Response to

Request for Additional Information No. 5, Revision 0

05/06/2008
U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 17.04 - Reliability Assurance Program (RAP)
Application Section: 17 SPLA Branch

Question 17.04-1:

Please identify the risk-significant structures, systems, and components (SSCs) included in the scope of the design reliability assurance program (D-RAP) and the rationale for inclusion.

Response to Question 17.04-1:

The level 1 PRA results are used to risk rank Systems, Structures and Components (SSC) for input to RAP. The risk importance process uses two standard PRA importance measures, Fussell-Vesely (FV) and Risk Achievement Worth (RAW), as screening tools to identify candidate risk significant SSCs:

1. The FV importance of a component is considered to be the sum of the FV importances for that component's basic event and common cause event failure modes.
2. The RAW importance of a component is considered the maximum of the RAW values computed for basic events involving failure modes of that component. The risk significance of the RAW values of common cause events is considered separately (using a different criterion) from the basic events that reflect an individual component. This reflects the relative increase in CDF/LERF that would exist if a set of components was made unavailable.

Based on NEI guidance[1], the importance measure criteria used to identify candidate risk significance are:

1. Sum of FV for all basic events modeling the SSC of interest, including common cause events ≥ 0.005
2. Maximum of component basic event RAW values ≥ 2
3. Maximum of applicable common cause events RAW values ≥ 20

The results of the component level importance evaluation can be found in the following tables:

1. Table 17.04-1-1: "U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) – Level 1 at Power" shows all components with FV ≥ 0.005.

2. Table 17.04-1-2: "U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power" shows all components with RAW ≥ 2.

3. Table 17.04-1-3: "U.S. EPR Risk Significant Common Cause Failure Groups Ranked by Risk Achievement Worth (RAW) - Level 1 at Power" shows all Common Cause Failure (CCF) groups with RAW ≥ 20.

4. Table 17.04-1-4: "U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) - Shutdown" shows all components with FV ≥ 0.005. (Note: Due to

[1] NEI 00-04, Rev. 0, "10 CFR 50.69 SSC Categorization Guideline," July 2005.

shutdown modeling constraints, some components' RAW values cannot be calculated accurately and are left blank).

5. Table 17.04-1-5: "U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Shutdown" shows all components with RAW ≥ 2.

6. Table 17.04-1-6: "U.S. EPR Risk Significant Common Cause Failure Groups Ranked by Risk Achievement Worth (RAW) - Shutdown" shows all CCF groups with RAW ≥ 20.

7. Table 17.04-1-7: "U.S. EPR Component Failure Modes Modeled in Level 1 PRA" shows definitions of component failure modes.

The level 1 lists do not include level 2 SSCs (unless related to level 1 core damage frequency), seismic SSCs or specific SSCs associated with at-power initiating events.

The components listed in the tables are the PRA input to the RAP component identification process. As described in FSAR Section 17.4.2.3, an expert panel is established to assess the qualitative and quantitative inputs related to risk-significant SSCs. The expert panel will use their expertise and PRA insights to develop the list of the risk-significant SSCs.

FSAR Impact:

The FSAR will not be changed as a result of this question.

Table 17.04-1-1: U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) – Level 1 at Power

No	System	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	FR,FS,PBNS,PBSM	**0.028**	1.2

Table 17.04-1-1: U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) – Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	FV	RAW
				JND40AP001			
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

Table 17.04-1-1: U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) – Level 1 at Power

No	System	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

Table 17.04-1-1: U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) – Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	FV	RAW
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
50	MSS	30LBA10AA002	Pneumatic Valve	MSS, Train 1 Main Steam Isolation Valve LBA10AA002	CL,FC,OP	**0.012**	2.8

Table 17.04-1-1: U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) – Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	FV	RAW
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

Table 17.04-1-1: U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) – Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	FV	RAW
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
75	RCS	30JEB20AA020	MOV	RCP Seal, RCP2 Seal Nitrogen Venting Isolation MOV JEB20AA020	FC,IR,OP	**0.006**	2.8

Table 17.04-1-1: U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) – Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	FV	RAW
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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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
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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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
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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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
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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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,PANS,PASM	**3.9**	0.000

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	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,PBNS,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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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,PANS,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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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,PBNS,PBSM	**2.3**	0.028
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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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
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

Table 17.04-1-2: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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

Table 17.04-1-3: U.S. EPR Risk Significant Common Cause Failure Groups Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	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**

Table 17.04-1-3: U.S. EPR Risk Significant Common Cause Failure Groups Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	CCF ID	Component Type	CCF Component Description	CCF RAW
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**

Table 17.04-1-3: U.S. EPR Risk Significant Common Cause Failure Groups Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	CCF ID	Component Type	CCF Component Description	CCF RAW
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**
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**

Table 17.04-1-3: U.S. EPR Risk Significant Common Cause Failure Groups Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	CCF ID	Component Type	CCF Component Description	CCF RAW
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**

Table 17.04-1-3: U.S. EPR Risk Significant Common Cause Failure Groups Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	CCF ID	Component Type	CCF Component Description	CCF RAW
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**
64	CCWS	KAA20AP001EFS_B-ALL	Pump	CCF of CCWS Pumps 2 and 3 to Start (Standby)	**25**

Table 17.04-1-3: U.S. EPR Risk Significant Common Cause Failure Groups Ranked by Risk Achievement Worth (RAW) - Level 1 at Power

No	System	CCF ID	Component Type	CCF Component Description	CCF RAW
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**

Table 17.04-1-4: U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	FV	RAW
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/RHR	30JNG33AA00	Check Valve	LHSI, CL3 First SIS Isolation Check Valve JNG33AA005	CL,FO	**0.244**	3.2
6	S SIS/RHR	5 30JNG23AA00	Check Valve	LHSI, CL2 First SIS Isolation Check Valve JNG23AA005	CL,FO	**0.243**	2.7
7	S SIS/RHR	5 30JNG43AA00	Check Valve	LHSI, CL4 First SIS Isolation Check Valve JNG43AA005	CL,FO	**0.243**	1.8
8	S CVCS	5 30KBA14AA00	MOV	CVCS, Low Pressure Reducing Station Isolation MOV KBA14AA004	CL,FC,IR,PANS, PASM	**0.239**	29.9
9	SIS/RHR	4 30JNG13AA00	Check Valve	LHSI, CL1 First SIS Isolation Check Valve JNG13AA005	CL,FO	**0.236**	4.6
10	S ELEC	5 30XKA50	Diesel Generator	ELEC, SBO Diesel Generator XKA50	FR,FS	**0.226**	4.6
11	CVCS	30KBA14AA10	MOV	CVCS, CVCS Low Power Reducing Station MOV KBA14AA106	FC,IR,OP,PBNS, PBSM	**0.170**	32.3

Table 17.04-1-4: U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	FV	RAW
12	SIS/RHR	30JNA20AA19	Safety Valve	RHR, LHSI Train 2 Safety Valve JNA20AA191	PO	**0.042**	
13	S SIS/RHR	1 30JNA10AA19	Safety Valve	RHR, LHSI Train 1 Safety Valve JNA10AA191	PO	**0.042**	
14	S SIS/RHR	1 30JNG10AA19	Safety Valve	LHSI, LHSI/RHR Train 10 Overpressure Protection Safety Valve JNG10AA192	PO	**0.042**	
15	S SIS/RHR	2 30JNG20AA19	Safety Valve	LHSI, LHSI/RHR Train 20 Overpressure Protection Safety Valve JNG20AA192, Premature Opening	PO	**0.042**	
16	S SIS/RHR	2 30JND10AP00	Pump	MHSI, MHSI Train 1 Motor Driven Pump JND10AP001	FR,FS,PANS,PASM	**0.041**	1.6
17	S ELEC	1 30XKA80	Diesel Generator	ELEC, SBO Diesel Generator XKA80	FR,FS	**0.034**	1.4
18	SIS/RHR	30JND20AP00	Pump	MHSI, MHSI Train 2 Motor Driven Pump JND20AP001	FR,FS,PBNS,PBSM	**0.034**	1.1
19	S SIS/RHR	1 30JND30AP00	Pump	MHSI, MHSI Train 3 Motor Driven Pump JND30AP001	FR,FS,PANS,PASM	**0.034**	1.0
20	S SIS/RHR	1 30JND40AP00	Pump	MHSI, MHSI Train 4 Motor Driven Pump JND40AP001	FR,FS,PBNS,PBSM	**0.033**	1.0
21	S IRWST	1 30JNK11AT00	Strainer	IRWST, SIS Sump Strainer to MHSI/LHSI Train 4 Pumps JNK11AT001	PG	**0.029**	1.2

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Table 17.04-1-4: U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	FV	RAW
22	IRWST	30JNK11AT00	Strainer	IRWST, SIS Sump Strainer to MHSI/LHSI Train 3 Pumps JNK11AT002	PG	**0.029**	1.1
23	IRWST	2 30JNK10AT00	Strainer	IRWST, SIS Sump Strainer to MHSI/LHSI Train 2 Pumps JNK10AT002	PG	**0.029**	1.1
24	IRWST	2 30JNK10AT00	Strainer	IRWST, SIS Sump Strainer to MHSI/LHSI Train 1 Pumps JNK10AT001	PG	**0.028**	1.3
25	IRWST	1 30JNK11AT00	Strainer	IRWST, SAHR Sump Strainer JNK11AT003	PG	**0.028**	2.3
26	SIS/RHR	3 30JNG30AA19	Safety Valve	LHSI, LHSI/RHR Train 30 Overpressure Protection Safety Valve JNG30AA192, Premature Opening	PO	**0.020**	
27	S SCWS	2 30QKA10GH0	Chiller	SCWS, Train 1 Chiller Unit QKA10GH001	FR,FS,PANS,PASM	**0.019**	4.4
28	ELEC	01 31BTD01_BAT	Battery	ELEC, 250V 1E 2-hr Battery 31BTD01	ST	**0.018**	10.2
29	SIS/RHR	30JNA30AA19	Safety Valve	RHR, LHSI Train 3 Safety Valve JNA30AA191	PO	**0.017**	
30	S CCWS	1 30KAA10AP00	Pump	CCWS, Train 1 Motor Driven Pump KAA10AP001	EL,FR,FS,PANS, PASM	**0.012**	3.7
31	ELEC	1 34BTD01_BAT	Battery	ELEC, 250V 1E 2-hr Battery 34BTD01	ST	**0.012**	2.5

Table 17.04-1-4: U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	FV	RAW
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/RHR	30JNG10AA00	MOV	LHSI, LHSI Pump 10 Suction from IRWST MOV JNG10AA001	CL,FC,FL,FO,IR,OP,PANS,PAS	**0.011**	
35	S SAHRS	1 30JMQ40AA00	MOV	SAHR, Suction Line Containment Isolation MOV JMQ40AA001	M CL,FO,PANS,PASM	**0.011**	3.8
36	SAHRS	1 30JMQ42AA00	MOV	SAHR, Train Recirculation Line MOV JMQ42AA001	CL,FC,FO,IR,OP, PANS,PASM	**0.011**	3.8
37	IRWST	1 30JNK11AA00	MOV	IRWST, SAHR Sump Containment Isolation MOV JNK11AA009	CL,FO,PBNS,PBSM	**0.011**	3.8
38	EFWS	9 30LAS11AP00	Pump	EFWS, Train 1 Motor Driven Pump LAS11AP001	EL,FR,FS,PANS, PASM	**0.011**	1.7
39	SIS/RHR	1 30JNG20AA00	MOV	LHSI, LHSI Pump 20 Suction from IRWST MOV JNG20AA001	CL,FC,FL,FO,IR,OP,PBNS,PBS	**0.010**	
40	S HVAC	1 30SAC01AN00	Fan	SAC, Normal Air Supply Fan SAC01AN001	M FR,FS	**0.010**	1.6
41	HVAC	1 30SAC31AN00	Fan	SAC, Normal Air Exhaust Fan SAC31AN001	FR,FS	**0.010**	1.6
42	CCWS	1 30KAA30AP00	Pump	CCWS, Train 3 Motor Driven Pump KAA30AP001	EL,FR,FS,PANS, PASM	**0.010**	2.5
		1					

Table 17.04-1-4: U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	FV	RAW
43	HVAC	30SAC03AN00	Fan	SAC, Normal Air Supply Fan SAC03AN001	FR,FS	**0.010**	1.1
44	HVAC	1 30SAC33AN00	Fan	SAC, Normal Air Exhaust Fan SAC33AN001	FR,FS	**0.010**	1.1
45	HVAC	1 30SAC02AN00	Fan	SAC, Normal Air Supply Fan SAC02AN001	FR,FS	**0.010**	1.0
46	HVAC	1 30SAC32AN00	Fan	SAC, Normal Air Exhaust Fan SAC32AN001	FR,FS	**0.010**	1.0
47	CCWS	1 30KAA20AP00	Pump	CCWS, Train 2 Motor Driven Pump KAA20AP001 External Leakage	EL,FR,FS,PBNS, PBSM	**0.009**	2.2
48	SIS/RHR	1 30JND10AA00	Check Valve	MHSI, MHSI Pump 10 Discharge Manual CHECK Valve JND10AA003	CL,FO,IR,MEC3	**0.009**	
49	S CCWS	3 30KAA40AP00	Pump	CCWS, Train 40 Motor Driven Pump KAA40AP001	EL,FR,FS,PBNS, PBSM	**0.009**	1.9
50	SCWS	1 30QKA10AP10	Pump	SCWS, Train 1 Motor Driven Safety Chiller Pump QKA10AP107	EL,FR,FS	**0.009**	4.2
51	SIS/RHR	7 30JND20AA00	Check Valve	MHSI, MHSI Pump 20 Discharge Manual CHECK Valve JND20AA003	CL,FO,IR,MEC3	**0.008**	
52	S SIS/RHR	3 30JNG10AP00	Pump	LHSI, LHSI Train 1 Motor Driven Pump JNG10AP001	FR,FS,PANS,PASM	**0.008**	3.7
53	S SCWS	1 30QKA40GH0 01	Chiller	SCWS, Train 4 Chiller Unit QKA40GH001	FR,FS,PANS,PASM	**0.007**	2.3

Table 17.04-1-4: U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	FV	RAW
54	HVAC	30SAC04AN00	Fan	SAC, Normal Air Supply Fan SAC04AN001	FR,FS	**0.007**	1.3
55	HVAC	1 30SAC34AN00	Fan	SAC, Normal Air Exhaust Fan SAC34AN001	FR,FS	**0.007**	1.3
56	SIS/RHR	1 30JNG30AP00	Pump	LHSI, LHSI Train 3 Motor Driven Pump JNG30AP001	FR,FS,PANS,PASM	**0.007**	2.3
57	S SIS/RHR	1 30JNG20AA00	MOV	LHSI, LHSI Train 2 to Radial Miniflow MOTOR OPERATED Check Valve JNG20AA003	IR,OP	**0.007**	
58	S SIS/RHR	3 30JNG10AA00	MOV	LHSI, LHSI Train 1 to Tangential Miniflow MOTOR OPERATED CV JNG10AA004	CL,FC,FO,IR,OP, PANS,PASM	**0.007**	
59	S SIS/RHR	4 30JNG40AP00	Pump	LHSI, LHSI Train 4 Motor Driven Pump JNG40AP001	FR,FS,PBNS,PBSM	**0.007**	2.0
60	S SIS/RHR	1 30JNG20AP00	Pump	LHSI, LHSI Train 2 Motor Driven Pump JNG20AP001	FR,FS,PBNS,PBSM	**0.007**	1.8
61	S SCWS	1 30QKA30AP10	Pump	SCWS, Train 3 Motor Driven Safety Chiller Pump QKA30AP107	EL,FR,FS	**0.007**	1.1
62	SCWS	7 30QKA20AP10	Pump	SCWS, Train 2 Motor Driven Safety Chiller Pump QKA20AP107	EL,FR,FS	**0.007**	1.0

Table 17.04-1-4: U.S. EPR Risk Significant Components Ranked by Fussell-Vesely (FV) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	FV	RAW
63	SIS/RHR	30JNG20AA00	MOV	LHSI, LHSI Train 2 to Tangential Miniflow MOTOR OPERATED CV JNG20AA004	CL,FC,FO,IR,OP, PBNS,PBSM	**0.006**	
64	S SIS/RHR	4 30JNG10AA00	MOV	LHSI, LHSI Train 1 to Radial Miniflow MOTOR OPERATED Check Valve JNG10AA003	IR,OP	**0.006**	
65	S SIS/RHR	3 30JNG30AA00	MOV	LHSI, LHSI Pump 30 Suction from IRWST MOV JNG30AA001	CL,FC,FL,FO,IR,OP,PANS,PAS	**0.005**	
66	S SCWS	1 30QKA40AP10 7	Pump	SCWS, Train 4 Motor Driven Safety Chiller Pump QKA40AP107	M EL,FR,FS	**0.005**	2.2

Table 17.04-1-5: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Shutdown

Rank	System	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	34BDB4BMT0	Circuit	ELEC, 6.9kV SWGR 34BDB to Transformer 34BMT02 Circuit Breaker	OP	**47.4**	0.000
6	ELEC	2 34BDC_4BDB1	Breaker Circuit	ELEC, 6.9kV SWGR 34BDC to 6.9kV SWGR 34BDB Circuit Breaker	OP	**47.4**	0.000
7	ELEC	34BDC_4BDB2	Breaker Circuit	ELEC, 6.9kV SWGR 34BDC to 6.9kV SWGR 34BDB Circuit Breaker	OP	**47.4**	0.000
8	ELEC	34BMT024BM	Breaker Circuit	ELEC, Transformer 34BMT02 to 480V Load Center 34BMB Circuit Breaker	OP	**47.4**	0.000
9	ELEC	B 34BNB02	Breaker 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	34BMB4BNT0	Circuit	ELEC, 480V Load Center 34BMB to Transformer 34BNT01 Circuit Breaker	OP	**41.6**	0.000
12	ELEC	1 34BNT014BNB 02	Breaker Circuit	ELEC, Transformer 34BNT01 to 480V MCC 34BNB02 Circuit Breaker	OP	**41.6**	0.000
			Breaker				

Table 17.04-1-5: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
13	CVCS	30KBA14AA10	MOV	CVCS, CVCS Low Power Reducing Station MOV KBA14AA106	FC,IR,OP,PBNS, PBSM	**32.3**	0.170
14	CVCS	6 30KBA14AA00	MOV	CVCS, Low Pressure Reducing Station Isolation MOV KBA14AA004	CL,FC,IR,PANS,	**29.9**	0.239
15	ELEC	4 34BDA	SWGR	ELEC, 6.9kV SWGR 34BDA	PASM 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	31BDB1BMT0	Circuit	ELEC, 6.9kV SWGR 31BDB to Transformer 31BMT02 Circuit Breaker	OP	**11.2**	0.000
24	ELEC	2 31BDC_1BDB1	Breaker Circuit	ELEC, 6.9kV SWGR 31BDC to 6.9kV SWGR 31BDB Circuit Breaker	OP	**11.2**	0.000
25	ELEC	31BDC_1BDB2	Breaker Circuit	ELEC, 6.9kV SWGR 31BDC to 6.9kV SWGR 31BDB Circuit Breaker	OP	**11.2**	0.000
26	ELEC	31BMT021BM B	Breaker Circuit Breaker	ELEC, Transformer 31BMT02 to 480V Load	OP	**11.2**	0.000

Table 17.04-1-5: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
				Center 31BMB Circuit Breaker			
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_4BDD	Circuit	ELEC, 6.9kV SWGR 34BDA to 6.9kV SWGR 34BDD Circuit Breaker	OP	**8.8**	0.000
31	ELEC	1 34BDA_4BDD	Breaker Circuit	ELEC, 6.9kV SWGR 34BDA to 6.9kV SWGR 34BDD Circuit Breaker	OP	**8.8**	0.000
32	ELEC	2 34BDD4BMT0	Breaker Circuit	ELEC, 6.9kV SWGR 34BDD to Transformer 34BMT04 Circuit Breaker	OP	**8.8**	0.000
33	ELEC	4 34BMT044BM	Breaker Circuit	ELEC, Transformer 34BMT04 to 480V Load Center 34BMD Circuit Breaker	OP	**8.8**	0.000
34	ELEC	D 31BNB02	Breaker 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	ELEC, 250V Battery 31BTD01 Circuit Breaker	OP	**7.6**	0.000
37	ELEC	31BMB1BNT0	Breaker Circuit	ELEC, 480V Load Center 31BMB to Transformer 31BNT01 Circuit Breaker	OP	**6.6**	0.000
38	ELEC	1 31BNT011BNB 02	Breaker Circuit	ELEC, Transformer 31BNT01 to 480V MCC 31BNB02 Circuit Breaker	OP	**6.6**	0.000
			Breaker				

Table 17.04-1-5: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
39	ELEC	31BUD	Bus	ELEC, Non 1E 250V DC Distribution Panel 31BUD	FL	**5.7**	0.000
40	ELEC	34BDA_4BDC	Circuit	ELEC, 6.9kV SWGR 34BDA to 6.9kV SWGR 34BDC Circuit Breaker	OP	**5.0**	0.000
41	ELEC	1 34BDA_4BDC	Breaker Circuit	ELEC, 6.9kV SWGR 34BDA to 6.9kV SWGR 34BDC Circuit Breaker	CL,FO,OP	**5.0**	0.000
42	SIS/RHR	2 30JNG13AA00	Breaker Check Valve	LHSI, CL1 First SIS Isolation Check Valve JNG13AA005	CL,FO	**4.6**	0.236
43	S ELEC	5 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	ELEC, SBO DG XKA50 to 6.9kV SWGR 31BBH Circuit Breaker	FC,OP	**4.5**	0.002
46	ELEC	31BBH_1BDC1	Breaker Circuit	ELEC, 6.9kV SWGR 31BBH to 6.9kV SWGR 31BDC Circuit Breaker	FC,OP	**4.5**	0.002
47	ELEC	31BBH_1BDC2	Breaker Circuit	ELEC, 6.9kV SWGR 31BBH to 6.9kV SWGR 31BDC Circuit Breaker	FC,OP	**4.5**	0.002
48	ELEC	31BBT081BBH	Breaker Circuit	ELEC, Transformer 31BBT08 to 6.9kV SWGR 31BBH Circuit Breaker	CL,FO,OP	**4.5**	0.002
49	ELEC	31BDA_1BDC	Breaker Circuit	ELEC, 6.9kV SWGR 31BDA to 6.9kV SWGR 31BDC Circuit Breaker	CL,FO,OP	**4.5**	0.002
50	SCWS	2 30QKA10GH00	Breaker Chiller	SCWS, Train 1 Chiller Unit QKA10GH001	FR,FS,PANS,PASM	**4.4**	0.019
51	SCWS	1 30QKA10AP107	Pump	SCWS, Train 1 Motor Driven Safety Chiller Pump QKA10AP107	EL,FR,FS	**4.2**	0.009

Table 17.04-1-5: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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	30JMQ40AA00	MOV	SAHR, Suction Line Containment Isolation MOV JMQ40AA001	CL,FO,PANS,PASM	**3.8**	0.011
56	SAHRS	1 30JMQ42AA00	MOV	SAHR, Train Recirculation Line MOV JMQ42AA001	CL,FC,FO,IR,OP,	**3.8**	0.011
57	IRWST	1 30JNK11AA00	MOV	IRWST, SAHR Sump Containment Isolation MOV JNK11AA009	CL,FO,PANS,PBSM	**3.8**	0.011
58	SIS/RHR	9 30JNG10AC00	HTX	LHSI, LHSI Train 1 HTX JNG10AC001	LK	**3.7**	0.000
59	S ELEC	1 34BNB03	MCC	ELEC, 480V MCC 34BNB03	FL,FR	**3.7**	0.000
60	CCWS	30KAA10AP00	Pump	CCWS, Train 1 Motor Driven Pump KAA10AP001	EL,FR,FS,PANS,	**3.7**	0.012
61	SIS/RHR	1 30JNG10AP001	Pump	LHSI, LHSI Train 1 Motor Driven Pump JNG10AP001	FR,FS,PANS,PASM	**3.7**	0.008
62	S ELEC	31BNB01	MCC	ELEC, 480V MCC 31BNB01	FL,FR	**3.6**	0.000
63	CCWS	30KAA80AP00	Pump	CCWS, SA-CCW Motor Driven Pump KAA80AP001	FR,FS	**3.6**	0.002
64	SAHRS	1 30JMQ40AP00	Pump	SAHR, Motor Driven Pump JMQ40AP001	FR,FS,PBNS,PBSM	**3.6**	0.002
		1					

Table 17.04-1-5: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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	30JMQ40AA00	Manual Valve	SAHR, Suction Manual Valve JMQ40AA002	MEC1	**3.3**	0.000
69	SAHRS	2 30JMQ40AA00	Manual Valve	SAHR, Discharge Manual Valve JMQ40AA003	MEC1	**3.3**	0.000
70	SAHRS	3 30JMQ40AA00	Manual Valve	SAHR, HTX Discharge Manual Valve JMQ40AA004	MEC1	**3.3**	0.000
71	CCWS	4 30KAA80AA00	Manual Valve	CCWS, SA-CCW Pump Suction Manual Valve KAA80AA001	MEC1	**3.3**	0.000
72	CCWS	1 30KAA80AA00	Manual Valve	CCWS, SA-CCW Pump Cooling Manual Valve KAA80AA002	MEC1	**3.3**	0.000
73	CCWS	2 30KAA80AA00	Manual Valve	CCWS, SA-CCW Pump Cooling Manual Valve KAA80AA003	MEC1	**3.3**	0.000
74	CCWS	3 30KAA80AA00	Manual Valve	CCWS, SA-CCW Pump Discharge Manual Valve KAA80AA004	MEC1	**3.3**	0.000
75	CCWS	4 30KAA80AA00	Manual Valve	CCWS, SA-CCW Pump Cooling Manual Valve KAA80AA005	MEC1	**3.3**	0.000
76	CCWS	5 30KAA82AA00	Manual Valve	CCWS, SA-CCW to SAHR Pump Coolers Manual Valve KAA82AA001	MEC1	**3.3**	0.000
77	CCWS	1 30KAA82AA00	Manual Valve	CCWS, SA-CCW from SAHR Pump Seal Water Cooler Manual Valve KAA82AA002	MEC1	**3.3**	0.000
		2					

Table 17.04-1-5: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
78	CCWS	30KAA82AA00	Manual Valve	CCWS, SA-CCW from SAHR Pump Motor Air Cooler Manual Valve KAA82AA003	MEC1	**3.3**	0.000
79	CCWS	3 30KAA82AA00	Manual Valve	CCWS, SA-CCW to SAGR Pump Bearing Cooler Manual Valve KAA82AA004	MEC1	**3.3**	0.000
80	SCWS	4 30QKA10AA00	Check Valve	SCWS, Train 1 Safety Chiller Pump Discharge Check Valve QKA10AA003	CL,FO	**3.3**	0.000
81	ESWS	3 30PEB80AP001	Pump	ESWS, SA-ESWS Motor Driven Pump PEB80AP001	FR,FS,PBNS,PBSM	**3.3**	0.002
82	SIS/RHR	30JNG10AA00	Check Valve	LHSI, LHSI CL1 Discharge Manual CHECK Valve JNG10AA006	CL,FO,IR,MEC3	**3.3**	0.000
83	S SIS/RHR	6 30JNG10AA00	Check Valve	LHSI, LHSI Pump 10 Discharge Check Valve JNG10AA009	CL,FO	**3.3**	0.000
84	S ELEC	9 31BNB03	MCC	ELEC, 480V MCC 31BNB03	FL,FR	**3.3**	0.000
85	SIS/RHR	30JNG33AA00	Check Valve	LHSI, CL3 First SIS Isolation Check Valve JNG33AA005	CL,FO	**3.2**	0.244
86	S CCWS	5 30KAA10AA00	Check Valve	CCWS, Train 1 Discharge from CCW HTX 10 Check Valve KAA10AA004	CL,FO	**3.1**	0.000
87	CCWS	4 30KAA12AA01	Check Valve	CCWS, Train 1 LHSI HTX Discharge Check Valve KAA12AA012	CL,FO	**3.1**	0.000
88	ELEC	2 30BRW10BUW11	Power Rack	ELEC, 24V DC I&C Power Rack 31BRW10/31BUW11	FL	**3.1**	0.000
89	ESWS	30PEB80AA00	Check Valve	ESWS, SA-ESWS Pump Discharge Manual CHECK Valve PEB80AA002	CL,FO,IR,MEC1	**3.1**	0.001
90	ESWS	2 30PEB80AA00	Manual Valve	ESWS, SA-CCWS HTX Suction Manual Valve PEB80AA003	MEC1	**3.1**	0.000
		3					

Table 17.04-1-5: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
91	ESWS	30PEB80AA00	Manual Valve	ESWS, SA-CCWS HTX Discharge Manual Valve PEB80AA004	MEC1	**3.1**	0.000
92	ESWS	4 30PEB80AA00	Manual Valve	ESWS, SA-CCWS HTX Discharge Manual Valve PEB80AA008	MEC1	**3.1**	0.000
93	CCWS	8 30KAA80AA19	Safety Valve	CCWS, SA-CCW Surge Tank to Pump Suction Line Safety Valve KAA80AA191	PO	**3.1**	0.000
94	SAHRS	1 30JMQ42AA00	Check Valve	SAHR, Recirculation Line Check Valve JMQ42AA002	CL,FO	**3.0**	0.000
95	CCWS	2 30KAA10BB00	Tank	CCWS, Train 1 Surge Tank KAA10BB001	EL	**3.0**	0.000
96	ESWS	1 30PEB80AT00	Filter	ESWS, SA-ESWS Debris Filter PEB80AT001	PG	**3.0**	0.000
97	SCWS	1 30QKA10AA10	MOV	SCWS, Train 1 Chiller By-pass MOV QKA10AA101	CF	**2.9**	0.000
98	ELEC	1 32BUD	Bus	ELEC, Non 1E 250V DC Distribution Panel 32BUD	FL	**2.7**	0.000
99	SIS/RHR	30JNG23AA00	Check Valve	LHSI, CL2 First SIS Isolation Check Valve JNG23AA005	CL,FO	**2.7**	0.243
100	S ELEC	5 30BRX10BUX	Power Rack	ELEC, 24V DC I&C Power Rack 31BRX10/31BUX11	FL	**2.6**	0.000
101	ELEC	11 30BRX70BUX	Power Rack	ELEC, 24V DC I&C Power Rack 34BRX70/34BUX71	FL	**2.6**	0.000
102	SAHRS	71 30JMQ40AC00	HTX	SAHR, HTX JMQ40AC001	LK	**2.6**	0.000
103	CCWS	1 30KAA80AC00	HTX	CCWS, SA-CCW Heat Exchanger KAA80AC001	EL,LK	**2.6**	0.000

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Table 17.04-1-5: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
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	30KAA10AA11	MOV	CCWS, Train 1 Heat Exchanger Bypass MOV KAA10AA112	IR,OP	**2.6**	0.000
107	SIS/RHR	2 30JNA10AA10	MOV	RHR, LHSI Train 1 HTX Bypass MOV JNA10AA101	IR,OP	**2.6**	0.000
108	S SIS/RHR	1 30JNG10AA06	MOV	LHSI, LHSI Pump 10 Discharge MOV JNG10AA060	CL	**2.6**	0.000
109	S SIS/RHR	0 30JNG10AA10	MOV	LHSI, LHSI Pump 10 Flow Control MOV JNG10AA102	CL	**2.6**	0.000
110	S ELEC	2 31BMB1BNB0	Circuit	ELEC, 480V Load Center 31BMB to 480V MCC 31BNB01 Circuit Breaker	OP	**2.6**	0.000
111	CCWS	1 30KAA30AP00	Breaker Pump	CCWS, Train 3 Motor Driven Pump KAA30AP001	EL,FR,FS,PANS,	**2.5**	0.010
112	CCWS	1 30KAA10AC00	HTX	CCWS, Train 1 HTX 10 KAA10AC001	PASM EL	**2.5**	0.000
113	ELEC	1 31BDA_1BDD	Circuit	ELEC, 6.9kV SWGR 31BDA to 6.9kV SWGR 31BDD Circuit Breaker	OP	**2.5**	0.000
114	ELEC	1 31BDA_1BDD	Breaker Circuit	ELEC, 6.9kV SWGR 31BDA to 6.9kV SWGR 31BDD Circuit Breaker	OP	**2.5**	0.000
115	ELEC	2 31BDD1BMT0	Breaker Circuit	ELEC, 6.9kV SWGR 31BDD to Transformer 31BMT04 Circuit Breaker	OP	**2.5**	0.000
116	ELEC	4 31BMT041BMD	Breaker Circuit Breaker	ELEC, Transformer 31BMT04 to 480V Load Center 31BMD Circuit Breaker	OP	**2.5**	0.000

Table 17.04-1-5: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
117	ELEC	34BTD01_BAT	Battery	ELEC, 250V 1E 2-hr Battery 34BTD01	ST	**2.5**	0.012
118	CCWS	30KAA12AA00	MOV	CCWS, Train 1 to LHSI HTX 10 Cooling MOV KAA12AA005	CL,FO,PANS,PASM	**2.5**	0.000
119	CCWS	5 30KAA80BB00	Tank	CCWS, SA-CCW Surge Tank to Pump Suction KAA80BB001	EL	**2.4**	0.000
120	SIS/RHR	1 30JNG30AP001	Pump	LHSI, LHSI Train 3 Motor Driven Pump JNG30AP001	FR,FS,PANS,PASM	**2.3**	0.007
121	S SCWS	30QKA40GH00	Chiller	SCWS, Train 4 Chiller Unit QKA40GH001	FR,FS,PANS,PASM	**2.3**	0.007
122	ESWS	1 30PEB40AA00	Check Valve	ESWS, Train 4 Pump Discharge Check Valve PEB40AA004	CL,FO,IR	**2.3**	0.001
123	IRWST	4 30JNK11AT00	Strainer	IRWST, SAHR Sump Strainer JNK11AT003	PG	**2.3**	0.028
124	CCWS	3 30KAA80AA02	MOV	CCWS, SA-CCW Surge Tank to Pump Suction Line MOV KAA80AA020	CL	**2.3**	0.000
125	CCWS	0 30KAA20AP00	Pump	CCWS, Train 2 Motor Driven Pump KAA20AP001 External Leakage	EL,FR,FS,PBNS,	**2.2**	0.009
126	SIS/RHR	1 30JNG40AC00	HTX	LHSI, LHSI Train 4 HTX JNG40AC001	PBSM LK	**2.2**	0.000
127	S ELEC	1 34BNB024BNB031	Circuit	ELEC, 480V MCC 34BNB02 to 480V MCC 34BNB03 Circuit Break	OP	**2.2**	0.000
128	ELEC	34BNB024BNB032	Breaker Circuit	ELEC, 480V MCC 34BNB02 to 480V MCC 34BNB03 Circuit Break	OP	**2.2**	0.000
129	ELEC	31BNB021BNB031	Breaker Circuit	ELEC, 480V MCC 31BNB02 to 480V MCC 31BNB03 Circuit Break	OP	**2.2**	0.000
			Breaker				

Table 17.04-1-5: U.S. EPR Risk Significant Components Ranked by Risk Achievement Worth (RAW) - Shutdown

Rank	System	Component ID	Component Type	Component Description	Failure Modes	RAW	FV
130	ELEC	31BNB021BNB032	Circuit	ELEC, 480V MCC 31BNB02 to 480V MCC 31BNB03 Circuit Break	OP	**2.2**	0.000
131	ELEC	34BDC4BMT0	Breaker Circuit	ELEC, 6.9kV SWGR 34BDB to Transformer 34BMT03 Circuit Breaker	OP	**2.2**	0.000
132	ELEC	3 34BMT034BM	Breaker Circuit	ELEC, Transformer 34BMT03 to 480V Load Center 34BMC Circuit Breaker	OP	**2.2**	0.000
133	SCWS	C 30QKA40AP10	Breaker Pump	SCWS, Train 4 Motor Driven Safety Chiller Pump QKA40AP107	EL,FR,FS	**2.2**	0.005
134	SIS/RHR	7 30JNG30AC00	HTX	LHSI, LHSI Train 3 HTX JNG30AC001	LK	**2.1**	0.000
135	S ELEC	1 33BDD	SWGR	ELEC, 6.9kV SWGR 33BDD	FL	**2.1**	0.000

Table 17.04-1-6: U.S. EPR Risk Significant Common Cause Failure Groups Ranked by Risk Achievement Worth (RAW) - Shutdown

No	System	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**

Table 17.04-1-6: U.S. EPR Risk Significant Common Cause Failure Groups Ranked by Risk Achievement Worth (RAW) - Shutdown

No	System	CCF ID	Component Type	CCF Component Description	CCF RAW
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 hotleg 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**

Table 17.04-1-6: U.S. EPR Risk Significant Common Cause Failure Groups Ranked by Risk Achievement Worth (RAW) - Shutdown

No	System	CCF ID	Component Type	CCF Component Description	CCF RAW
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**
35	I&C	HL TEMP CCF-ALL	Sensor	CCF of hotleg 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 hotleg WR pressure sensors	**42**
38	I&C	CL WRTEMP CCF-ALL	Sensor	CCF of cold leg WR temp sensors	**30**

Table 17.04-1-7: U.S. EPR Component Failure Modes Modeled in Level 1 PRA

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

Table 17.04-1-7: U.S. EPR Component Failure Modes Modeled in Level 1 PRA

Failure Mode	Definition	Sample Basic Event Description
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)

Table 17.04-1-7: U.S. EPR Component Failure Modes Modeled in Level 1 PRA

Failure Mode	Definition	Sample Basic Event Description
SO	Fails to Remain Closed, Spurious Operation	GWPS, Inflow Line Inboard MOV KPL84AA003, Fails to Remain Closed
ST	Fails on Demand	(SO) ELEC, 250V Non 1E 2-hr Battery 31BTA01, Fails on Demand