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September 24, 2009

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

BELL BEND NUCLEAR POWER PLANT
RESPONSE TO RAI No. 6
BNP-2009-270 Docket No. 52-039

References:
1) M. Canova (NRC) to R. Sgarro (PPL Bell Bend, LLC), Bell Bend COLA – Request for Information No. 6 (RAI No. 6) – RAP-2605, email dated June 9, 2009

2) R. Sgarro (PPL Bell Bend, LLC) to U. S. Nuclear Regulatory Commission (NRC), BNP-2009-125, "Request for Extension for RAI Set 6", dated June 25, 2009

3) R. Sgarro (PPL Bell Bend, LLC) to U. S. Nuclear Regulatory Commission (NRC), BNP-2009-125, "Request for Extension for RAI Set 6", dated September 8, 2009

The purpose of this letter is to respond to the request for additional information (RAI) identified in NRC correspondence to PPL Bell Bend, LLC (PPL) (Reference 1). This RAI addresses the Reliability Assurance Program, as discussed in Section 17.4 of the Final Safety Analysis Report (FSAR), as submitted in Part 2 of the Bell Bend Nuclear Power Plant Combined License Application (COLA).

The NRC requested that PPL provide additional information to support the review of the Bell Bend COLA in Reference 1 on June 9, 2009. The responses to the questions identified in RAI No. 6 were requested to be provided within 30 calendar days. Based on vendor review and input, the time required to complete the necessary work exceeded this timeframe and PPL requested additional time to prepare the information supporting this response (References 2 and 3).

The enclosure provides our responses to RAI No. 6, Questions 17.04-1, 17.04-2 and 17.04-3, which include revised COLA content. A Licensing Basis Document Change Request has been initiated to incorporate these changes in a future revision of the COLA. This future revision of the COLA is the only new regulatory commitment.

Should you have questions, please contact the undersigned at 570.802.8102.

D079
NRO

I declare under penalty of perjury that the foregoing is true and correct.

Executed on September 24, 2009

Respectfully,

Rocco R. Sgarro

RRS/kw

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Enclosure 1

Response to NRC Request for Additional Information Set No. 6
Bell Bend Nuclear Power Plant

RAI 6
Question 17.04-1

In response to RAI 21 in the US EPR design certification process, AREVA identified structures, systems and components (SSCs) within the scope of the reliability assurance program (RAP). Please update section 17.4 of the applicant's FSAR in accordance with AREVA's response to RAI 21, RAP, or provide the rationale for not revising this section of the FSAR.

Response

The response to U.S. EPR design certification RAI No. 226, Question 17.4-16, updated the U.S. EPR FSAR Tier 2, Section 17.4 to include the revised PRA input initially provided in the AREVA response to U.S. EPR design certification RAI 21. The revised PRA input is included in a U.S.EPR Tier 2 FSAR compilation Table 17.4-1 which replaces and results in the elimination of Bell Bend Nuclear Power Plant (BBNPP) FSAR Tables 17.4-1 through 17.4-7. Additionally, the response to design certification RAI No. 226, Question 17.4-16 updated the U.S. EPR FSAR Tier 2, Section 17.4 to include a deterministic list of SSCs, at a system and structure level, to identify those U.S. EPR scope systems and structures determined to be within the scope of the RAP consistent with the AREVA response to U.S. EPR design certification RAI 21. This new table is provided in U.S. EPR FSAR Tier 2 as Table 17.4-2. U.S. EPR FSAR Tier 2 Table 17.4-2 includes both those systems and structures determined by the PRA and those determined by the expert panel described in U.S. EPR design certification RAI 21. The new tables in the U.S. EPR FSAR (Tables 17.4-1 and 17.4-2) will be incorporated by reference into the BBNPP FSAR (S-COLA) after the new tables are included in the revision to the U.S. EPR FSAR (DCD) and Calvert Cliffs Nuclear Power Plant's FSAR (R-COLA) reflects the DCD revision, to maintain alignment of the DCD, R-COLA and S-COLA.

Site specific systems and structures were qualitatively evaluated for inclusion in the RAP based on deterministic criteria similar to that used by the expert panel process described in BBNPP FSAR Section 17.4.4.1. These criteria include, but were not limited to:

- A contribution to the initiators
- An implicit contribution to the core damage frequency (CDF)
- An implicit contribution to the large release fraction (LRF)
- A contribution to seismic margin analysis, performance history/operating experience of the component
- Technical Specifications considerations for the component
- Detection of component failures
- The effect of component failure on the other systems

As a result of this qualitative evaluation, a new BBNPP FSAR Table 17.4-3 will be added to provide a list of plant specific systems and structures to be included within the RAP.

COLA Impact:

The BBNPP FSAR will be revised as shown below.

Section 17.4.2

17.4.2 RELIABILITY ASSURANCE PROGRAM IMPLEMENTATION

The U.S. EPR FSAR includes the following COL Item in Section 17.4.2:

> A COL applicant that references the U.S. EPR design certification will identify the site specific SSC~~s~~ within the scope of the RAP.

This COL Item is addressed as follows:

Based on a review of site-specific information, the design certification probabilistic risk assessment (PRA) is bounding and representative of the U.S. EPR plant proposed at the {Bell Bend} site. It is concluded that the U.S. EPR design-specific PRA model can be used, without modification, as the plant-specific PRA. This is based on the plant-specific features being conservatively modeled in the design-specific U.S. EPR PRA. Site and plant parameters that could influence the PRA results are addressed in the evaluation and it is determined that the design-PRA: (1) bounds or sufficiently captures site and plant parameters; and (2) the site and plant parameters do not have a significant impact on the PRA results and insights. Therefore, no changes to the design-specific internal events PRA are necessary when considering specific site and plant parameters.

Based on the above evaluation, no additional components related to the site are identified by the PRA for the site-specific RAP scope. Accordingly, the SSC~~s~~ identified ~~for~~ by the PRA for consideration to be within the RAP during the design certification process are the same SSC~~s~~ for consideration within the plant-specific RAP scope. ~~No new components are identified as a result of site-specific or plant-specific characterization.~~

U.S.EPR FSAR Tier 2 Table~~s~~ 17.4-1 ~~through 17.4-6 specify~~ specifies the SSC~~s~~ identified by the PRA for consideration within the scope of RAP.

For systems and structures within the design certification scope, deterministic insights in the risk-significant SSC determination process are incorporated by using an expert panel. A list of systems and structures within the design certification scope and the bases to be included within the RAP program are provided in U.S. EPR FSAR Tier 2, Table 17.4-2.

Site specific systems and structures were qualitatively evaluated based on deterministic criteria including but not limited to:

- A contribution to the initiators
- An implicit contribution to the CDF
- An implicit contribution to the LRF

- A contribution to seismic margin analysis, performance history/operating experience of the component
- Technical Specifications considerations for the component
- Detection of component failures
- The effect of component failure on the other systems

As a result of this qualitative evaluation, Table 17.4-3 provides a list of plant specific systems and structures to be included within the RAP.

Section 17.4.4.1.4.1

17.4.4.1.4.1 PRA Risk Ranking

A component's risk determination is based upon its impact on the results of the PRA. Both core damage frequency (CDF) and containment response to a core damaging event, including large ~~early~~ release frequency (L~~E~~RF) are calculated. The PRA models internal initiating events at full power and low power shutdown, and also accounts for the risk associated with external events. The PRA risk categorization of a component is based upon its Fussell-Vesely (FV) importance, which is the fraction of the CDF and L~~E~~RF to which failure of the component contributes, and its risk achievement worth (RAW), which is the factor by which the CDF and L~~E~~RF would increase if it were assumed that the component is guaranteed to fail. Specifically, PRA risk categorization to identify SSCs is based upon the following: ...

FSAR Section 17 Table Revisions

- Delete Tables 17.4-1 through 17.4-7.
- Insert new Table 17.4-3, "Site Specific Systems and Structures Included Within RAP."

~~Table 17.4-1 Definitions of Component Failure Modes~~

~~Failure Mode~~	~~Definition~~	~~Sample Basic Event Description~~
~~BP~~	~~Back Plane Failure~~	~~I&C, Analog output module fails (affects backplane bus)~~
~~CF~~	~~Fails to Control Flow~~	~~LHSI, LHSI Pump 10 Throttle Control MOV JNG10AA104, Fails to Control Flow~~
~~CL~~	~~Fails to Remain Open, Spurious Operation~~	~~ELEC, 13.8kV SWGR 31BBA Circuit Breaker 2 to 13.8kV SWGR 31BBC, Fails to Remain Open (SO)~~
~~EL~~	~~External Leakage~~	~~CCWS, Train 1 HTX 10 KAA10AC001, Shell - External Leakage~~
~~FC~~	~~Fails to Close on Demand~~	~~ELEC, 6.9kV SWGR 31BBH to 6.9kV SWGR 31BDC Circuit Breaker, Fails to Close on Demand~~
~~FD~~	~~RTB UV interposing relay fails to (de-energize to) trip~~	~~RTB UV interposing relay fails to (de-energize to) trip~~
~~FE~~	~~RTB shunt interposing relay fails to (energize to) trip~~	~~RTB shunt interposing relay fails to (energize to) trip~~
~~FL~~	~~Fails During Operation~~	~~ELEC, 24V DC I&C Power Rack 31BRW12/31BUW13, Fails During Operation~~
~~FO~~	~~Fails to Open on Demand~~	~~ELEC, 13.8kV SWGR 31BBA Circuit Breaker 2 to 13.8kV SWGR 31BBC, Fails to Open on Demand~~
~~FR~~	~~Fails to Run~~	~~ELEC, Inverter 31BRU01, Fails to Run~~
~~FS~~	~~Fails to Start on Demand~~	~~LHSI, LHSI Train 3 Motor Driven Pump JNG30AP001, Fails to Start on Demand~~
~~IR~~	~~Internal Rupture~~	~~LHSI, LHSI Pump 40 Suction from IRWST MOV JNG40AA001, Internal Rupture~~
~~LK~~	~~Tube Leakage~~	~~LHSI, LHSI Train 1 HTX JNG10AC001, Tube Leakage~~
~~MEC1~~	~~Left in Wrong Position, Monitored~~	~~DWS, DWS Pump 12 Suction Manual Valve GHC12AA001, Left in Wrong Position~~
~~MEC3~~	~~Left in Wrong Position, Non-Monitored~~	~~DWS, DWS Pump 12 Discharge Manual Valve GHC12AA003, Left in Wrong Position~~
~~NS~~	~~Non-Self-monitored Equipment Failure~~	~~I&C, Analog signal modifier fails (non-self-monitored)~~
~~OP~~	~~Fails to Remain Closed, Spurious Operation~~	~~ELEC, 13.8kV SWGR 31BBA Circuit Breaker 1 to 13.8kV SWGR 31BBC, Fails to Remain Closed (SO)~~
~~PANS~~	~~Priority Module A Fails (Non-Self-Monitored)~~	~~ELEC, SWGR 1BBA/1BBC Breaker, PAC A Priority Module (Type AV42) Fails (Non-Self-Monitored)~~
~~PASM~~	~~Priority Module A Fails (Self-Monitored)~~	~~ELEC, SWGR 1BBA/1BBC Breaker, PAC A Priority Module (Type AV42) Fails (Self-Monitored)~~
~~PBNS~~	~~Priority Module B Fails (Non-Self-Monitored)~~	~~ELEC, SWGR 2BBA/2BBC Breaker, PAC B Priority Module (Type AV42) Fails (Non-Self-Monitored)~~
~~PBSM~~	~~Priority Module B Fails (Self-Monitored)~~	~~ELEC, SWGR 2BBA/2BBC Breaker, PAC B Priority Module (Type AV42) Fails (Self-Monitored)~~
~~PG~~	~~Plugs~~	~~IRWST, SIS Sump Strainer to MHSI/LHSI Train 1 Pumps JNK10AT001, Plugs~~
~~PO~~	~~Premature Opening~~	~~LHSI, LHSI/RHR Train 10 Overpressure Protection Safety Valve JNG10AA192, Premature Opening~~
~~SF~~	~~Seal Failure~~	~~Mechanical Failure of the Stand Still Seal for RCP1~~
~~SM~~	~~Self-Monitored Equipment Failure~~	~~I&C, Analog signal modifier fails (self-monitored)~~
~~SO~~	~~Fails to Remain Closed, Spurious Operation~~	~~GWPS, Inflow Line Inboard MOV KPL84AA003, Fails to Remain~~ Closed (SO)
~~ST~~	~~Fails on Demand~~	~~ELEC, 250V Non 1E 2-hr Battery 31BTA01, Fails on Demand~~

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Table 17.4-2 Risk Significant SSCs Ranked by FV for "At Power" Events, All Components with FV Greater Than or Equal to 0.005

(Page 1 of 4)

No	System US	Component ID	Component Type	Component Description	Failure Modes	FV—RAW
1	ELEC	30XKA20	Diesel Generator	ELEC, Emergency Diesel Generator XKA20	FR, FS	0.114—2.1
2	ELEC	30XKA30	Diesel Generator	ELEC, Emergency Diesel Generator XKA30	FR, FS	0.109—1.9
3	SCWS	30QKA10GH001	Chiller	SCWS, Train 1 Chiller Unit QKA10GH001	FR, FS, PANS, PASM	0.102—18.4
4	ELEC	30XKA10	Diesel Generator	ELEC, Emergency Diesel Generator XKA10	FR, FS	0.100—1.6
5	SCWS	30QKA40GH001	Chiller	SCWS, Train 4 Chiller Unit QKA40GH001	FR, FS, PANS, PASM	0.099—15.9
6	ELEC	30XKA40	Diesel Generator	ELEC, Emergency Diesel Generator XKA40	FR, FS	0.097—1.5
7	SIS/RHRS	30JND10AP001	Pump	MHSI, MHSI Train 1 Motor Driven Pump JND10AP001	FR, FS, PANS, PASM	0.038—1.7
8	ELEC	30XKA50	Diesel Generator	ELEC, SBO Diesel Generator XKA50	FR, FS	0.034—1.5
9	SIS/RHRS	30JND30AP001	Pump	MHSI, MHSI Train 3 Motor Driven Pump JND30AP001	FR, FS, PANS, PASM	0.033—1.5
10	SIS/RHRS	30JND20AP001	Pump	MHSI, MHSI Train 2 Motor Driven Pump JND20AP001	FR, FS, PBNS, PBSM	0.033—1.4
11	ELEC	30XKA80	Diesel Generator	ELEC, SBO Diesel Generator XKA80	FR, FS	0.032—1.5
12	EFWS	30LAS11AP001	Pump	EFWS, Train 1 Motor Driven Pump LAS11AP001	EL, FR, FS, PANS, PASM	0.030—2.5
13	SIS/RHRS	30JND40AP001	Pump	MHSI, MHSI Train 4 Motor Driven Pump JND40AP001	FR, FS, PBNS, PBSM	0.028—1.2
14	EFWS	30LAS41AP001	Pump	EFWS, Train 4 Motor Driven Pump LAS41AP001	EL, FR, FS, PBNS, PBSM	0.028—2.3
15	ELEC	31BTD01_BAT	Battery	ELEC, 250V 1E 2 hr Battery 31BTD01	ST	0.028—13.3
16	ELEC	34BTD01_BAT	Battery	ELEC, 250V 1E 2 hr Battery 34BTD01	ST	0.027—13.2
17	MSS	30LBA13AA001	Pneumatic Valve	MSS, Train 1 MSRIV LBA13AA001	CL, FC, FO	0.020—1.0
18	MSS	30LBA33AA001	Pneumatic Valve	MSS, Train 3 MSRIV LBA33AA001	CL, FC, FO	0.020—1.0
19	MSS	30LBA23AA001	Pneumatic Valve	MSS, Train 2 MSRIV LBA23AA001	CL, FC, FO	0.020—1.0
20	MSS	30LBA40AA002	Pneumatic Valve	MSS, Train 4 Main Steam Isolation Valve LBA40AA002	CL, FC, OP	0.020—8.7
21	SIS/RHRS	30JNG13AA005	Check Valve	LHSI, CL1 First SIS Isolation Check Valve JNG13AA005	CL, FO	0.020—2.0
22	ESWS	30PED10AN002	Fan	UHS, Cooling Tower Train 1 Cooling Fan PED10AN002	FR, FS	0.020—2.4
23	SIS/RHRS	30JNG23AA005	Check Valve	LHSI, CL2 First SIS Isolation Check Valve JNG23AA005	CL, FO	0.019—1.8
24	MSS	30LBA43AA001	Pneumatic Valve	MSS, Train 4 MSRIV LBA43AA001	CL, FC, FO, OP	0.019—1.0
25	SIS/RHRS	30JNG33AA005	Check Valve	LHSI, CL3 First SIS Isolation Check Valve JNG33AA005	CL, FO	0.019—1.8

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Table 17.4-2 Risk Significant SSCs Ranked by FV for "At Power" Events, All Components with FV Greater Than or Equal to 0.005

(Page 2 of 4)

No	System US	Component ID	Component Type	Component Description	Failure Modes	FV RAW
26	ELEC	32BTD01_BAT	Battery	ELEC, 250V 1E 2-hr Battery 32BTD01	ST	0.017 1.6
27	ELEC	33BTD01_BAT	Battery	ELEC, 250V 1E 2-hr Battery 33BTD01	ST	0.017 1.4
28	ESWS	30PED20AN002	Fan	UHS, Cooling Tower Train 2 Cooling Fan PED20AN002	FR, FS	0.017 1.9
29	SIS/RHRS	30JNG43AA005	Check Valve	LHSI, CL4 First SIS Isolation Check Valve JNG43AA005	CL, FO	0.017 1.1
30	EFWS	30LAS31AP001	Pump	EFWS, Train 3 Motor Driven Pump LAS31AP001	EL, FR, FS, PANS, PASM	0.016 1.4
31	EFWS	30LAS21AP001	Pump	EFWS, Train 2 Motor Driven Pump LAS21AP001	EL, FR,FS, PBNS, PBSM	0.016 1.4
32	ESWS	30PED30AN002	Fan	UHS, Cooling Tower Train 3 Cooling Fan PED30AN002	FR, FS	0.016 1.7
33	CCWS	30KAA12AA005	MOV	CCWS, Train 1 to LHSI HTX 10 Cooling MOV KAA12AA005	CL, FO, PANS, PASM	0.016 2.3
34	HVAC	30SAC01AN001	Fan	SAC, Normal Air Supply Fan SAC01AN001	FR, FS	0.015 17.0
35	HVAC	30SAC31AN001	Fan	SAC, Normal Air Exhaust Fan SAC31AN001	FR, FS	0.015 17.0
36	HVAC	30SAC04AN001	Fan	SAC, Normal Air Supply Fan SAC04AN001	FR, FS	0.015 15.5
37	HVAC	30SAC34AN001	Fan	SAC, Normal Air Exhaust Fan SAC34AN001	FR, FS	0.015 15.5
38	SCWS	30QKA10AP107	Pump	SCWS, Train 1 Motor Driven Safety Chiller Pump QKA10AP107	EL, FR, FS	0.014 17.7
39	ELEC	32BRA	MCC	ELEC, 480V MCC 32BRA	FL, FR	0.014 80.1
40	ELEC	31BRA	MCC	ELEC, 480V MCC 31BRA	FL, FR	0.014 79.9
41	ESWS	30PEB20AP001	Pump	ESWS, Train 2 Motor Driven Pump PEB20AP001	FR, FS, PBNS, PBSM	0.014 3.2
42	CCWS	30KAA22AA005	MOV	CCWS, Train 2 to LHSI HTX 20 Cooling MOV KAA22AA005	CL, FO, PBNS, PBSM	0.014 1.9
43	SCWS	30QKA40AP107	Pump	SCWS, Train 4 Motor Driven Safety Chiller Pump QKA40AP107	EL, FR, FS	0.014 15.3
44	CCWS	30KAA32AA005	MOV	CCWS, Train 3 to LHSI HTX 30 Cooling MOV KAA32AA005	CL, FO, PANS, PASM	0.013 1.7
45	RCS	30JEB30AA010	MOV	RCP, RCP3 Leakoff Isolation MOV JEB30AA010	FC,IR,OP	0.013 4.7
46	RCS	30JEB30AA020	MOV	RCP Seal, RCP3 Seal Nitrogen Venting Isolation MOV JEB30AA020	FC,IR,OP	0.013 4.7
47	RCS	30JEB40AA010	MOV	RCP, RCP4 Leakoff Isolation MOV JEB40AA010	FC,IR,OP	0.013 4.7
48	RCS	30JEB40AA020	MOV	RCP Seal, RCP4 Seal Nitrogen Venting Isolation MOV JEB40AA020	FC,IR,OP	0.013 4.7
49	ESWS	30PEB30AP001	Pump	ESWS, Train 3 Motor Driven Pump PEB30AP001	FR,FS,PANS,PASM	0.012 2.8

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Table 17.4-2 Risk Significant SSCs Ranked by FV for "At Power" Events, All Components with FV Greater Than or Equal to 0.005

(Page 3 of 4)

No	System US	Component ID	Component Type	Component Description	Failure Modes	FV—RAW
50	MSS	30LBA10AA002	Pneumatic Valve	MSS, Train 1 Main Steam Isolation Valve LBA10AA002	CL,FC,OP	0.012—2.8
51	MSS	30LBA20AA002	Pneumatic Valve	MSS, Train 2 Main Steam Isolation Valve LBA20AA002	CL,FC,OP	0.012—2.8
52	MSS	30LBA30AA002	Pneumatic Valve	MSS, Train 3 Main Steam Isolation Valve LBA30AA002	CL,FC,OP	0.010—1.6
53	ESWS	30PED40AN002	Fan	UHS, Cooling Tower Train 4 Cooling Fan PED40AN002	FR,FS	0.009—1.1
54	CCWS	30KAA42AA005	MOV	CCWS, Train 4 to LHSI HTX 40 Cooling MOV KAA42AA005	CL,FO,PBNS,PBSM	0.009—1.1
55	HVAC	30SAC02AN001	Fan	SAC, Normal Air Supply Fan SAC02AN001	FR,FS	0.008—4.2
56	HVAC	30SAC32AN001	Fan	SAC, Normal Air Exhaust Fan SAC32AN001	FR,FS	0.008—4.2
57	ESWS	30PEB20AA005	MOV	ESWS, Train 2 Pump Discharge Isolation MOV PEB20AA005	CL,FO,PBNS,PBSM	0.008—3.1
58	HVAC	30SAC03AN001	Fan	SAC, Normal Air Supply Fan SAC03AN001	FR,FS	0.008—3.8
59	HVAC	30SAC33AN001	Fan	SAC, Normal Air Exhaust Fan SAC33AN001	FR,FS	0.008—3.8
60	SIS/RHRS	30JNG10AA006	Check Valve	LHSI, LHSI CL1 Discharge Manual CHECK Valve JNG10AA006	CL,FO,IR,MEC3	0.007—1.8
61	MSS	30LBA43AA101	MOV	MSS, Train 4 MSRCV LBA43AA101	CF,FC,IR,OP,PBNS,PBSM	0.006—2.9
62	MSS	30LBA13AA712	Pneumatic Valve	MSS, Train 1a MSRIV Pneumatic Pilot Valve LBA13AA712	CL,FO	0.006—1.0
63	MSS	30LBA13AA713	Pneumatic Valve	MSS, Train 1a MSRIV Pneumatic Pilot Valve LBA13AA713	CL,FO	0.006—1.0
64	MSS	30LBA23AA712	Pneumatic Valve	MSS, Train 2a MSRIV Pneumatic Pilot Valve LBA23AA712	CL,FO	0.006—1.0
65	MSS	30LBA23AA713	Pneumatic Valve	MSS, Train 2a MSRIV Pneumatic Pilot Valve LBA23AA713	CL,FO	0.006—1.0
66	MSS	30LBA33AA712	Pneumatic Valve	MSS, Train 3a MSRIV Pneumatic Pilot Valve LBA33AA712	CL,FO	0.006—1.0
67	MSS	30LBA33AA713	Pneumatic Valve	MSS, Train 3a MSRIV Pneumatic Pilot Valve LBA33AA713	CL,FO	0.006—1.0
68	MSS	30LBA33AA716	Pneumatic Valve	MSS, Train 3b MSRIV Pneumatic Pilot Valve LBA33AA716	CL,FO	0.006—1.0
69	MSS	30LBA33AA717	Pneumatic Valve	MSS, Train 3b MSRIV Pneumatic Pilot Valve LBA33AA717	CL,FO	0.006—1.0
70	MSS	30LBA43AA716	Pneumatic Valve	MSS, Train 4b MSRIV Pneumatic Pilot Valve LBA43AA716	CL,FC,FO,OP	0.006—1.0
71	ESWS	30PEB30AA005	MOV	ESWS, Train 3 Pump Discharge Isolation MOV PEB30AA005	CL,FO,PANS,PASM	0.006—2.7
72	RCS	30JEB10AA010	MOV	RCP, RCP1 Leakoff Isolation MOV JEB10AA010	FC,IR,OP	0.006—2.8
73	RCS	30JEB10AA020	MOV	RCP Seal, RCP1 Seal Nitrogen Venting Isolation MOV JEB10AA020	FC,IR,OP	0.006—2.8
74	RCS	30JEB20AA010	MOV	RCP, RCP2 Leakoff Isolation MOV JEB20AA010	FC,IR,OP	0.006—2.8

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Table 17.4-2 Risk Significant SSCs Ranked by FV for "At Power" Events, All Components with FV Greater Than or Equal to 0.005

(Page 4 of 4)

No	System US	Component ID	Component Type	Component Description	Failure Modes	FV RAW
75	RCS	30JEB20AA020	MOV	RCP Seal, RCP2 Seal Nitrogen Venting Isolation MOV JEB20AA020	FC,IR,OP	0.006 2.8
76	SIS/RHRS	30JNG30AA006	Check Valve	LHSI, LHSI CL3 Discharge Manual CHECK Valve JNG30AA006	CL,FO,IR,MEC3	0.006 1.7
77	SIS/RHRS	30JND10AA003	Check Valve	MHSI, MHSI Pump 10 Discharge Manual CHECK Valve JND10AA003	CL,FO,IR,MEC3	0.006 1.7
78	SCWS	30QKA20AP107	Pump	SCWS, Train 2 Motor Driven Safety Chiller Pump QKA20AP107	EL,FR,FS	0.006 4.2
79	SCWS	30QKA30AP107	Pump	SCWS, Train 3 Motor Driven Safety Chiller Pump QKA30AP107	EL,FR,FS	0.005 3.8
80	SIS/RHRS	30JNG20AA006	Check Valve	LHSI, LHSI CL2 Discharge Manual CHECK Valve JNG20AA006	CL,FO,IR,MEC3	0.005 1.6

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Table 17.4-3 Risk Significant SSCs Ranked by RAW for "At Power" Events, All Components with RAW Greater Than or Equal to 2

(Page 1 of 8)

No	System US	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
1	ELEC	31BDA	SWGR	ELEC, 6.9kV SWGR 31BDA	FL	88.2	0.002
2	ELEC	31BDB	SWGR	ELEC, 6.9kV SWGR 31BDB	FL	82.6	0.002
3	ELEC	31BMB	Load Center	ELEC, 480V Load Center 31BMB	FL	82.6	0.002
4	ELEC	31BMT02	Transformer	ELEC, 6.9kV-480V Transformer 31BMT02	FL	82.6	0.002
5	ELEC	31BDC	SWGR	ELEC, 6.9kV SWGR 31BDC	FL	82.4	0.002
6	ELEC	32BDB	SWGR	ELEC, 6.9kV SWGR 32BDB	FL	82.4	0.002
7	ELEC	32BMB	Load Center	ELEC, 480V Load Center 32BMB	FL	82.4	0.002
8	ELEC	32BMT02	Transformer	ELEC, 6.9kV-480V Transformer 32BMT02	FL	82.4	0.002
9	ELEC	30BRW10BUW11	Power Rack	ELEC, 24V DC I&C Power Rack 31BRW10/31BUW11	FL	82.3	0.002
10	ELEC	30BRW32BUW33	Power Rack	ELEC, 24V DC I&C Power Rack 32BRW32/32BUW33	FL	82.2	0.002
11	ELEC	31BDB1BMT02	Circuit Breaker	ELEC, 6.9kV SWGR 31BDB to Transformer 31BMT02 Circuit Breaker	OP	80.5	0.001
12	ELEC	31BDC_1BDB1	Circuit Breaker	ELEC, 6.9kV SWGR 31BDC to 6.9kV SWGR 31BDB Circuit Breaker	OP	80.5	0.001
13	ELEC	31BDC_1BDB2	Circuit Breaker	ELEC, 6.9kV SWGR 31BDC to 6.9kV SWGR 31BDB Circuit Breaker	OP	80.5	0.001
14	ELEC	31BMT021BMB	Circuit Breaker	ELEC, Transformer 31BMT02 to 480V Load Center 31BMB Circuit Breaker	OP	80.5	0.001
15	ELEC	32BDB2BMT02	Circuit Breaker	ELEC, 6.9kV SWGR 32BDB to Transformer 32BMT02 Circuit Breaker	OP	80.5	0.001
16	ELEC	32BMT022BMB	Circuit Breaker	ELEC, Transformer 32BMT02 to 480V Load Center 32BMB Circuit Breaker	OP	80.5	0.001
17	ELEC	32BRA	MCC	ELEC, 480V MCC 32BRA	FL,FR	80.1	0.014
18	ELEC	31BRA	MCC	ELEC, 480V MCC 31BRA	FL,FR	79.9	0.014
19	ELEC	31BRU011BRA	Circuit Breaker	ELEC, Inverter 31BRU01 to 480V MCC 31BRA Circuit Breaker	OP	77.6	0.001
20	ELEC	32BRU012BRA	Circuit Breaker	ELEC, Inverter 32BRU01 to 480V MCC 32BRA Circuit Breaker	OP	77.6	0.001
21	ELEC	32BDA	SWGR	ELEC, 6.9kV SWGR 32BDA	FL	41.4	0.001
22	ELEC	32BDA_2BDB1	Circuit Breaker	ELEC, 6.9kV SWGR 32BDA to 6.9kV SWGR 32BDB Circuit Breaker	OP	40.5	0.000
23	ELEC	32BDA_2BDB2	Circuit Breaker	ELEC, 6.9kV SWGR 32BDA to 6.9kV SWGR 32BDB Circuit Breaker	OP	40.5	0.000
24	EFWS	30LAR10BB001	Tank	EFWS, Train 1 EFW Storage Tank LAR10BB001	EL	21.6	0.000
25	EFWS	30LAR20BB001	Tank	EFWS, Train 2 EFW Storage Tank LAR20BB001	EL	21.6	0.000
26	EFWS	30LAR30BB001	Tank	EFWS, Train 3 EFW Storage Tank LAR30BB001	EL	21.6	0.000
27	EFWS	30LAR40BB001	Tank	EFWS, Train 4 EFW Storage Tank LAR40BB001	EL	21.6	0.000
28	ELEC	34BUC	Bus	ELEC, 250V DC Bus 34BUC	FL	18.8	0.000
29	SCWS	30QKA10GH001	Chiller	SCWS, Train 1 Chiller Unit QKA10GH001	FR,FS,PANS, PASM	18.4	0.102
30	SCWS	30QKA10AP107	Pump	SCWS, Train 1 Motor Driven Safety Chiller Pump QKA10AP107	EL,FR,FS	17.7	0.014

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Table 17.4-3 Risk Significant SSCs Ranked by RAW for "At Power" Events, All Components with RAW Greater Than or Equal to 2

(Page 2 of 8)

No	System US	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
31	HVAC	30SAC01AN001	Fan	SAC, Normal Air Supply Fan SAC01AN001	FR,FS	17.0	0.015
32	HVAC	30SAC31AN001	Fan	SAC, Normal Air Exhaust Fan SAC31AN001	FR,FS	17.0	0.015
33	SCWS	30QKA40GH001	Chiller	SCWS, Train 4 Chiller Unit QKA40GH001	FR,FS,PANS, PASM	15.9	0.099
34	ELEC	34BDA	SWGR	ELEC, 6.9kV SWGR 34BDA	FL	15.8	0.000
35	HVAC	30SAC04AN001	Fan	SAC, Normal Air Supply Fan SAC04AN001	FR,FS	15.5	0.015
36	HVAC	30SAC34AN001	Fan	SAC, Normal Air Exhaust Fan SAC34AN001	FR,FS	15.5	0.015
37	SCWS	30QKA40AP107	Pump	SCWS, Train 4 Motor Driven Safety Chiller Pump QKA40AP107	EL,FR,FS	15.3	0.014
38	SCWS	30QKA10AA101	MOV	SCWS, Train 1 Chiller By-pass MOV QKA10AA101	CF	13.8	0.000
39	SCWS	30QKC10AA101	MOV	SCWS, Return from SAC Div 1 MOV QKC10AA101	CL	13.8	0.000
40	HVAC	30SAC01AA003	MOV	SAC, Normal Air Inlet Motor Operated Damper SAC01AA003	CL	13.8	0.000
41	HVAC	30SAC31AA002	MOV	SAC, Normal Air Exhaust Motor Operated Damper SAC31AA002	CL	13.8	0.000
42	SCWS	30QKA10AA003	Check Valve	SCWS, Train 1 Safety Chiller Pump Discharge Check Valve QKA10AA003	CL,FO	13.4	0.001
43	HVAC	30SAC01AA005	Check Valve	SAC, Normal Air Inlet Supply Fan Discharge Check Damper SAC01AA005	CL,FC,FO,IR	13.4	0.001
44	HVAC	30SAC31AA003	Check Valve	SAC, Normal Air Exhaust Supply Fan Discharge Check Damper SAC31AA003	CL,FO	13.4	0.000
45	ELEC	31BTD01_BAT	Battery	ELEC, 250V 1E 2-hr Battery 31BTD01	ST	13.3	0.028
46	ELEC	34BTD01_BAT	Battery	ELEC, 250V 1E 2-hr Battery 34BTD01	ST	13.2	0.027
47	ELEC	30BRW70BUW71	Power Rack	ELEC, 24V DC I&C Power Rack 34BRW70/34BUW71	FL	12.7	0.000
48	CCWS	30KAB20AA192	Safety Valve	CCWS, CCWS CH2 Return Safety Valve KAB20AA192	PO	12.7	0.001
49	CCWS	30KAB20AA193	Safety Valve	CCWS, FPCS Train 2 Cooling Header Safety Valve KAB20AA193	PO	12.7	0.001
50	CCWS	30KAB30AA192	Safety Valve	CCWS, CCWS CH2 RCP3/4 TB Return Safety Valve KAB30AA192	PO	12.7	0.001
51	CCWS	30KAB70AA191	Safety Valve	CCWS, CVCS HP Cooler 2 Return Safety Valve KAB60AA191	PO	12.7	0.001
52	SCWS	30QKA40AA101	MOV	SCWS, Train 4 Chiller By-pass MOV QKA40AA101	CF	12.2	0.000
53	SCWS	30QKC40AA101	MOV	SCWS, Return from SAC Div 4 MOV QKC40AA101	CL	12.2	0.000
54	HVAC	30SAC04AA003	MOV	SAC, Normal Air Inlet Motor Operated Damper SAC04AA003	CL	12.2	0.000
55	HVAC	30SAC34AA002	MOV	SAC, Normal Air Exhaust Motor Operated Damper SAC34AA002	CL	12.2	0.000
56	SCWS	30QKA40AA003	Check Valve	SCWS, Train 4 Safety Chiller Pump Discharge Check Valve QKA40AA003	CL,FO	11.9	0.001

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Table 17.4-3 Risk Significant SSCs Ranked by RAW for "At Power" Events, All Components with RAW Greater Than or Equal to 2

(Page 3 of 8)

No	System US	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
57	HVAC	30SAC04AA005	Check Valve	SAC, Normal Air Inlet Supply Fan Discharge Check Damper SAC04AA005	CL,FC,FO,IR	11.9	0.001
58	HVAC	30SAC34AA003	Check Valve	SAC, Normal Air Exhaust Supply Fan Discharge Check Damper SAC34AA003	CL,FO	11.9	0.000
59	ELEC	31BDA_1BDC1	Circuit Breaker	ELEC, 6.9kV SWGR 31BDA to 6.9kV SWGR 31BDC Circuit Breaker	OP	11.1	0.000
60	ELEC	31BDA_1BDC2	Circuit Breaker	ELEC, 6.9kV SWGR 31BDA to 6.9kV SWGR 31BDC Circuit Breaker	CL,FO,OP	11.1	0.000
61	ELEC	31BNB01	MCC	ELEC, 480V MCC 31BNB01	FL,FR	9.9	0.001
62	ELEC	31BUC	Bus	ELEC, 250V DC Bus 31BUC	FL	9.7	0.000
63	ELEC	34BNB01	MCC	ELEC, 480V MCC 34BNB01	FL,FR	9.7	0.001
64	MSS	30LBA40AA002	Pneumatic Valve	MSS, Train 4 Main Steam Isolation Valve LBA40AA002	CL,FC,OP	8.7	0.020
65	MSS	30LBA41AA191	Safety Valve	MSS, Train 4 Main Steam Safety Relief Valve LBA41AA191	FO,PO	8.4	0.004
66	MSS	30LBA42AA191	Safety Valve	MSS, Train 4 Main Steam Safety Relief Valve LBA42AA191	FO,PO	8.4	0.004
67	ELEC	31BTD01	Circuit Breaker	ELEC, 250V Battery 31BTD01 Circuit Breaker	OP	7.7	0.000
68	ELEC	34BTD01	Circuit Breaker	ELEC, 250V Battery 34BTD01 Circuit Breaker	OP	7.3	0.000
69	CCWS	30KAB10AA192	Safety Valve	CCWS, CCWS CH1 Return Safety Valve KAB10AA192	PO	6.3	0.000
70	CCWS	30KAB10AA193	Safety Valve	CCWS, FPCS Train 1 Cooling Header Safety Valve KAB10AA193	PO	6.3	0.000
71	CCWS	30KAB30AA191	Safety Valve	CCWS, CCWS CH1 RCP1/2 TB Return Safety Valve KAB30AA191	PO	6.3	0.000
72	CCWS	30KAB60AA191	Safety Valve	CCWS, CVCS HP Cooler 1 Return Safety Valve KAB60AA191	PO	6.3	0.000
73	ELEC	34BDD	SWGR	ELEC, 6.9kV SWGR 34BDD	FL	5.9	0.000
74	ELEC	34BMD	Load Center	ELEC, 480V Load Center 34BMD	FL	5.9	0.000
75	ELEC	34BMT04	Transformer	ELEC, 6.9kV-480V Transformer 34BMT04	FL	5.9	0.000
76	ELEC	34BRB	MCC	ELEC, 480V MCC 34BRB	FL,FR	4.9	0.001
77	ELEC	34BDB	SWGR	ELEC, 6.9kV SWGR 34BDB	FL	4.8	0.000
78	ELEC	34BMB	Load Center	ELEC, 480V Load Center 34BMB	FL	4.8	0.000
79	ELEC	34BMT02	Transformer	ELEC, 6.9kV-480V Transformer 34BMT02	FL	4.8	0.000
80	ELEC	34BDC	SWGR	ELEC, 6.9kV SWGR 34BDC	FL	4.8	0.000
81	RCS	30JEB30AA010	MOV	RCP, RCP3 Leakoff Isolation MOV JEB30AA010	FC,IR,OP	4.7	0.013
82	RCS	30JEB30AA020	MOV	RCP Seal, RCP3 Seal Nitrogen Venting Isolation MOV JEB30AA020	FC,IR,OP	4.7	0.013
83	RCS	30JEB40AA010	MOV	RCP, RCP4 Leakoff Isolation MOV JEB40AA010	FC,IR,OP	4.7	0.013
84	RCS	30JEB40AA020	MOV	RCP Seal, RCP4 Seal Nitrogen Venting Isolation MOV JEB40AA020	FC,IR,OP	4.7	0.013
85	ELEC	31BTB01_BAT	Battery	ELEC, 250V Non-1E 12-hr Battery 31BTB01	ST	4.6	0.002

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Table 17.4-3 Risk Significant SSCs Ranked by RAW for "At Power" Events, All Components with RAW Greater Than or Equal to 2

(Page 4 of 8)

No	System US	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
86	ELEC	33BDB	SWGR	ELEC, 6.9kV SWGR 33BDB	FL	4.6	0.000
87	ELEC	33BMB	Load Center	ELEC, 480V Load Center 33BMB	FL	4.6	0.000
88	ELEC	33BMT02	Transformer	ELEC, 6.9kV-480V Transformer 33BMT02	FL	4.6	0.000
89	ELEC	30BRW52BUW53	Power Rack	ELEC, 24V DC I&C Power Rack BRW52/BUW53	FL	4.5	0.000
90	ELEC	32BTB01_BAT	Battery	ELEC, 250V Non 1E 12-hr Battery 32BTB01	ST	4.5	0.002
91	ELEC	34BRA	MCC	ELEC, 480V MCC 34BRA	FL,FR	4.4	0.001
92	ESWS	30PEB10AP001	Pump	ESWS, Train 1 Motor Driven Pump PEB10AP001	FR,FS,PANS, PASM	4.4	0.003
93	SCWS	30QKA20GH001	Chiller	SCWS, Train 2 Chiller Unit QKA20GH001	FR,FS,PBNS, PBSM	4.3	0.004
94	HVAC	30SAC02AN001	Fan	SAC, Normal Air Supply Fan SAC02AN001	FR,FS	4.2	0.008
95	HVAC	30SAC32AN001	Fan	SAC, Normal Air Exhaust Fan SAC32AN001	FR,FS	4.2	0.008
96	SCWS	30QKA20AP107	Pump	SCWS, Train 2 Motor Driven Safety Chiller Pump QKA20AP107	EL,FR,FS	4.2	0.006
97	RCS	30JEB30 SSSF	Stand Still Seal	Stand Still Seal for RCP3	SF	4.2	0.003
98	RCS	30JEB40 SSSF	Stand Still Seal	Stand Still Seal for RCP4	SF	4.2	0.003
99	ELEC	32BUD	Bus	ELEC, Non 1E 250V DC Distribution Panel 32BUD	FL	4.1	0.000
100	CCWS	30KAA10AP001	Pump	CCWS, Train 1 Motor Driven Pump KAA10AP001	EL,FR,FS,PAN S,PASM	3.9	0.000
101	SCWS	30QKA30GH001	Chiller	SCWS, Train 3 Chiller Unit QKA30GH001	FR,FS,PBNS, PBSM	3.9	0.004
102	ELEC	34BDA_4BDD1	Circuit Breaker	ELEC, 6.9kV SWGR 34BDA to 6.9kV SWGR 34BDD Circuit Breaker	OP	3.9	0.000
103	ELEC	34BDA_4BDD2	Circuit Breaker	ELEC, 6.9kV SWGR 34BDA to 6.9kV SWGR 34BDD Circuit Breaker	OP	3.9	0.000
104	ELEC	34BDD4BMT04	Circuit Breaker	ELEC, 6.9kV SWGR 34BDD to Transformer 34BMT04 Circuit Breaker	OP	3.9	0.000
105	ELEC	34BMT044BMD	Circuit Breaker	ELEC, Transformer 34BMT04 to 480V Load Center 34BMD Circuit Breaker	OP	3.9	0.000
106	HVAC	30SAC03AN001	Fan	SAC, Normal Air Supply Fan SAC03AN001	FR,FS	3.8	0.008
107	HVAC	30SAC33AN001	Fan	SAC, Normal Air Exhaust Fan SAC33AN001	FR,FS	3.8	0.008
108	RCS	30JEB30AA018	SOV	RCP Seal, RCP3 Nitrogen Supply Solenoid Valve JEB30AA018	CL,FO	3.8	0.001
109	RCS	30JEB40AA018	SOV	RCP Seal, RCP4 Nitrogen Supply Solenoid Valve JEB40AA018	CL,FO	3.8	0.001
110	SCWS	30QKA30AP107	Pump	SCWS, Train 3 Motor Driven Safety Chiller Pump QKA30AP107	EL,FR,FS	3.8	0.005
111	ELEC	31BUD	Bus	ELEC, Non 1E 250V DC Distribution Panel 31BUD	FL	3.8	0.000
112	CCWS	30KAA22AA101	MOV	CCWS, Common Header 1 QKA20 Chiller Return 3-Way MOV KAA22AA101	CL	3.6	0.000

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Table 17.4-3 Risk Significant SSCs Ranked by RAW for "At Power" Events, All Components with RAW Greater Than or Equal to 2

(Page 5 of 8)

No	System US	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
113	SCWS	30QKA20AA003	Check Valve	SCWS, Train 2 Safety Chiller Pump Discharge Check Valve QKA20AA003	CL,FO	3.6	0.000
114	SCWS	30QKA20AA101	MOV	SCWS, Train 2 Chiller By-pass MOV QKA20AA101	CF	3.6	0.000
115	SCWS	30QKC20AA101	MOV	SCWS, Return from SAC Div 2 MOV QKC20AA101	CL	3.6	0.000
116	HVAC	30SAC02AA003	MOV	SAC, Normal Air Inlet Motor Operated Damper SAC02AA003	CL	3.6	0.000
117	HVAC	30SAC02AA005	Check Valve	SAC, Normal Air Inlet Supply Fan Discharge Check Damper SAC02AA005	CL,FC,FO,IR	3.6	0.000
118	HVAC	30SAC32AA002	MOV	SAC, Normal Air Exhaust Motor Operated Damper SAC32AA002	CL	3.6	0.000
119	HVAC	30SAC32AA003	Check Valve	SAC, Normal Air Exhaust Supply Fan Discharge Check Damper SAC32AA003	CL,FO	3.6	0.000
120	ELEC	31BRB	MCC	ELEC, 480V MCC 31BRB	FL,FR	3.6	0.000
121	ELEC	33BDB3BMT02	Circuit Breaker	ELEC, 6.9kV SWGR 33BDB to Transformer 33BMT02 Circuit Breaker	OP	3.5	0.000
122	ELEC	33BMT023BMB	Circuit Breaker	ELEC, Transformer 33BMT02 to 480V Load Center 33BMB Circuit Breaker	OP	3.5	0.000
123	ELEC	34BDB4BMT02	Circuit Breaker	ELEC, 6.9kV SWGR 34BDB to Transformer 34BMT02 Circuit Breaker	OP	3.5	0.000
124	ELEC	34BDC_4BDB1	Circuit Breaker	ELEC, 6.9kV SWGR 34BDC to 6.9kV SWGR 34BDB Circuit Breaker	OP	3.5	0.000
125	ELEC	34BDC_4BDB2	Circuit Breaker	ELEC, 6.9kV SWGR 34BDC to 6.9kV SWGR 34BDB Circuit Breaker	OP	3.5	0.000
126	ELEC	34BMT024BMB	Circuit Breaker	ELEC, Transformer 34BMT02 to 480V Load Center 34BMB Circuit Breaker	OP	3.5	0.000
127	ELEC	34BDA_4BDC1	Circuit Breaker	ELEC, 6.9kV SWGR 34BDA to 6.9kV SWGR 34BDC Circuit Breaker	OP	3.5	0.000
128	ELEC	34BDA_4BDC2	Circuit Breaker	ELEC, 6.9kV SWGR 34BDA to 6.9kV SWGR 34BDC Circuit Breaker	CL,FO,OP	3.5	0.000
129	CCWS	30KAA32AA101	MOV	CCWS, Common Header 2 QKA30 Chiller Return 3-Way MOV KAA32AA101	CL	3.3	0.000
130	SCWS	30QKA30AA003	Check Valve	SCWS, Train 3 Safety Chiller Pump Discharge Check Valve QKA30AA003	CL,FO	3.3	0.000
131	SCWS	30QKA30AA101	MOV	SCWS, Train 3 Chiller By-pass MOV QKA30AA101	CF	3.3	0.000
132	SCWS	30QKC30AA101	MOV	SCWS, Return from SAC Div 3 MOV QKC30AA101	CL	3.3	0.000
133	HVAC	30SAC03AA003	MOV	SAC, Normal Air Inlet Motor Operated Damper SAC03AA003	CL	3.3	0.000
134	HVAC	30SAC03AA005	Check Valve	SAC, Normal Air Inlet Supply Fan Discharge Check Damper SAC03AA005	CL,FC,FO,IR	3.3	0.000
135	HVAC	30SAC33AA002	MOV	SAC, Normal Air Exhaust Motor Operated Damper SAC33AA002	CL	3.3	0.000
136	HVAC	30SAC33AA003	Check Valve	SAC, Normal Air Exhaust Supply Fan Discharge Check Damper SAC33AA003	CL,FO	3.3	0.000

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Table 17.4-3 Risk Significant SSCs Ranked by RAW for "At Power" Events, All Components with RAW Greater Than or Equal to 2

(Page 6 of 8)

No	System US	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
137	ESWS	30PEB20AP001	Pump	ESWS, Train 2 Motor Driven Pump PEB20AP001	FR,FS,PBNS, PBSM	3.2	0.014
138	ELEC	32BRU03	Inverter	ELEC, Inverter 32BRU03	FR	3.1	0.000
139	ELEC	31BNB02	MCC	ELEC, 480V MCC 31BNB02	FL,FR	3.1	0.000
140	ESWS	30PEB20AA005	MOV	ESWS, Train 2 Pump Discharge Isolation MOV PEB20AA005	CL,FO,PBNS, PBSM	3.1	0.008
141	ELEC	32BRC	MCC	ELEC, 480V MCC 32BRC	FL	2.9	0.000
142	ELEC	32BRU0301	Switch	ELEC, Inverter 32BRU03 Bypass Switch 32BRU0301	OP	2.9	0.000
143	MSS	30LBA43AA101	MOV	MSS, Train 4 MSRCV LBA43AA101	CF,FC,IR,OP,P BNS,PBSM	2.9	0.006
144	ESWS	30PEB30AP001	Pump	ESWS, Train 3 Motor Driven Pump PEB30AP001	FR,FS,PANS, PASM	2.8	0.012
145	RCS	30JEB10AA010	MOV	RCP, RCP1 Leakoff Isolation MOV JEB10AA010	FC,IR,OP	2.8	0.006
146	RCS	30JEB10AA020	MOV	RCP Seal, RCP1 Seal Nitrogen Venting Isolation MOV JEB10AA020	FC,IR,OP	2.8	0.006
147	RCS	30JEB20AA010	MOV	RCP, RCP2 Leakoff Isolation MOV JEB20AA010	FC,IR,OP	2.8	0.006
148	RCS	30JEB20AA020	MOV	RCP Seal, RCP2 Seal Nitrogen Venting Isolation MOV JEB20AA020	FC,IR,OP	2.8	0.006
149	MSS	30LBA10AA002	Pneumatic Valve	MSS, Train 1 Main Steam Isolation Valve LBA10AA002	CL,FC,OP	2.8	0.012
150	MSS	30LBA20AA002	Pneumatic Valve	MSS, Train 2 Main Steam Isolation Valve LBA20AA002	CL,FC,OP	2.8	0.012
151	ESWS	30PEB30AA005	MOV	ESWS, Train 3 Pump Discharge Isolation MOV PEB30AA005	CL,FO,PANS, PASM	2.7	0.006
152	SIS/RHRS	30JNG10AC001	HTX	LHSI, LHSI Train 1 HTX JNG10AC001	LK	2.6	0.000
153	ELEC	31BDD	SWGR	ELEC, 6.9kV SWGR 31BDD	FL	2.6	0.000
154	ELEC	31BMD	Load Center	ELEC, 480V Load Center 31BMD	FL	2.6	0.000
155	ELEC	31BMT04	Transformer	ELEC, 6.9kV 480V Transformer 31BMT04	FL	2.6	0.000
156	ELEC	33BDA	SWGR	ELEC, 6.9kV SWGR 33BDA	FL	2.5	0.000
157	EFWS	30LAS11AP001	Pump	EFWS, Train 1 Motor Driven Pump LAS11AP001	EL,FR,FS,PAN S,PASM	2.5	0.030
158	OCWS	30QNA22AN001	Chiller	OCWS, Train 2A Chiller Unit QNA22AN001	FR	2.4	0.001
159	OCWS	30QNA23AN001	Chiller	OCWS, Train 1B Chiller Unit QNA23AN001	FR	2.4	0.001
160	ELEC	33BRA	MCC	ELEC, 480V MCC 33BRA	FL,FR	2.4	0.000
161	RCS	30JEB10 SSSF	Stand Still Seal	Stand Still Seal for RCP1	SF	2.4	0.001
162	RCS	30JEB20 SSSF	Stand Still Seal	Stand Still Seal for RCP2	SF	2.4	0.001
163	RCS	30JEB30AA019	Check Valve	RCP Seal, RCP3 Nitrogen Supply Check Valve JEB30AA019	CL,FO	2.4	0.000
164	RCS	30JEB40AA019	Check Valve	RCP Seal, RCP4 Nitrogen Supply Check Valve JEB40AA019	CL,FO	2.4	0.000
165	ESWS	30PED10AN002	Fan	UHS, Cooling Tower Train 1 Cooling Fan PED10AN002	FR,FS	2.4	0.020
166	EFWS	30LAS41AP001	Pump	EFWS, Train 4 Motor Driven Pump LAS41AP001	EL,FR,FS,PBN S,PBSM	2.3	0.028

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Table 17.4-3 Risk Significant SSCs Ranked by RAW for "At Power" Events, All Components with RAW Greater Than or Equal to 2

(Page 7 of 8)

No	System US	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
167	ELEC	31BRU03	Inverter	ELEC, Inverter 31BRU03	FR	2.3	0.000
168	CCWS	30KAA12AA005	MOV	CCWS, Train 1 to LHSI HTX 10 Cooling MOV KAA12AA005	CL,FO,PANS, PASM	2.3	0.016
169	RCS	30JEB30AP001	Circuit Breaker	ELEC, 13.8kV SWGR 33BBC Circuit Breaker for RCP JEB30AP001	CL,FO,PANS, PASM	2.3	0.001
170	RCS	30JEB40AP001	Circuit Breaker	ELEC, 13.8kV Bus BBH Circuit Breaker for RCP JEB40AP001	CL,FO,PANS, PASM	2.3	0.001
171	ELEC	35BBA	SWGR	ELEC, 13.8kV SWGR 35BBA	FL	2.3	0.000
172	ELEC	35BFE	Load Center	ELEC, 480V Load Center 35BFE	FL	2.3	0.000
173	ELEC	35BFT05	Transformer	ELEC, 13.8kV 480V Transformer 35BFT05	FL	2.3	0.000
174	CCWS	30KAA10BB001	Tank	CCWS, Train 1 Surge Tank KAA10BB001	EL	2.3	0.000
175	OCWS	30QNA22AP033	Pump	OCWS, Train 2A Motor Driven Chiller Unit Pump QNA22AP033	EL,FR	2.3	0.000
176	OCWS	30QNA23AP043	Pump	OCWS, Train 1B Motor Driven Chiller Unit Pump QNA23AP043	EL,FR	2.3	0.000
177	ELEC	31BRC	MCC	ELEC, 480V MCC 31BRC	FL	2.3	0.000
178	ELEC	31BRU0301	Switch	ELEC, Inverter 31BRU03 Bypass Switch 31BRU0301	OP	2.3	0.000
179	ELEC	34BNB02	MCC	ELEC, 480V MCC 34BNB02	FL,FR	2.3	0.000
180	ELEC	33BDA_3BDB1	Circuit Breaker	ELEC, 6.9kV SWGR 33BDA to 6.9kV SWGR 33BDB Circuit Breaker	OP	2.2	0.000
181	ELEC	33BDA_3BDB2	Circuit Breaker	ELEC, 6.9kV SWGR 33BDA to 6.9kV SWGR 33BDB Circuit Breaker	OP	2.2	0.000
182	SIS/RHRS	30JNG10AA104	MOV	LHSI, LHSI Pump 10 Throttle Control MOV JNG10AA104	CF,CL	2.2	0.002
183	CCWS	30KAA20AP001	Pump	CCWS, Train 2 Motor Driven Pump KAA20AP001	EL,FR,FS,PBNS,PBSM	2.2	0.004
184	RCS	30JEB10AA018	SOV	RCP Seal, RCP1 Nitrogen Supply Solenoid Valve JEB10AA018	CL,FO	2.2	0.001
185	RCS	30JEB20AA018	SOV	RCP Seal, RCP2 Nitrogen Supply Solenoid Valve JEB20AA018	CL,FO	2.2	0.001
186	EFWS	30LAR11AA103	MOV	EFWS, Train 1 SG Pressure Control MOV LAR11AA103	CF,PANS,PASM	2.2	0.002
187	EFWS	30LAR11AA105	MOV	EFWS, Train 1 SG Level Control MOV LAR11AA005	CF,PANS,PASM	2.2	0.002
188	ESWS	30PEB20AA007	Manual Valve	ESWS, Train 2 Manual Valve PEB20AA007	MEC1	2.1	0.000
189	ESWS	30PEB20AA009	Manual Valve	ESWS, Train 2 Manual Valve PEB20AA009	MEC1	2.1	0.000
190	ESWS	30PEB20AA010	Manual Valve	ESWS, Train 2 Manual Valve PEB20AA010	CL,MEC1	2.1	0.000
191	EFWS	30LAR41AA103	MOV	EFWS, Train 4 SG Pressure Control MOV LAR41AA103	CF,PBNS,PBSM	2.1	0.002
192	EFWS	30LAR41AA105	MOV	EFWS, Train 4 SG Level Control MOV LAR41AA005	CF,PBNS,PBSM	2.1	0.002
193	ELEC	32BNB02	MCC	ELEC, 480V MCC 32BNB02	FL,FR	2.1	0.000
194	CCWS	30KAA10AA112	MOV	CCWS, Train 1 Heat Exchanger Bypass MOV KAA10AA112	IR,OP	2.1	0.000

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Table 17.4-3 Risk Significant SSCs Ranked by RAW for "At Power" Events, All Components with RAW Greater Than or Equal to 2

(Page 8 of 8)

No	System US	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
195	ESWS	30PEB10AA005	MOV	ESWS, Train 1 Pump Discharge Isolation MOV, PEB10AA005	CL	2.1	0.000
196	ESWS	30PEB10AA010	MOV	UHS, Cooling Tower Train 1 Spray MOV PEB10AA010, Fails to Remain Open (SO)	CL	2.1	0.000
197	ESWS	30PEB10AA011	MOV	UHS, Cooling Tower Train 1 Bypass Line MOV PEB10AA011, Internal Rupture	IR,OP	2.1	0.000
198	ELEC	30XKA20	Diesel Generator	ELEC, Emergency Diesel Generator XKA20	FR,FS	2.1	0.114
199	SIS/RHRS	30JNG13AA005	Check Valve	LHSI, CL1 First SIS Isolation Check Valve JNG13AA005	CL,FO	2.0	0.020
200	ESWS	30PED10AN001	Fan	UHS, Cooling Tower Train 1 Cooling Fan PED10AN001	FR,FS	2.0	0.003
201	MFWS	30LAB31AA001	Pneumatic Valve	FWS, HP Heater Train 1 Bypass Pneumatic Valve LAB31AA001	CL	2.0	0.000
202	MFWS	30LAB31AA002	Pneumatic Valve	FWS, HP Heater Train 1 Bypass Pneumatic Valve LAB31AA002	CL	2.0	0.000
203	MFWS	30LAB32AA001	Pneumatic Valve	FWS, HP Heater Train 2 Bypass Pneumatic Valve LAB32AA001	CL	2.0	0.000
204	MFWS	30LAB32AA002	Pneumatic Valve	FWS, HP Heater Train 2 Bypass Pneumatic Valve LAB32AA002	CL	2.0	0.000
205	CLCWS	30PGB19AA191	Safety Valve	CLCWS, Safety Valve PGB19AA191	PO	2.0	0.000

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Table 17.4-4 Risk Significant SSCs Common Cause Failure Ranked by RAW, for "At Power" Events, All CCFs with RAW Greater Than or Equal to 20

(Page 1 of 3)

No	System US	CCF ID	Component Type	CCF Component Description	CCF RAW
1	ELEC	BTD01_BAT__ST_D ALL	Battery	CCF of Safety Related Batteries on Demand	39,960
2	I&C	CL TXS OSCCF	Software	Software CCF of TXS operating system or multiple diversity groups	23,510
3	HVAC	SAC01AN001EFR_D ALL	Fan	CCF to Run Normal Air Supply Fans	3,768
4	HVAC	SAC31AN001EFR_D ALL	Fan	CCF to Run Normal Air Exhaust Fans	3,768
5	SCWS	QKA10AP107EFR_D ALL	Pump	CCF of SCWS Pumps to Run	3,736
6	IRWST	JNK10AT001SPG_P ALL	Strainer	CCF of IRWST Sump Strainers—Plugged	3,117
7	SIS/RHRS	JNG13AA005CFO_D ALL	Check Valve	CCF to Open LHSI/MHSI Common Injection Check Valves	3,040
8	I&C	CL PS B SWCCF	Software	Software CCF of Protection System diversity group B	3,009
9	I&C	ALU B CCF NS ALL	ALU	CCF of ALU B Protection System Computer Processors (Non-Self Monitored)	2,921
10	I&C	ALU B CCF SM ALL	ALU	CCF of ALU B Protection System Computer Processors (Self Monitored)	2,889
11	I&C	APU4 CCF NS ALL	APU	CCF of APU 4 Protection System Computer Processors (Non-Self Monitored)	2,064
12	I&C	APU4 CCF SM ALL	APU	CCF of APU 4 Protection System Computer Processors (Self Monitored)	2,045
13	I&C	SG4 PRES CCF ALL	Sensor	CCF of SG4 pressure sensors	2,037
14	I&C	SAS CCF ALL	SAS	CCF of Safety Automation System (SAS) Divisions	805
15	ELEC	XKA10_____DFR_D ALL	Diesel Generator	CCF of EDGs to Run	518
16	MSS	LBA13AA001PFO_D ALL	Pneumatic Valve	CCF to Open Main Steam Relief Isolation Valves	498
17	MSS	MSRIVSCPFO_P ALL	Pneumatic Valve	CCF to Open Main Steam Relief Isolation Pneumatic Pilot Valves	496
18	MSS	MSRIVSOOFO_P ALL	SOV	CCF to Open Main Steam Relief Isolation Solenoid Pilot Valves	494
19	ELEC	XKA10_____DFS_D ALL	Diesel Generator	CCF of EDGs to Start	473
20	SIS/RHRS	JND10AP001EFR_D ALL	Pump	CCF of MHSI Pumps to Run	447
21	SIS/RHRS	JND10AP001EFS_D ALL	Pump	CCF of MHSI Pumps to Start	438
22	I&C	PZR PRES CCF ALL	Sensor	CCF of pressurizer (RCS) pressure sensors	426
23	SIS/RHRS	JND10AA003CFO_D ALL	Check Valve	CCF to Open MHSI Pump Discharge Motor Operated CHECK Valves	421
24	SIS/RHRS	JND10AA007CFO_D ALL	Check Valve	CCF to Open MHSI Discharge CVs (CIVs)	421
25	I&C	APU3 CCF NS ALL	APU	CCF of APU 3 Protection System Computer Processors (Non-Self Monitored)	403
26	I&C	APU3 CCF SM ALL	APU	CCF of APU 3 Protection System Computer Processors (Self Monitored)	394
27	ELEC	BDT01_BDA_BFO_D ALL	Circuit Breaker	CCF to Open Normal Supply 6.9kV Circuit Breakers from Aux. Xfrm to Safety Related SWGRs	379
28	ELEC	BDT02_BDA BFO_D ALL	Circuit Breaker	CCF to Open Backup Supply 6.9kV Circuit Breakers from Aux. Xfrm to Safety Related SWGRs	379
29	ELEC	XKA10_1BDABFO_D ALL	Circuit Breaker	CCF to Close EDG Supply Breakers	379
30	ESWS	PED10AN001EFR_D ALL	Fan	CCF to Run Normally Running Cooling Tower Fans	370
31	CCWS	KAA12AA005EFO_D ALL	MOV	CCF to Open CCWS to LHSI HTX Cooling MOV	368

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Table 17.4-4 Risk Significant SSCs Common Cause Failure Ranked by RAW, for "At Power" Events, All CCFs with RAW Greater Than or Equal to 20

(Page 2 of 3)

No	System US	CCF ID	Component Type	CCF Component Description	CCF RAW
32	ESWS	PED10AN002EFS_D ALL	Fan	CCF to Start Standby Cooling Tower Fans	367
33	ESWS	PED10AN002EFR_D ALL	Fan	CCF to Run Standby Cooling Tower Fans	357
34	SIS/RHRS	JNG10AP001EFS_D ALL	Pump	CCF of LHSI Pumps to Start	339
35	MSS	LBA11AA191SFO_H ALL	Safety Valve	CCF to Open Main Steam Safety Relief Valves	328
36	SIS/RHRS	JNG10AP001EFR_D ALL	Pump	CCF of LHSI Pumps to Run	322
37	ESWS	PEB10AA004CFO_D ALL	Check Valve	CCF to Open ESWS Pump Discharge Check Valves	321
38	CCWS	KAA12AA012CFO_D ALL	Check Valve	CCF to Open CCWS from LHSI HTX Discharge Check Valve	316
39	SIS/RHRS	JNG10AA006CFO_D ALL	Check Valve	CCF to Open LHSI Check Valves (SIS Second Isolation Valves)	311
40	SIS/RHRS	JNG10AA009CFO_D ALL	Check Valve	CCF to Open LHSI Discharge Check Valves	311
41	SIS/RHRS	JNG10AA011CFO_D ALL	Check Valve	CCF to Open LHSI Discharge Check Valves	311
42	SCWS	QKA10GH001_FR_B ALL	Chiller	CCF of the Air Cooled SCWS Chiller Units to Run	300
43	EFWS	LAS11AP001EFS_D ALL	Pump	CCF of EFWS Pumps to Start	283
44	EFWS	LAS11AP001EFR_D ALL	Pump	CCF of EFWS Pumps to Run	283
45	I&C	CL PS A SWCCF	Software	Software CCF of Protection System diversity group A	274
46	MSS	LBA10AA002PFC_D ALL	Pneumatic Valve	CCF to Close Main Steam Isolation Valves	221
47	I&C	ALU A CCF NS ALL	ALU	CCF of ALU A Protection System Computer Processors (Non Self Monitored)	202
48	I&C	APU2 CCF NS ALL	APU	CCF of APU 2 Protection System Computer Processors (Non Self Monitored)	202
49	SCWS	QKA10GH001_FS_B ALL	Chiller	CCF of the Air Cooled SCWS Chiller Units to Start	202
50	SCWS	QKA10AP107EFS_D ALL	Pump	CCF of SCWS Pumps to Start	198
51	HVAC	SAC01AN001EFS_D ALL	Fan	CCF to Start Normal Air Supply Fans	196
52	HVAC	SAC31AN001EFS_D ALL	Fan	CCF to Start Normal Air Exhaust Fans	196
53	SCWS	QKA10AA003CFO_D ALL	Check Valve	CCF to Open SCWS Pump Discharge Check Valves	194
54	HVAC	SAC01AA005CFO_D ALL	Check Valve	CCF to Open Normal SAC Supply Fan Discharge Check Dampers	194
55	HVAC	SAC31AA003CFO_D ALL	Check Valve	CCF to Open Normal Air Exhaust Fan Discharge Check Damper	184
56	I&C	ALU A CCF SM ALL	ALU	CCF of ALU A Protection System Computer Processors (Self Monitored)	101
57	I&C	APU2 CCF SM ALL	APU	CCF of APU 2 Protection System Computer Processors (Self Monitored)	101
58	SIS/RHRS	JNA10AA001EFO_D ALL	MOV	CCF to Open LHSI Pump Suction from RCS MOVs	64
59	SIS/RHRS	JNA10AA002EFO_D ALL	MOV	CCF to Open LHSI Pump Suction from RCS Angled MOVs	64
60	SIS/RHRS	JNA10AA003EFO_D ALL	MOV	CCF to Open LHSI Pump Suction from RCS MOVs	64
61	SIS/RHRS	JNG10AA004EFC_D ALL	MOV	CCF to Close LHSI to Tangential Miniflow MOTOR Operated Check Valves	64
62	I&C	PAS	PAS	Process Automation System (PAS) Fails (Estimate)	30
63	ESWS	PEB20AP001EFS_B ALL	Pump	CCF of ESWS Pumps 2 and 3 to Start (Standby)	29

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Table 17.4-4 Risk Significant SSCs Common Cause Failure Ranked by RAW, for "At Power" Events, All CCFs with RAW Greater Than or Equal to 20

(Page 3 of 3)

No	System US	CCF ID	Component Type	CCF Component Description	CCF RAW
64	CCWS	KAA20AP001EFS_B-ALL	Pump	CCF of CCWS Pumps 2 and 3 to Start (Standby)	25
65	CCWS	KAA10AA004CFO_D-ALL	Check Valve	CCF to Open CCWS HTX Discharge Check Valves	21
66	SCWS	QKA20GH001_FR_B-ALL	Chiller	CCF of the CCWS Cooled SCWS Chiller Units to Run	20

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~~Table 17.4-5 Risk Significant SSCs Ranked by FV for "Shutdown" Events, All Components with FV Greater Than or Equal To 0.005~~

~~(Page 1 of 3)~~

~~No~~	~~System US~~	~~Component ID~~	~~Component Type~~	~~Component Description~~	~~Failure Modes~~	~~FV~~	~~RAW[1]~~
~~1~~	~~ELEC~~	~~30XKA20~~	~~Diesel Generator~~	~~ELEC, Emergency Diesel Generator XKA20~~	~~FR,FS~~	~~0.291~~	~~1.8~~
~~2~~	~~ELEC~~	~~30XKA30~~	~~Diesel Generator~~	~~ELEC, Emergency Diesel Generator XKA30~~	~~FR,FS~~	~~0.289~~	~~1.8~~
~~3~~	~~ELEC~~	~~30XKA40~~	~~Diesel Generator~~	~~ELEC, Emergency Diesel Generator XKA40~~	~~FR,FS~~	~~0.288~~	~~1.8~~
~~4~~	~~ELEC~~	~~30XKA10~~	~~Diesel Generator~~	~~ELEC, Emergency Diesel Generator XKA10~~	~~FR,FS~~	~~0.264~~	~~1.5~~
~~5~~	~~SIS/RHRS~~	~~30JNG33AA005~~	~~Check Valve~~	~~LHSI, CL3 First SIS Isolation Check Valve JNG33AA005~~	~~CL,FO~~	~~0.244~~	~~3.2~~
~~6~~	~~SIS/RHRS~~	~~30JNG23AA005~~	~~Check Valve~~	~~LHSI, CL2 First SIS Isolation Check Valve JNG23AA005~~	~~CL,FO~~	~~0.243~~	~~2.7~~
~~7~~	~~SIS/RHRS~~	~~30JNG43AA005~~	~~Check Valve~~	~~LHSI, CL4 First SIS Isolation Check Valve JNG43AA005~~	~~CL,FO~~	~~0.243~~	~~1.8~~
~~8~~	~~CVCS~~	~~30KBA14AA004~~	~~MOV~~	~~CVCS, Low Pressure Reducing Station Isolation MOV KBA14AA004~~	~~CL, FC, IR, PANS, PASM~~	~~0.239~~	~~29.9~~
~~9~~	~~SIS/RHRS~~	~~30JNG13AA005~~	~~Check Valve~~	~~LHSI, CL1 First SIS Isolation Check Valve JNG13AA005~~	~~CL,FO~~	~~0.236~~	~~4.6~~
~~10~~	~~ELEC~~	~~30XKA50~~	~~Diesel Generator~~	~~ELEC, SBO Diesel Generator XKA50~~	~~FR,FS~~	~~0.226~~	~~4.6~~
~~11~~	~~CVCS~~	~~30KBA14AA106~~	~~MOV~~	~~CVCS, CVCS Low Power Reducing Station MOV KBA14AA106~~	~~FC, IR, OP, PBNS, PBSM~~	~~0.170~~	~~32.3~~
~~12~~	~~SIS/RHRS~~	~~30JNA20AA191~~	~~Safety Valve~~	~~RHR, LHSI Train 2 Safety Valve JNA20AA191~~	~~PO~~	~~0.042~~	
~~13~~	~~SIS/RHRS~~	~~30JNA10AA191~~	~~Safety Valve~~	~~RHR, LHSI Train 1 Safety Valve JNA10AA191~~	~~PO~~	~~0.042~~	
~~14~~	~~SIS/RHRS~~	~~30JNG10AA192~~	~~Safety Valve~~	~~LHSI, LHSI/RHR Train 10 Overpressure Protection Safety Valve JNG10AA192~~	~~PO~~	~~0.042~~	
~~15~~	~~SIS/RHRS~~	~~30JNG20AA192~~	~~Safety Valve~~	~~LHSI, LHSI/RHR Train 20 Overpressure Protection Safety Valve JNG20AA192, Premature Opening~~	~~PO~~	~~0.042~~	
~~16~~	~~SIS/RHRS~~	~~30JND10AP001~~	~~Pump~~	~~MHSI, MHSI Train 1 Motor Driven Pump JND10AP001~~	~~FR,FS,PANS, PASM~~	~~0.041~~	~~1.6~~
~~17~~	~~ELEC~~	~~30XKA80~~	~~Diesel Generator~~	~~ELEC, SBO Diesel Generator XKA80~~	~~FR,FS~~	~~0.034~~	~~1.4~~
~~18~~	~~SIS/RHRS~~	~~30JND20AP001~~	~~Pump~~	~~MHSI, MHSI Train 2 Motor Driven Pump JND20AP001~~	~~FR,FS,PBNS, PBSM~~	~~0.034~~	~~1.1~~
~~19~~	~~SIS/RHRS~~	~~30JND30AP001~~	~~Pump~~	~~MHSI, MHSI Train 3 Motor Driven Pump JND30AP001~~	~~FR,FS,PANS, PASM~~	~~0.034~~	~~1.0~~
~~20~~	~~SIS/RHRS~~	~~30JND40AP001~~	~~Pump~~	~~MHSI, MHSI Train 4 Motor Driven Pump JND40AP001~~	~~FR,FS,PBNS, PBSM~~	~~0.033~~	~~1.0~~
~~21~~	~~IRWST~~	~~30JNK11AT001~~	~~Strainer~~	~~IRWST, SIS Sump Strainer to MHSI/ LHSI Train 4 Pumps JNK11AT001~~	~~PG~~	~~0.029~~	~~1.2~~
~~22~~	~~IRWST~~	~~30JNK11AT002~~	~~Strainer~~	~~IRWST, SIS Sump Strainer to MHSI/ LHSI Train 3 Pumps JNK11AT002~~	~~PG~~	~~0.029~~	~~1.1~~
~~23~~	~~IRWST~~	~~30JNK10AT002~~	~~Strainer~~	~~IRWST, SIS Sump Strainer to MHSI/ LHSI Train 2 Pumps JNK10AT002~~	~~PG~~	~~0.029~~	~~1.1~~
~~24~~	~~IRWST~~	~~30JNK10AT001~~	~~Strainer~~	~~IRWST, SIS Sump Strainer to MHSI/ LHSI Train 1 Pumps JNK10AT001~~	~~PG~~	~~0.028~~	~~1.3~~
~~25~~	~~IRWST~~	~~30JNK11AT003~~	~~Strainer~~	~~IRWST, SAHR Sump Strainer JNK11AT003~~	~~PG~~	~~0.028~~	~~2.3~~

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Table 17.4-5 Risk Significant SSCs Ranked by FV for "Shutdown" Events, All Components with FV Greater Than or Equal To 0.005

(Page 2 of 3)

No	System US	Component ID	Component Type	Component Description	Failure Modes	FV	RAW[1]
26	SIS/RHRS	30JNG30AA192	Safety Valve	LHSI, LHSI/RHR Train 30 Overpressure Protection Safety Valve JNG30AA192, Premature Opening	PO	0.020	
27	SCWS	30QKA10GH001	Chiller	SCWS, Train 1 Chiller Unit QKA10GH001	FR,FS,PANS, PASM	0.019	4.4
28	ELEC	31BTD01_BAT	Battery	ELEC, 250V 1E 2-hr Battery 31BTD01	ST	0.018	10.2
29	SIS/RHRS	30JNA30AA191	Safety Valve	RHR, LHSI Train 3 Safety Valve JNA30AA191	PO	0.017	
30	CCWS	30KAA10AP001	Pump	CCWS, Train 1 Motor Driven Pump KAA10AP001	EL,FR,FS,PANS, PASM	0.012	3.7
31	ELEC	34BTD01_BAT	Battery	ELEC, 250V 1E 2-hr Battery 34BTD01	ST	0.012	2.5
32	ELEC	33BTD01_BAT	Battery	ELEC, 250V 1E 2-hr Battery 33BTD01	ST	0.012	1.7
33	ELEC	32BTD01_BAT	Battery	ELEC, 250V 1E 2-hr Battery 32BTD01	ST	0.011	1.5
34	SIS/RHRS	30JNG10AA001	MOV	LHSI, LHSI Pump 10 Suction from IRWST MOV JNG10AA001	CL,FC,FL,FO,IR,OP,PANS, PASM	0.011	
35	SAHRS	30JMQ40AA001	MOV	SAHR, Suction Line Containment Isolation MOV JMQ40AA001	CL,FO,PANS, PASM	0.011	3.8
36	SAHRS	30JMQ42AA001	MOV	SAHR, Train Recirculation Line MOV JMQ42AA001	CL,FC,FO,IR, OP, PANS,PASM	0.011	3.8
37	IRWST	30JNK11AA009	MOV	IRWST, SAHR Sump Containment Isolation MOV JNK11AA009	CL,FO,PBNS, PBSM	0.011	3.8
38	EFWS	30LAS11AP001	Pump	EFWS, Train 1 Motor Driven Pump LAS11AP001	EL,FR,FS,PANS, PASM	0.011	1.7
39	SIS/RHRS	30JNG20AA001	MOV	LHSI, LHSI Pump 20 Suction from IRWST MOV JNG20AA001	CL,FC,FL,FO, IR,OP,PBNS, PBSM	0.010	
40	HVAC	30SAC01AN001	Fan	SAC, Normal Air Supply Fan SAC01AN001	FR,FS	0.010	1.6
41	HVAC	30SAC31AN001	Fan	SAC, Normal Air Exhaust Fan SAC31AN001	FR,FS	0.010	1.6
42	CCWS	30KAA30AP001	Pump	CCWS, Train 3 Motor Driven Pump KAA30AP001	EL,FR,FS, PANS, PASM	0.010	2.5
43	HVAC	30SAC03AN001	Fan	SAC, Normal Air Supply Fan SAC03AN001	FR,FS	0.010	1.1
44	HVAC	30SAC33AN001	Fan	SAC, Normal Air Exhaust Fan SAC33AN001	FR,FS	0.010	1.1
45	HVAC	30SAC02AN001	Fan	SAC, Normal Air Supply Fan SAC02AN001	FR,FS	0.010	1.0
46	HVAC	30SAC32AN001	Fan	SAC, Normal Air Exhaust Fan SAC32AN001	FR,FS	0.010	1.0
47	CCWS	30KAA20AP001	Pump	CCWS, Train 2 Motor Driven Pump KAA20AP001 External Leakage	EL,FR,FS,PBNS, PBSM	0.009	2.2
48	SIS/RHRS	30JND10AA003	Check Valve	MHSI, MHSI Pump 10 Discharge Manual CHECK Valve JND10AA003	CL,FO,IR, MEC3	0.009	
49	CCWS	30KAA40AP001	Pump	CCWS, Train 40 Motor Driven Pump KAA40AP001	EL,FR,FS, PBNS, PBSM	0.009	1.9
50	SCWS	30QKA10AP107	Pump	SCWS, Train 1 Motor Driven Safety Chiller Pump QKA10AP107	EL,FR,FS	0.009	4.2

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Table 17.4-5 Risk Significant SSCs Ranked by FV for "Shutdown" Events, All Components with FV Greater Than or Equal To 0.005

(Page 3 of 3)

No	System US	Component ID	Component Type	Component Description	Failure Modes	FV	RAW[1]
51	SIS/RHRS	30JND20AA003	Check Valve	MHSI, MHSI Pump 20 Discharge Manual CHECK Valve JND20AA003	CL,FO,IR, MEC3	0.008	
52	SIS/RHRS	30JNG10AP001	Pump	LHSI, LHSI Train 1 Motor Driven Pump JNG10AP001	FR,FS,PANS, PASM	0.008	3.7
53	SCWS	30QKA40GH001	Chiller	SCWS, Train 4 Chiller Unit QKA40GH001	FR,FS,PANS, PASM	0.007	2.3
54	HVAC	30SAC04AN001	Fan	SAC, Normal Air Supply Fan SAC04AN001	FR,FS	0.007	1.3
55	HVAC	30SAC34AN001	Fan	SAC, Normal Air Exhaust Fan SAC34AN001	FR,FS	0.007	1.3
56	SIS/RHRS	30JNG30AP001	Pump	LHSI, LHSI Train 3 Motor Driven Pump JNG30AP001	FR,FS,PANS, PASM	0.007	2.3
57	SIS/RHRS	30JNG20AA003	MOV	LHSI, LHSI Train 2 to Radial Miniflow MOTOR OPERATED Check Valve JNG20AA003	IR,OP	0.007	
58	SIS/RHRS	30JNG10AA004	MOV	LHSI, LHSI Train 1 to Tangential Miniflow MOTOR OPERATED CV JNG10AA004	CL,FC,FO,IR, OP,PANS,PAS M	0.007	
59	SIS/RHRS	30JNG40AP001	Pump	LHSI, LHSI Train 4 Motor Driven Pump JNG40AP001	FR,FS,PBNS, PBSM	0.007	2.0
60	SIS/RHRS	30JNG20AP001	Pump	LHSI, LHSI Train 2 Motor Driven Pump JNG20AP001	FR,FS,PBNS, PBSM	0.007	1.8
61	SCWS	30QKA30AP107	Pump	SCWS, Train 3 Motor Driven Safety Chiller Pump QKA30AP107	EL,FR,FS	0.007	1.1
62	SCWS	30QKA20AP107	Pump	SCWS, Train 2 Motor Driven Safety Chiller Pump QKA20AP107	EL,FR,FS	0.007	1.0
63	SIS/RHRS	30JNG20AA004	MOV	LHSI, LHSI Train 2 to Tangential Miniflow MOTOR OPERATED CV JNG20AA004	CL,FC,FO,IR, OP,PBNS,PBS M	0.006	
64	SIS/RHRS	30JNG10AA003	MOV	LHSI, LHSI Train 1 to Radial Miniflow MOTOR OPERATED Check Valve JNG10AA003	IR,OP	0.006	
65	SIS/RHRS	30JNG30AA001	MOV	LHSI, LHSI Pump 30 Suction from IRWST MOV JNG30AA001	CL,FC,FL,FO,I R,OP,PANS,P ASM	0.005	
66	SCWS	30QKA40AP107	Pump	SCWS, Train 4 Motor Driven Safety Chiller Pump QKA40AP107	EL,FR,FS	0.005	2.2

Notes

1. Due to modeling constraints, some components' RAW values are left blank.

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Table 17.4-6 Risk Significant SSCs Ranked by RAW for "Shutdown" Events, All Components with RAW Greater Than or Equal To 2

(Page 1 of 5)

No	System US	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
1	ELEC	34BDB	SWGR	ELEC, 6.9kV SWGR 34BDB	FL	50.6	0.001
2	ELEC	34BDC	SWGR	ELEC, 6.9kV SWGR 34BDC	FL	50.6	0.001
3	ELEC	34BMB	Load Center	ELEC, 480V Load Center 34BMB	FL	50.6	0.001
4	ELEC	34BMT02	Transformer	ELEC, 6.9kV-480V Transformer 34BMT02	FL	50.6	0.001
5	ELEC	34BDB4BMT02	Circuit Breaker	ELEC, 6.9kV SWGR 34BDB to Transformer 34BMT02 Circuit Breaker	OP	47.4	0.000
6	ELEC	34BDC_4BDB1	Circuit Breaker	ELEC, 6.9kV SWGR 34BDC to 6.9kV SWGR 34BDB Circuit Breaker	OP	47.4	0.000
7	ELEC	34BDC_4BDB2	Circuit Breaker	ELEC, 6.9kV SWGR 34BDC to 6.9kV SWGR 34BDB Circuit Breaker	OP	47.4	0.000
8	ELEC	34BMT024BMB	Circuit Breaker	ELEC, Transformer 34BMT02 to 480V Load Center 34BMB Circuit Breaker	OP	47.4	0.000
9	ELEC	34BNB02	MCC	ELEC, 480V MCC 34BNB02	FL,FR	42.8	0.001
10	ELEC	34BNT01	Transformer	ELEC, Constant Voltage Transformer 34BNT01	FL	42.8	0.001
11	ELEC	34BMB4BNT01	Circuit Breaker	ELEC, 480V Load Center 34BMB to Transformer 34BNT01 Circuit Breaker	OP	41.6	0.000
12	ELEC	34BNT014BNB02	Circuit Breaker	ELEC, Transformer 34BNT01 to 480V MCC 34BNB02 Circuit Breaker	OP	41.6	0.000
13	CVCS	30KBA14AA106	MOV	CVCS, CVCS Low Power Reducing Station MOV KBA14AA106	FC,IR,OP,PBNS, PBSM	32.3	0.170
14	CVCS	30KBA14AA004	MOV	CVCS, Low Pressure Reducing Station Isolation MOV KBA14AA004	CL,FC,IR,PANS, PASM	29.9	0.239
15	ELEC	34BDA	SWGR	ELEC, 6.9kV SWGR 34BDA	FL	14.8	0.000
16	ELEC	31BDB	SWGR	ELEC, 6.9kV SWGR 31BDB	FL	13.7	0.000
17	ELEC	31BDC	SWGR	ELEC, 6.9kV SWGR 31BDC	FL	13.7	0.000
18	ELEC	31BMB	Load Center	ELEC, 480V Load Center 31BMB	FL	13.7	0.000
19	ELEC	31BMT02	Transformer	ELEC, 6.9kV-480V Transformer 31BMT02	FL	13.7	0.000
20	ELEC	34BDD	SWGR	ELEC, 6.9kV SWGR 34BDD	FL	11.6	0.000
21	ELEC	34BMD	Load Center	ELEC, 480V Load Center 34BMD	FL	11.6	0.000
22	ELEC	34BMT04	Transformer	ELEC, 6.9kV-480V Transformer 34BMT04	FL	11.6	0.000
23	ELEC	31BDB1BMT02	Circuit Breaker	ELEC, 6.9kV SWGR 31BDB to Transformer 31BMT02 Circuit Breaker	OP	11.2	0.000
24	ELEC	31BDC_1BDB1	Circuit Breaker	ELEC, 6.9kV SWGR 31BDC to 6.9kV SWGR 31BDB Circuit Breaker	OP	11.2	0.000
25	ELEC	31BDC_1BDB2	Circuit Breaker	ELEC, 6.9kV SWGR 31BDC to 6.9kV SWGR 31BDB Circuit Breaker	OP	11.2	0.000
26	ELEC	31BMT021BMB	Circuit Breaker	ELEC, Transformer 31BMT02 to 480V Load Center 31BMB Circuit Breaker	OP	11.2	0.000
27	ELEC	31BTD01_BAT	Battery	ELEC, 250V 1E-2 hr Battery 31BTD01	ST	10.2	0.018
28	ELEC	34BUC	Bus	ELEC, 250V DC Bus 34BUC	FL	10.0	0.000
29	ELEC	31BUC	Bus	ELEC, 250V DC Bus 31BUC	FL	9.0	0.000
30	ELEC	34BDA_4BDD1	Circuit Breaker	ELEC, 6.9kV SWGR 34BDA to 6.9kV SWGR 34BDD Circuit Breaker	OP	8.8	0.000

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~~Table 17.4-6 Risk-Significant SSCs Ranked by RAW for "Shutdown" Events, All Components with RAW Greater Than or Equal To 2~~

~~(Page 2 of 5)~~

~~No~~	~~System US~~	~~Component ID~~	~~Component Type~~	~~Component Description~~	~~Failure Modes~~	~~RAW~~	~~FV~~
~~31~~	~~ELEC~~	~~34BDA_4BDD2~~	~~Circuit Breaker~~	~~ELEC, 6.9kV SWGR 34BDA to 6.9kV SWGR 34BDD Circuit Breaker~~	~~OP~~	~~8.8~~	~~0.000~~
~~32~~	~~ELEC~~	~~34BDD4BMT04~~	~~Circuit Breaker~~	~~ELEC, 6.9kV SWGR 34BDD to Transformer 34BMT04 Circuit Breaker~~	~~OP~~	~~8.8~~	~~0.000~~
~~33~~	~~ELEC~~	~~34BMT044BMD~~	~~Circuit Breaker~~	~~ELEC, Transformer 34BMT04 to 480V Load Center 34BMD Circuit Breaker~~	~~OP~~	~~8.8~~	~~0.000~~
~~34~~	~~ELEC~~	~~31BNB02~~	~~MCC~~	~~ELEC, 480V MCC 31BNB02~~	~~FL,FR~~	~~7.7~~	~~0.000~~
~~35~~	~~ELEC~~	~~31BNT01~~	~~Transformer~~	~~ELEC, Constant Voltage Transformer 31BNT01~~	~~FL~~	~~7.7~~	~~0.000~~
~~36~~	~~ELEC~~	~~31BTD01~~	~~Circuit Breaker~~	~~ELEC, 250V Battery 31BTD01 Circuit Breaker~~	~~OP~~	~~7.6~~	~~0.000~~
~~37~~	~~ELEC~~	~~31BMB1BNT01~~	~~Circuit Breaker~~	~~ELEC, 480V Load Center 31BMB to Transformer 31BNT01 Circuit Breaker~~	~~OP~~	~~6.6~~	~~0.000~~
~~38~~	~~ELEC~~	~~31BNT011BNB02~~	~~Circuit Breaker~~	~~ELEC, Transformer 31BNT01 to 480V MCC 31BNB02 Circuit Breaker~~	~~OP~~	~~6.6~~	~~0.000~~
~~39~~	~~ELEC~~	~~31BUD~~	~~Bus~~	~~ELEC, Non 1E 250V DC Distribution Panel 31BUD~~	~~FL~~	~~5.7~~	~~0.000~~
~~40~~	~~ELEC~~	~~34BDA_4BDC1~~	~~Circuit Breaker~~	~~ELEC, 6.9kV SWGR 34BDA to 6.9kV SWGR 34BDC Circuit Breaker~~	~~OP~~	~~5.0~~	~~0.000~~
~~41~~	~~ELEC~~	~~34BDA_4BDC2~~	~~Circuit Breaker~~	~~ELEC, 6.9kV SWGR 34BDA to 6.9kV SWGR 34BDC Circuit Breaker~~	~~CL,FO,OP~~	~~5.0~~	~~0.000~~
~~42~~	~~SIS/RHRS~~	~~30JNG13AA005~~	~~Check Valve~~	~~LHSI, CL1 First SIS Isolation Check Valve JNG13AA005~~	~~CL,FO~~	~~4.6~~	~~0.236~~
~~43~~	~~ELEC~~	~~30XKA50~~	~~Diesel Generator~~	~~ELEC, SBO Diesel Generator XKA50~~	~~FR,FS~~	~~4.6~~	~~0.226~~
~~44~~	~~ELEC~~	~~31BTB01_BAT~~	~~Battery~~	~~ELEC, 250V Non 1E 12 hr Battery 31BTB01~~	~~ST~~	~~4.6~~	~~0.002~~
~~45~~	~~ELEC~~	~~30XKA50_1BBH~~	~~Circuit Breaker~~	~~ELEC, SBO DG XKA50 to 6.9kV SWGR 31BBH Circuit Breaker~~	~~FC,OP~~	~~4.5~~	~~0.002~~
~~46~~	~~ELEC~~	~~31BBH_1BDC1~~	~~Circuit Breaker~~	~~ELEC, 6.9kV SWGR 31BBH to 6.9kV SWGR 31BDC Circuit Breaker~~	~~FC,OP~~	~~4.5~~	~~0.002~~
~~47~~	~~ELEC~~	~~31BBH_1BDC2~~	~~Circuit Breaker~~	~~ELEC, 6.9kV SWGR 31BBH to 6.9kV SWGR 31BDC Circuit Breaker~~	~~FC,OP~~	~~4.5~~	~~0.002~~
~~48~~	~~ELEC~~	~~31BBT081BBH~~	~~Circuit Breaker~~	~~ELEC, Transformer 31BBT08 to 6.9kV SWGR 31BBH Circuit Breaker~~	~~CL,FO,OP~~	~~4.5~~	~~0.002~~
~~49~~	~~ELEC~~	~~31BDA_1BDC2~~	~~Circuit Breaker~~	~~ELEC, 6.9kV SWGR 31BDA to 6.9kV SWGR 31BDC Circuit Breaker~~	~~CL,FO,OP~~	~~4.5~~	~~0.002~~
~~50~~	~~SCWS~~	~~30QKA10GH001~~	~~Chiller~~	~~SCWS, Train 1 Chiller Unit QKA10GH001~~	~~FR,FS,PANS,PASM~~	~~4.4~~	~~0.019~~
~~51~~	~~SCWS~~	~~30QKA10AP107~~	~~Pump~~	~~SCWS, Train 1 Motor Driven Safety Chiller Pump QKA10AP107~~	~~EL,FR,FS~~	~~4.2~~	~~0.009~~
~~52~~	~~ELEC~~	~~31BBH~~	~~SWGR~~	~~ELEC, 6.9kV SWGR 31BBH~~	~~FL~~	~~4.2~~	~~0.000~~
~~53~~	~~ELEC~~	~~31BRV31BUV~~	~~Power Rack~~	~~ELEC, 24V DC I&C Power Rack 31BRV/31BUV~~	~~FL~~	~~4.2~~	~~0.000~~
~~54~~	~~ELEC~~	~~31BTB01~~	~~Circuit Breaker~~	~~ELEC, 250V Battery 31BTB01 Circuit Breaker~~	~~OP~~	~~3.9~~	~~0.000~~
~~55~~	~~SAHRS~~	~~30JMQ40AA001~~	~~MOV~~	~~SAHR, Suction Line Containment Isolation MOV JMQ40AA001~~	~~CL,FO,PANS,PASM~~	~~3.8~~	~~0.011~~
~~56~~	~~SAHRS~~	~~30JMQ42AA001~~	~~MOV~~	~~SAHR, Train Recirculation Line MOV JMQ42AA001~~	~~CL,FC,FO,IR,OP, PANS,PASM~~	~~3.8~~	~~0.011~~

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Table 17.4-6 Risk-Significant SSCs Ranked by RAW for "Shutdown" Events, All Components with RAW Greater Than or Equal To 2

(Page 3 of 5)

No	System US	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
57	IRWST	30JNK11AA009	MOV	IRWST, SAHR Sump Containment Isolation MOV JNK11AA009	CL,FO,PBNS,PBSM	3.8	0.011
58	SIS/RHRS	30JNG10AC001	HTX	LHSI, LHSI Train 1 HTX JNG10AC001	LK	3.7	0.000
59	ELEC	34BNB03	MCC	ELEC, 480V MCC 34BNB03	FL,FR	3.7	0.000
60	CCWS	30KAA10AP001	Pump	CCWS, Train 1 Motor Driven Pump KAA10AP001	EL,FR,FS,PANS, PASM	3.7	0.012
61	SIS/RHRS	30JNG10AP001	Pump	LHSI, LHSI Train 1 Motor Driven Pump JNG10AP001	FR,FS,PANS,PASM	3.7	0.008
62	ELEC	31BNB01	MCC	ELEC, 480V MCC 31BNB01	FL,FR	3.6	0.000
63	CCWS	30KAA80AP001	Pump	CCWS, SA-CCW Motor Driven Pump KAA80AP001	FR,FS	3.6	0.002
64	SAHRS	30JMQ40AP001	Pump	SAHR, Motor Driven Pump JMQ40AP001	FR,FS,PBNS,PBSM	3.6	0.002
65	ELEC	31BDD	SWGR	ELEC, 6.9kV SWGR 31BDD	FL	3.4	0.000
66	ELEC	31BMD	Load Center	ELEC, 480V Load Center 31BMD	FL	3.4	0.000
67	ELEC	31BMT04	Transformer	ELEC, 6.9kV-480V Transformer 31BMT04	FL	3.4	0.000
68	SAHRS	30JMQ40AA002	Manual Valve	SAHR, Suction Manual Valve JMQ40AA002	MEC1	3.3	0.000
69	SAHRS	30JMQ40AA003	Manual Valve	SAHR, Discharge Manual Valve JMQ40AA003	MEC1	3.3	0.000
70	SAHRS	30JMQ40AA004	Manual Valve	SAHR, HTX Discharge Manual Valve JMQ40AA004	MEC1	3.3	0.000
71	CCWS	30KAA80AA001	Manual Valve	CCWS, SA-CCW Pump Suction Manual Valve KAA80AA001	MEC1	3.3	0.000
72	CCWS	30KAA80AA002	Manual Valve	CCWS, SA-CCW Pump Cooling Manual Valve KAA80AA002	MEC1	3.3	0.000
73	CCWS	30KAA80AA003	Manual Valve	CCWS, SA-CCW Pump Cooling Manual Valve KAA80AA003	MEC1	3.3	0.000
74	CCWS	30KAA80AA004	Manual Valve	CCWS, SA-CCW Pump Discharge Manual Valve KAA80AA004	MEC1	3.3	0.000
75	CCWS	30KAA80AA005	Manual Valve	CCWS, SA-CCW Pump Cooling Manual Valve KAA80AA005	MEC1	3.3	0.000
76	CCWS	30KAA82AA001	Manual Valve	CCWS, SA-CCW to SAHR Pump Coolers Manual Valve KAA82AA001	MEC1	3.3	0.000
77	CCWS	30KAA82AA002	Manual Valve	CCWS, SA-CCW from SAHR Pump Seal Water Cooler Manual Valve KAA82AA002	MEC1	3.3	0.000
78	CCWS	30KAA82AA003	Manual Valve	CCWS, SA-CCW from SAHR Pump Motor Air Cooler Manual Valve KAA82AA003	MEC1	3.3	0.000
79	CCWS	30KAA82AA004	Manual Valve	CCWS, SA-CCW to SAGR Pump Bearing Cooler Manual Valve KAA82AA004	MEC1	3.3	0.000
80	SCWS	30QKA10AA003	Check Valve	SCWS, Train 1 Safety Chiller Pump Discharge Check Valve QKA10AA003	CL,FO	3.3	0.000
81	ESWS	30PEB80AP001	Pump	ESWS, SA-ESWS Motor Driven Pump PEB80AP001	FR,FS,PBNS,PBSM	3.3	0.002
82	SIS/RHRS	30JNG10AA006	Check Valve	LHSI, LHSI CL1 Discharge Manual CHECK Valve JNG10AA006	CL,FO,IR,MEC3	3.3	0.000

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Table 17.4-6 Risk Significant SSCs Ranked by RAW for "Shutdown" Events, All Components with RAW Greater Than or Equal To 2

(Page 4 of 5)

No	System US	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
83	SIS/RHRS	30JNG10AA009	Check Valve	LHSI, LHSI Pump 10 Discharge Check Valve JNG10AA009	CL,FO	3.3	0.000
84	ELEC	31BNB03	MCC	ELEC, 480V MCC 31BNB03	FL,FR	3.3	0.000
85	SIS/RHRS	30JNG33AA005	Check Valve	LHSI, CL3 First SIS Isolation Check Valve JNG33AA005	CL,FO	3.2	0.244
86	CCWS	30KAA10AA004	Check Valve	CCWS, Train 1 Discharge from CCW HTX 10 Check Valve KAA10AA004	CL,FO	3.1	0.000
87	CCWS	30KAA12AA012	Check Valve	CCWS, Train 1 LHSI HTX Discharge Check Valve KAA12AA012	CL,FO	3.1	0.000
88	ELEC	30BRW10BUW11	Power Rack	ELEC, 24V DC I&C Power Rack 31BRW10/31BUW11	FL	3.1	0.000
89	ESWS	30PEB80AA002	Check Valve	ESWS, SA ESWS Pump Discharge Manual CHECK Valve PEB80AA002	CL,FO,IR,MEC 1	3.1	0.001
90	ESWS	30PEB80AA003	Manual Valve	ESWS, SA CCWS HTX Suction Manual Valve PEB80AA003	MEC1	3.1	0.000
91	ESWS	30PEB80AA004	Manual Valve	ESWS, SA CCWS HTX Discharge Manual Valve PEB80AA004	MEC1	3.1	0.000
92	ESWS	30PEB80AA008	Manual Valve	ESWS, SA CCWS HTX Discharge Manual Valve PEB80AA008	MEC1	3.1	0.000
93	CCWS	30KAA80AA191	Safety Valve	CCWS, SA CCW Surge Tank to Pump Suction Line Safety Valve KAA80AA191	PO	3.1	0.000
94	SAHRS	30JMQ42AA002	Check Valve	SAHR, Recirculation Line Check Valve JMQ42AA002	CL,FO	3.0	0.000
95	CCWS	30KAA10BB001	Tank	CCWS, Train 1 Surge Tank KAA10BB001	EL	3.0	0.000
96	ESWS	30PEB80AT001	Filter	ESWS, SA ESWS Debris Filter PEB80AT001	PG	3.0	0.000
97	SCWS	30QKA10AA101	MOV	SCWS, Train 1 Chiller By-pass MOV QKA10AA101	CF	2.9	0.000
98	ELEC	32BUD	Bus	ELEC, Non 1E 250V DC Distribution Panel 32BUD	FL	2.7	0.000
99	SIS/RHRS	30JNG23AA005	Check Valve	LHSI, CL2 First SIS Isolation Check Valve JNG23AA005	CL,FO	2.7	0.243
100	ELEC	30BRX10BUX11	Power Rack	ELEC, 24V DC I&C Power Rack 31BRX10/31BUX11	FL	2.6	0.000
101	ELEC	30BRX70BUX71	Power Rack	ELEC, 24V DC I&C Power Rack 34BRX70/34BUX71	FL	2.6	0.000
102	SAHRS	30JMQ40AC001	HTX	SAHR, HTX JMQ40AC001	LK	2.6	0.000
103	CCWS	30KAA80AC001	HTX	CCWS, SA CCW Heat Exchanger KAA80AC001	EL,LK	2.6	0.000
104	ELEC	34BMC	Load Center	ELEC, 480V Load Center 34BMC	FL	2.6	0.000
105	ELEC	34BMT03	Transformer	ELEC, 6.9kV 480V Transformer 34BMT03	FL	2.6	0.000
106	CCWS	30KAA10AA112	MOV	CCWS, Train 1 Heat Exchanger Bypass MOV KAA10AA112	IR,OP	2.6	0.000
107	SIS/RHRS	30JNA10AA101	MOV	RHR, LHSI Train 1 HTX Bypass MOV JNA10AA101	IR,OP	2.6	0.000
108	SIS/RHRS	30JNG10AA060	MOV	LHSI, LHSI Pump 10 Discharge MOV JNG10AA060	CL	2.6	0.000

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~~Table 17.4-6 Risk-Significant SSCs Ranked by RAW for "Shutdown" Events, All Components with RAW Greater Than or Equal To 2~~

~~(Page 5 of 5)~~

~~No~~	~~System US~~	~~Component ID~~	~~Component Type~~	~~Component Description~~	~~Failure Modes~~	~~RAW~~	~~FV~~
~~109~~	~~SIS/RHRS~~	~~30JNG10AA102~~	~~MOV~~	~~LHSI, LHSI Pump 10 Flow Control MOV JNG10AA102~~	~~CL~~	~~2.6~~	~~0.000~~
~~110~~	~~ELEC~~	~~31BMB1BNB01~~	~~Circuit Breaker~~	~~ELEC, 480V Load Center 31BMB to 480V MCC 31BNB01 Circuit Breaker~~	~~OP~~	~~2.6~~	~~0.000~~
~~111~~	~~CCWS~~	~~30KAA30AP001~~	~~Pump~~	~~CCWS, Train 3 Motor Driven Pump KAA30AP001~~	~~EL,FR,FS,PANS, PASM~~	~~2.5~~	~~0.010~~
~~112~~	~~CCWS~~	~~30KAA10AC001~~	~~HTX~~	~~CCWS, Train 1 HTX 10 KAA10AC001~~	~~EL~~	~~2.5~~	~~0.000~~
~~113~~	~~ELEC~~	~~31BDA_1BDD1~~	~~Circuit Breaker~~	~~ELEC, 6.9kV SWGR 31BDA to 6.9kV SWGR 31BDD Circuit Breaker~~	~~OP~~	~~2.5~~	~~0.000~~
~~114~~	~~ELEC~~	~~31BDA_1BDD2~~	~~Circuit Breaker~~	~~ELEC, 6.9kV SWGR 31BDA to 6.9kV SWGR 31BDD Circuit Breaker~~	~~OP~~	~~2.5~~	~~0.000~~
~~115~~	~~ELEC~~	~~31BDD1BMT04~~	~~Circuit Breaker~~	~~ELEC, 6.9kV SWGR 31BDD to Transformer 31BMT04 Circuit Breaker~~	~~OP~~	~~2.5~~	~~0.000~~
~~116~~	~~ELEC~~	~~31BMT041BMD~~	~~Circuit Breaker~~	~~ELEC, Transformer 31BMT04 to 480V Load Center 31BMD Circuit Breaker~~	~~OP~~	~~2.5~~	~~0.000~~
~~117~~	~~ELEC~~	~~34BTD01_BAT~~	~~Battery~~	~~ELEC, 250V 1E-2 hr Battery 34BTD01~~	~~ST~~	~~2.5~~	~~0.012~~
~~118~~	~~CCWS~~	~~30KAA12AA005~~	~~MOV~~	~~CCWS, Train 1 to LHSI HTX 10 Cooling MOV KAA12AA005~~	~~CL,FO,PANS,PASM~~	~~2.5~~	~~0.000~~
~~119~~	~~CCWS~~	~~30KAA80BB001~~	~~Tank~~	~~CCWS, SA-CCW Surge Tank to Pump Suction KAA80BB001~~	~~EL~~	~~2.4~~	~~0.000~~
~~120~~	~~SIS/RHRS~~	~~30JNG30AP001~~	~~Pump~~	~~LHSI, LHSI Train 3 Motor Driven Pump JNG30AP001~~	~~FR,FS,PANS,PASM~~	~~2.3~~	~~0.007~~
~~121~~	~~SCWS~~	~~30QKA40GH001~~	~~Chiller~~	~~SCWS, Train 4 Chiller Unit QKA40GH001~~	~~FR,FS,PANS,PASM~~	~~2.3~~	~~0.007~~
~~122~~	~~ESWS~~	~~30PEB40AA004~~	~~Check Valve~~	~~ESWS, Train 4 Pump Discharge Check Valve PEB40AA004~~	~~CL,FO,IR~~	~~2.3~~	~~0.001~~
~~123~~	~~IRWST~~	~~30JNK11AT003~~	~~Strainer~~	~~IRWST, SAHR Sump Strainer JNK11AT003~~	~~PG~~	~~2.3~~	~~0.028~~
~~124~~	~~CCWS~~	~~30KAA80AA020~~	~~MOV~~	~~CCWS, SA-CCW Surge Tank to Pump Suction Line MOV KAA80AA020~~	~~CL~~	~~2.3~~	~~0.000~~
~~125~~	~~CCWS~~	~~30KAA20AP001~~	~~Pump~~	~~CCWS, Train 2 Motor Driven Pump KAA20AP001 External Leakage~~	~~EL,FR,FS,PBNS, PBSM~~	~~2.2~~	~~0.009~~
~~126~~	~~SIS/RHRS~~	~~30JNG40AC001~~	~~HTX~~	~~LHSI, LHSI Train 4 HTX JNG40AC001~~	~~LK~~	~~2.2~~	~~0.000~~
~~127~~	~~ELEC~~	~~34BNB024BNB031~~	~~Circuit Breaker~~	~~ELEC, 480V MCC 34BNB02 to 480V MCC 34BNB03 Circuit Break~~	~~OP~~	~~2.2~~	~~0.000~~
~~128~~	~~ELEC~~	~~34BNB024BNB032~~	~~Circuit Breaker~~	~~ELEC, 480V MCC 34BNB02 to 480V MCC 34BNB03 Circuit Break~~	~~OP~~	~~2.2~~	~~0.000~~
~~129~~	~~ELEC~~	~~31BNB021BNB031~~	~~Circuit Breaker~~	~~ELEC, 480V MCC 31BNB02 to 480V MCC 31BNB03 Circuit Break~~	~~OP~~	~~2.2~~	~~0.000~~
~~130~~	~~ELEC~~	~~31BNB021BNB032~~	~~Circuit Breaker~~	~~ELEC, 480V MCC 31BNB02 to 480V MCC 31BNB03 Circuit Break~~	~~OP~~	~~2.2~~	~~0.000~~
~~131~~	~~ELEC~~	~~34BDC4BMT03~~	~~Circuit Breaker~~	~~ELEC, 6.9kV SWGR 34BDB to Transformer 34BMT03 Circuit Breaker~~	~~OP~~	~~2.2~~	~~0.000~~
~~132~~	~~ELEC~~	~~34BMT034BMC~~	~~Circuit Breaker~~	~~ELEC, Transformer 34BMT03 to 480V Load Center 34BMC Circuit Breaker~~	~~OP~~	~~2.2~~	~~0.000~~
~~133~~	~~SCWS~~	~~30QKA40AP107~~	~~Pump~~	~~SCWS, Train 4 Motor Driven Safety Chiller Pump QKA40AP107~~	~~EL,FR,FS~~	~~2.2~~	~~0.005~~
~~134~~	~~SIS/RHRS~~	~~30JNG30AC001~~	~~HTX~~	~~LHSI, LHSI Train 3 HTX JNG30AC001~~	~~LK~~	~~2.1~~	~~0.000~~
~~135~~	~~ELEC~~	~~33BDD~~	~~SWGR~~	~~ELEC, 6.9kV SWGR 33BDD~~	~~FL~~	~~2.1~~	~~0.000~~

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Table 17.4-7 Risk Significant SSCs Common Cause Failure Ranked by RAW for "Shutdown" Events, All CCFs with RAW Greater Than or Equal To 20

(Page 1 of 2)

No	System US	CCF ID	Component Type	CCF Component Description	CCF RAW
1	SIS/RHRS	JNG13AA005CFO_D ALL	Check Valve	CCF to Open LHSI/MHSI Common Injection Check Valves (SIS First Isolation Valves)	50,890
2	IRWST	JNK10AT001SPG_P ALL	Strainer	CCF of IRWST Sump Strainers - Plugged	50,250
3	ELEC	BTD01_BAT__ST_D ALL	Battery	CCF of Safety-Related Batteries on Demand	30,590
4	I&C	CL TXS OSCCF	Software	Software CCF of TXS operating system or multiple diversity groups	8,059
5	I&C	SAS CCF ALL	SAS	CCF of Safety Automation System (SAS) Divisions	5,673
6	HVAC	SAC01AN001EFR_D ALL	Fan	CCF to Run Normal Air Supply Fans	5,100
7	HVAC	SAC31AN001EFR_D ALL	Fan	CCF to Run Normal Air Exhaust Fans	5,100
8	SCWS	QKA10AP107EFR_D ALL	Pump	CCF of SCWS Pumps to Run	5,078
9	CVCS	KBA14AA004EFC_B ALL	MOV	CCF to Close CVCS Low Pressure Reducing Station MOVs	2,099
10	ESWS	PEB10AP001EFS_D ALL	Pump	CCF of the ESWS Pumps to Start	1,977
11	ELEC	XKA10_____DFR_D ALL	Diesel Generator	CCF of EDGs to Run	1,933
12	ELEC	XKA10_____DFS_D ALL	Diesel Generator	CCF of EDGs to Start	1,916
13	ESWS	PEB10AA004CFO_D ALL	Check Valve	CCF to Open ESWS Pump Discharge Check Valves	1,902
14	ELEC	BDT01_BDA_BFO_D ALL	Circuit Breaker	CCF to Open Normal Supply 6.9kV Circuit Breakers from Aux. Xfrm to Safety-Related SWGRs	1,884
15	ELEC	BDT02_BDA_BFO_D ALL	Circuit Breaker	CCF to Open Backup Supply 6.9kV Circuit Breakers from Aux. Xfrm to Safety-Related SWGRs	1,884
16	ELEC	XKA10_1BDABFC_D ALL	Circuit Breaker	CCF to Close EDG Supply Breakers	1,884
17	SIS/RHRS	JND10AP001EFR_D ALL	Pump	CCF of MHSI Pumps to Run	752
18	SIS/RHRS	JND10AP001EFS_D ALL	Pump	CCF of MHSI Pumps to Start	695
19	I&C	CL PS B SWCCF	Software	Software CCF of Protection System diversity group B	617
20	SIS/RHRS	JND10AA007CFO_D ALL	Check Valve	CCF to Open MHSI Discharge CVs (CIVs)	558
21	I&C	HL LVL CCF ALL	Sensor	CCF of hot leg loop level	553
22	SCWS	QKA10AP107EFS_D ALL	Pump	CCF of SCWS Pumps to Start	401
23	SCWS	QKA10AA003CFO_D ALL	Check Valve	CCF to Open SCWS Pump Discharge Check Valves	399
24	HVAC	SAC01AN001EFS_D ALL	Fan	CCF to Start Normal Air Supply Fans	398
25	HVAC	SAC31AN001EFS_D ALL	Fan	CCF to Start Normal Air Exhaust Fans	398
26	HVAC	SAC01AA005CFO_D ALL	Check Valve	CCF to Open Normal SAC Supply Fan Discharge Check Dampers	398
27	HVAC	SAC31AA003CFO_D ALL	Check Valve	CCF to Open Normal Air Exhaust Fan Discharge Check Damper	398
28	I&C	ALU B CCF NS ALL	ALU	CCF of ALU B Protection System Computer Processors (Non-Self-Monitored)	369
29	I&C	APU3 CCF NS ALL	APU	CCF of APU 3 Protection System Computer Processors (Non-Self-Monitored)	369
30	I&C	ALU B CCF SM ALL	ALU	CCF of ALU B Protection System Computer Processors (Self-Monitored)	291
31	I&C	APU3 CCF SM ALL	APU	CCF of APU 3 Protection System Computer Processors (Self-Monitored)	291
32	SIS/RHRS	JNG10AA006CFO_D ALL	Check Valve	CCF to Open LHSI Check Valves (SIS Second Isolation Valves)	287
33	SIS/RHRS	JNG10AA009CFO_D ALL	Check Valve	CCF to Open LHSI Discharge CVs (CIVs)	287
34	I&C	PAS	PAS	Process Automation System (PAS) Fails (Estimate)	55

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Table 17.4-7 Risk-Significant SSCs Common Cause Failure Ranked by RAW for "Shutdown" Events, All CCFs with RAW Greater Than or Equal To 20

(Page 2 of 2)

No	System US	CCF ID	Component Type	CCF Component Description	CCF RAW
35	I&C	HL TEMP CCF ALL	Sensor	CCF of hot leg WR temperature sensors	54
36	CCWS	KAA10AP001EFS_D ALL	Pump	CCF of the CCWS Pumps to Start	52
37	I&C	HL PRES CCF ALL	Sensor	CCF of hot leg WR pressure sensors	42
38	I&C	CL WRTEMP CCF ALL	Sensor	CCF of cold leg WR temp sensors	30

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{Table 17.4-3—Site Specific Systems and Structures Included Within RAP}

System Name	Qualitative Determination for System Addition
STRUCTURES	
Essential Service Water Emergency Makeup System Pumphouse	System failure modes may affect multiple trains/systems
Essential Service Water Emergency Makeup System Retention Pond	System failure modes may affect multiple trains/systems
Switchgear Building	System failure modes may affect multiple trains/systems (Station Blackout)
POWER CONVERSION SYSTEMS	
Feedwater Heating System	System contains components important to maintaining system reliability
DISTRIBUTED UTILITIES	
Essential Service Water Emergency Makeup System	Considered in design basis analysis; The system function is considered important in the Safety Analysis Report; A contribution to initiators; Technical Specification considerations
ELECTRICAL SYSTEMS	
Offsite Power System-partial (plant specific scope)	Contains components important to maintaining system reliability; System failure modes may affect multiple trains/systems; Technical Specification considerations
Switchyard	Contains components important to maintaining system reliability; System failure modes may affect multiple trains/systems; Technical Specification considerations

RAI 6
Question 17.04-2

Please describe, per the SSCs determination process in Section 17.4 of the Standard Review Plan, NUREG-0800, which deterministic insights have been considered in the selection of site-specific SSCs within the scope of the RAP. State which SSCs are identified as risk-significant by deterministic insights, and provide the rationale(s) for making these determinations.

Response

The systems (in addition to those identified by the PRA input) designated for inclusion within the scope of the RAP were deterministically identified by an expert panel for the systems within the design certification scope. The expert panel consisted of personnel from the following groups:

- Balance of Plant Mechanical Systems
- Engineering Integration
- Nuclear Island Mechanical Systems
- Technical Specifications
- Safety Analysis
- Containment Analysis
- Radiation Analysis
- PRA

The results from the expert panel review on the systems and structures within the design certification scope are documented in U.S. EPR FSAR Tier 2, Table 17.4-2 (See response to design certification RAI No. 226, Question 17.4-16).

Site-specific systems and structures and their bases were qualitatively identified for inclusion in the RAP. The results from this qualitative screening of site-specific systems and structures are documented in BBNPP FSAR Table 17.4-3 (See response to question 17.04-1):

COLA Impact:

There are no BBNPP FSAR changes beyond those provided in the response to question 17.04-1.

RAI 6
Question 17.04-3

In response to US EPR DC RAI 21, Question 17.04-2, AREVA stated that, "The full scope RAP will include passive components such as tanks and check valves that are modeled in the U.S. EPR PRA and identified as risk significant, or the ones that will be identified as risk-significant based on deterministic insights." Accordingly, please identify the passive SSCs that have been added to the scope of RAP and provide the rationale(s) used for adding them.

Response

U.S. EPR FSAR Tier 2 Table 17.4-1 specifies the structures, systems and components (SSCs) identified by the PRA for consideration within the scope of RAP. This list includes passive components to the extent that they are modeled within the PRA. U.S. EPR FSAR Tier 2 Table 17.4-2 shows the results from the initial expert panel review on the systems and structures within the design certification scope. This list of systems and structures, along with the site specific list of systems and structures provided in the response to question 17.04-1, and the PRA input to the RAP list, identify the passive SSCs that have been added to the scope of RAP and the rationale used for adding them.

COLA Impact:

There are no BBNPP FSAR changes beyond those provided in the response to question 17.04-1.