Table 19.1-41—U.S. EPR Important Cutsets - Level 1 Flooding
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Group No	Cutset Numbers	Cutset Frequencies	Contribution to CDF (%)		Sequence Type and a Representative Cutset		Sequence Description
			Group	Cumulative	Event Identifier	Event Description	
1	1	3.2E-08	52.2	52.2	**Sequence FLD-ANN-ALL-2: FLD-ANN-ALL, PROB ANNULUS**		
					IE FLD-ANN-ALL	Flood in the Reactor Building annulus (contained)	A flood caused by a pipe break in the annulus reaches the level of the electrical penetrations and connection boxes. The flood damages the connection boxes, therefore all sensors and signals from inside containment are lost, which is assumed to lead to core damage.
					PROB ANNULUS	Probability that the annulus connection boxes will withstand a contained Flood.	
2	2, 6, 22,34,35,71,72	3.0E-09	4.8	57.0	**Sequence LOCCW-13: FLD-SAB14 FB, MFW, SSS, EFW, PBL**		
					IE FLD-SAB14 FB	Flood in Safeguard Building 1 or 4 (Pump Room) Including Fuel Building	As explained in Section 19.1.5.2.2.3, a flood in the pump room of SB 4 results in the loss of CCWS CH2. With SAC1 in maintenance, PAS failure and operator failure to recover room cooling result in the loss of ventilation in Division 1, 2 and 3 as explained in Section 19.1.4.1.1.3 PAS fails MFW and SSS, all EFW trains are lost because of the loss of ventilation. PBL fails because of loss of Division 1.
					PAS	Process Automation System Fails	
					SAC01/QKA10 PM1	Normal SAC01/QKA10 Train unavailable due to preventive maintenance	
					OPF-SAC-2H	Operator Fails to Recover Room Cooling Locally	
3	5, 23, 24,73, 74	8E-10	1.3	58.3	**Sequence LOCCW-13: FLD-EFW, MFW, SSS, EFW, PBL**		
					IE FLD-EFW	EFW Pipe Break	A flood occurs due to a pipe break in EFW train 4, flooding SB 4 pump room and the fuel building. The sequence of events is the same as for Cutset Group 3. A variant of this cutset has a consequential LOOP instead of the failure of PAS, and SAC4 in maintenance instead of SAC1. LOOP prevents the operator to make-up for the 4 EFW tank draining simultaneously. All EFW trains are lost and PBL fails because of the loss of Division 4.
					PAS	Process Automation System Fails	
					SAC01/QKA10 PM1	Normal SAC01/QKA10 Train Unavailable due to Preventive Maintenance	
					OPF-SAC-2H	Operator Fails to Recover Room Cooling Locally	
4	3, 4, 7, 19-21	1.8E-09	2.9	61.1	**Sequence LBOP-13: FLD-TB, EFW, PBL**		
					IE FLD-TB	Flood in the Turbine Building	A flood in the turbine building fails MFW and SSS. CCF of all normal ventilation trains requires the maintenance train to start. Priority goes to supplying train 2 and 3, so ventilation is lost in Division 1 and 4, therefore all ventilation fails as explained in Section 19.1.4.1.1.3. All EFW trains are lost because of the loss of ventilation. PBL fails because of the loss of Division 1/4.
					SAC31AN001EFR_D-ALL	CCF to run Normal Air Exhaust Fans	
					OPF-SAC-2H	Operator Fails to Recover Room Cooling Locally	
5	8, 13, 29	3.5E-10	0.6	61.8	**Sequence LBOP-14: FLD-TB, EFW, OP FB**		
					IE FLD-TB	Flood in the Turbine Building	A flood in the Turbine Building fails MFW and SSS. CCF of EFW pumps to start requires the operators to initiate Feed and Bleed. Failure to do so results in core damage. A variant of this cutset has EFW failing because of software CCF.
					LAS11AP001EFS_D-ALL	CCF of EFWS Pumps to Start	
					OPE-FB-90M	Operator Fails to Initiate Feed & Bleed for Transient	

Table 19.1-41—U.S. EPR Important Cutsets - Level 1 Flooding
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Group No	Cutset Numbers	Cutset Frequencies	Contribution to CDF (%)		Sequence Type and a Representative Cutset		Sequence Description
			Group	Cumulative	Event Identifier	Event Description	
6	9-12, 14-17, 44-47, 60-67, 80-108	2.40E-09	3.9	65.7	**Sequence LOCCW-31: FLD-SAB14 FB, RCP LOCA, MHSI, SAHR**		
					IE FLD-SAB14 FB	Flood in Safeguard Building 1 or 4 (Pump Room) including Fuel Building	A flood in the pump room of SB 4 extending to the FB fails CCWS CH2 and the CVCS. Seal cooling to RCP 4 is lost and an RCP4 nitrogen valve fails to close, resulting in a seal LOCA. CCF of MHSI pumps to run requires FCD, injection with LHSI and long term cooling of IRWST with the SAHRS. The SAHRS is unavailable because of the flood. Variants of this cutset include failure of the SSSS instead of failure of a nitrogen valve to close.
					JEB40AA020EFC	RCP Seal, RCP4 Seal Nitrogen Venting Isolation MOV JEB40AA020, Fails to Close On Demand	
					PROB SEAL LOCA	Probability of seal LOCA given loss of Seal Cooling	
					JND10AP001EFR_D-123	CCF of MHSI Pumps to Run	
7	18, 68, 69	1.9E-10	0.3	66.0	**Sequence LOCCW-8: FLD-EFW, MFW, SSS, EFW PBF, OP FB**		
					IE FLD-EFW	EFW Pipe Break	A flood occurs due to a pipe break in EFW train 4, flooding SB 4 pump room and the Fuel Building. LOOP fails MFW and SSS and prevents the operator to make-up for the 4 EFW tank draining simultaneously. All EFW trains are lost and the operator fails to initiate feed and bleed.
					LOOPCSD+REC	Consequential LOOP and Failure of Recovery Within 1 Hour for IEs Leading to Auto Scram	
					OPE-FB-90M	Operator Fails to Initiate Feed & Bleed for Transient	
8	25-28, 30-33, 40-43, 56-59, 76, 77	1.0E-09	1.7	67.7	**Sequence LOCCW-17: FLD-SAB14 FB, RCP LOCA, LHSI, SAHR**		
					IE FLD-SAB14 FB	Flood in Safeguard Building 1 or 4 (Pump Room) including Fuel Building	A flood in the pump room of SB 4 extending to the FB fails CCWS CH2 and the CVCS. Seal cooling to RCP 4 is lost and an RCP4 nitrogen valve fails to close, resulting in a seal LOCA. MHSI injection is successful. Long term cooling of IRWST fails due to CCF of CCW MOVs to LHSI heat exchanger. The SAHRS is also unavailable for long term cooling because of the flood.
					JEB40AA020EFC	RCP Seal, RCP4 Seal Nitrogen Venting Isolation MOV JEB40AA020, Fails to Close On Demand	
					PROB SEAL LOCA	Probability of seal LOCA given loss of Seal Cooling	
					KAA12AA005EFO_D-ALL	CCF To Open CCWS to LHSI HTX Cooling MOV	
9	36-39	1.9E-10	0.3	68.1	**Sequence LOCCW-32: FLD-SAB14 FB, RCP LOCA, MHSI, ACC**		
					IE FLD-SAB14 FB	Flood in Safeguard Building 1 or 4 (Pump Room) including Fuel Building	A flood in the pump room of SB 4 extending to the FB fails CCWS CH2 and the CVCS. Seal cooling to RCP 4 is lost and an RCP4 nitrogen valve fails to close, resulting in a seal LOCA. CCF of injection check valves fail MHSI and accumulators injection.
					JEB40AA010EFC	RCP Seal, RCP4 Seal Nitrogen Venting Isolation MOV JEB40AA010, Fails to Close On Demand	
					PROB SEAL LOCA	Probability of seal LOCA given loss of Seal Cooling	
					JND10AP001EFR_D-ALL	CCF To Open LHSI/MHSI Common Injection Check Valves	

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Group No	Cutset Numbers	Cutset Frequencies	Contribution to CDF (%)		Sequence Type and a Representative Cutset		Sequence Description
			Group	Cumulative	Event Identifier	Event Description	
10	48-55	3.1E-10	0.5	68.5	**Sequence LOCCW-31: FLD-EFW, RCP LOCA, MHSI, SAHR**		
					IE FLD-EFW	EFW Pipe Break	A flood occurs due to a pipe break in EFW train 4, flooding SB 4 pump room and the Fuel Building. The sequence of events is the same as for Cutset Group 6.
					JEB40AA010EFC	RCP Seal, RCP4 Seal Nitrogen Venting Isolation MOV JEB40AA010, Fails to Close On Demand	
					PROB SEAL LOCA	Probability of seal LOCA given loss of Seal Cooling	
					JND10AP001EFR_D-123	CCF of MHSI Pumps to Run	
11	70	2.7E-11	0.0	68.6	**Sequence LOCCW-12: FLD-EFW, MFW, SSS, EFW, MHSI 01**		
					IE FLD-SAB14 FB	Flood in Safeguard Building 1 or 4 (Pump Room) Including Fuel Building	As explained in Section 19.1.5.2.2.3, a flood in the pump room of SB 4 results in the loss of CCWS CH2. With SAC2 in maintenance, PAS failure and operator failure to recover room cooling results in the loss of ventilation in Division 2 and 3. PAS fails MFW and SSS, MSRTs fail because of the loss of Division 2 and 3, EFW steam relief through MSSVs fail because it requires two EFW trains and only Division 1 is available. MHSI Pump 1 fails therefore feed and bleed is not possible.
					PAS	Process Automation System Fails	
					SAC02/QKA20 PM2	Normal SAC02/QKA20 Train unavailable due to preventive maintenance	
					OPF-SAC-2H	Operator Fails to Recover Room Cooling Locally	
					JND10AP001EFR	MHSI, MHSI Train 1 Motor Driven Pump JND10AP001, Fails to Run	
12	75, 78	5.0E-11	0.1	68.7	**Sequence LOCCW-12: FLD-EFW, MFW, SSS, EFW, MHSI 01**		
					IE FLD-EFW	EFW Pipe Break	A flood occurs due to a pipe break in EFW train 4, flooding SB 4 pump room and the Fuel Building. LOOP fails MFW and SSS and prevents the operator to make-up for the 4 EFW tank draining simultaneously. All EFW trains are lost. No MHSI pump is available for feed and bleed because of the failure of EDGs to run.
					LOOPCSD+REC	Consequential LOOP and Failure of Recovery Within 1 Hour for IEs Leading to Auto Scram	
					XKA10___DFR_D-ALL	CCF of EDGs to Run	

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