ASCE 43-05 ANS 2.26	ASCE 43-05 ANS 2.26	ASCE 43-05 ANS 2.26	ASCE 43-05 ANS 2.26

1. I = Importance factor (see Table 11.5-1 of ASCE 7-05; R = Response Modification Factor Coefficient in ASCE 7-05; R_a = Actual (reduced) Response Modification Coefficient to be used in design
2. ASCE 7-05 Occupancy Category IV ($I=1.5$) shall be used if there is a radiological release consequence of concern to the public or the environment resulting from an unmitigated failure of the SSC.
3. The modal response spectrum or time history response procedures in ASCE 43-05 should be used to analyze the SSCs. If analyses cannot be used for the SSCs, then shake table testing shall be performed in accordance with ASCE 7-05.



Example List of UPF Safety SSCs, NP Categorization, & Limit States

Safety SSC	Safety Function	Safety Classification	PC	SDC	Limit State
Criticality Accident Alarm System (CAAS)	Reduces the consequences of a criticality accident through detection to alert workers to evacuate	SS	N/A ¹	N/A ²	N/A ²
Facility structure	Reduce the frequency of a criticality accident, loss of confinement, and/or fire due to natural phenomena events	SS	PC-3	SDC-3	D
Primary and secondary confinement ventilation system	Ensure that any potential release of material is mitigated by dedicated essential exhaust flow paths	SS	PC-2 ³	SDC-2	D
Process equipment and material containers that serve a confinement function	To prevent hazardous material releases	SS	N/A ¹	SDC-3 or SDC-2 ⁴	B or D ⁴
Process equipment and material containers that serve a criticality safety function	To prevent criticality accidents	SS	N/A ¹	SDC-3	D

1. Systems located inside the PC-3 structure are not subjected to the wind and flood NP events. If parts are located outside then those parts of the system would be PC-3
2. Plans are to prevent seismically-initiated criticality accidents through the application of individual SDC-3 component/equipment items, where required.
3. Only those components exterior to the PC-3 structure
4. SDC categorization/limit state will be based on functional requirements of individual equipment items.

