

Form 4.1-PWR Pressurized-Water Reactor Examination Outline

Facility: Summer		K/A Catalog Rev. 3										Rev. 0	Date of Exam: 10/30/2023				
Tier	Group	RO K/A Category Points												SRO-Only Points			
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total	
1. Emergency and Abnormal Plant Evolutions	1	3	3	3				3	3				3	18	3	3	6
	2	2	1	1				1	1				2	8	2	2	4
	Tier Totals	5	4	4				4	4				5	26	5	5	10
2. Plant Systems	1	3	4	2	2	3	2	3	3	2	1	3	28	3	2	5	
	2	0	0	1	1	1	1	1	1	1	2	0	9	0	2	3	
	Tier Totals	3	4	3	3	4	3	4	4	3	3	3	37	5	3	8	
3. Generic Knowledge and Abilities Categories	CO	EC			RC			EM			6	CO	EC	RC	EM	7	
	2	2			1			1				2	2	1	2		

4. Theory	Reactor Theory	Thermodynamics	6	
	3	3		

Notes: CO = Conduct of Operations; EC = Equipment Control; RC = Radiation Control;
 = Emergency Procedures/Plan
 EM =

* These systems/evolutions may be eliminated from the sample when Revision 2 of the K/A catalog is used to develop the sample plan.

** These systems/evolutions are only included as part of the sample (as applicable to the facility) when Revision 2 of the K/A catalog is used to develop the sample plan.

Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/**SRO**)

Item #	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	Q#
1	(000007) (EPE 7; BW E02 & E10; CE E02) Reactor Trip, Stabilization, Recovery				X			(000007EA1.02) Ability to operate and/or monitor the following as they apply to (EPE 7) REACTOR TRIP, STABILIZATION, RECOVERY (CFR: 41.5 / 41.7 / 45.5 to 45.8): MFW system	3.3	1
2	(000008) (APE 8) Pressurizer Vapor Space Accident						X	(000008) (APE 8) Pressurizer Vapor Space Accident (G2.1.32) CONDUCT OF OPERATIONS: Ability to explain and apply system precautions, limitations, notes, or cautions (CFR: 41.10 / 43.2 / 45.12)	4.0	76
3	(000009) (EPE 9) Small Break LOCA	X						(000009EK1.01) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (EPE 9) SMALL-Break LOCA (CFR: 41.5 / 41.7 / 45.7 / 45.8): Natural circulation and cooling, including reflux boiling	3.8	2
4	(000011) (EPE 11) Large Break LOCA			X				(000011EK3.12) Knowledge of the reasons for the following responses and/or actions as they apply to (EPE 11) LARGE-Break LOCA (CFR: 41.5 / 41.10 / 45.6 / 45.13): Actions contained in an EOP for large-break LOCA	4.2	3
5	(000011) (EPE 11) Large Break LOCA					X		(000011EA2.05) Ability to determine and/or interpret the following as they apply to (EPE 11) LARGE-Break LOCA (CFR: 41.10 / 43.5 / 45.13): Significance of ECCS pump operation	4.1	77
6	(000015) (APE 15) Reactor Coolant Pump Malfunctions			X				(000015AK3.07) Knowledge of the reasons for the following responses and/or actions as they apply to (APE 15) REACTOR COOLANT Pump Malfunctions (CFR: 41.5 / 41.10 / 45.6 / 45.13): Ensuring that S/G levels are controlled properly for natural circulation enhancement	3.7	4
7	(000022) (APE 22) Loss of Reactor Coolant Makeup				X			(000022AA1.05) Ability to operate and/or monitor the following as they apply to (APE 22) LOSS OF REACTOR Coolant Makeup (CFR: 41.5 / 41.7 / 45.5 to 45.8): RCP seal backpressure regulator valves	3.3	5
8	(000025) (APE 25) Loss of Residual Heat Removal System			X				(000025AK3.08) Knowledge of the reasons for the following responses and/or actions as they apply to (APE 25) LOSS OF RESIDUAL Heat Removal System (CFR: 41.5 / 41.10 / 45.6 / 45.13): Verifying capability for ECCS while in RHR cooling mode	3.5	6
9	(000026) (APE 26) Loss of Component Cooling Water						X	(000026) (APE 26) Loss of Component Cooling Water (G2.1.29) CONDUCT OF OPERATIONS: Knowledge of how to conduct system lineups, such as valves, breakers, or switches (CFR: 41.10 / 45.1 / 45.12)	4.1	7
10	(000027) (APE 27) Pressurizer Pressure Control System Malfunction	X						(000027AK1.05) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (APE 27) PRESSURIZER PRESSURE Control System Malfunction (CFR: 41.5 / 41.7 / 45.7 / 45.8): TS limits for RCS pressure	4.1	8

11	(000029) (EPE 29) Anticipated Transient Without Scram						X	(000029) (EPE 29) Anticipated Transient Without Scram (G2.4.16) EMERGENCY PROCEDURES/PLAN: Knowledge of emergency and abnormal operating procedures implementation hierarchy and coordination with other support procedures or guidelines, such as operating procedures, abnormal operating procedures, or severe accident management guidelines (CFR: 41.10 / 43.5 / 45.13)	4.4	78
12	(000038) (EPE 38) Steam Generator Tube Rupture						X	(000038EA2.17) Ability to determine and/or interpret the following as they apply to (EPE 38) STEAM GENERATOR Tube Rupture (CFR: 41.10 / 43.5 / 45.13): RCP restart criteria	3.1	79
13	(000040) (APE 40; BW E05; CE E05; W E12) Steam Line Rupture – Excessive Heat Transfer	X						(000040AK1.02) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (APE 40) STEAM LINE RUPTURE (CFR: 41.5 / 41.7 / 45.7 / 45.8): Leak rate versus pressure change	3.3	9
14	(000054) (APE 54; CE E06) Loss of Main Feedwater		X					(000054AK2.02) Knowledge of the relationship between (APE 54) LOSS OF Main Feedwater and the following systems or components (CFR: 41.8 / 41.10 / 45.3): Controllers affected by loss of MFW	3.0	10
15	(000055) (EPE 55) Station Blackout		X					(000055EK2.01) Knowledge of the relationship between (EPE 55) Station Blackout and the following systems or components (CFR: 41.8 / 41.10 / 45.3): Letdown isolation, RCP seal return, PZR PORVs, or secondary PORVs (atmospheric relief valves)	3.9	11
16	(000056) (APE 56) Loss of Offsite Power		X					(000056AK2.12) Knowledge of the relationship between (APE 56) Loss of Offsite Power and the following systems or components (CFR: 41.8 / 41.10 / 45.3): RCS	3.9	12
17	(000057) (APE 57) Loss of Vital AC Instrument Bus						X	(000057) (APE 57) Loss of Vital AC Instrument Bus (G2.2.40) EQUIPMENT CONTROL: Ability to apply TS with action statements of less than or equal to 1 hour (CFR: 41.10 / 43.2 / 43.5 / 45.3)	3.4	13
18	(000058) (APE 58) Loss of DC Power				X			(000058AA1.06) Ability to operate and/or monitor the following as they apply to (APE 58) LOSS OF DC Power (CFR: 41.5 / 41.7 / 45.5 to 45.8): DC distribution system	3.7	14
19	(000062) (APE 62) Loss of Nuclear Service Water						X	(000062AA2.05) Ability to determine and/or interpret the following as they apply to (APE 62) LOSS OF SERVICE WATER (CFR: 41.10 / 43.5 / 45.13): The normal values for the SWS-header flow rate and the flow rates to the components cooled by the SWS	3.0	80
20	(000065) (APE 65) Loss of Instrument Air					X		(000065AA2.07) Ability to determine and/or interpret the following as they apply to (APE 65) LOSS OF Instrument Air (CFR: 41.10 / 43.5 / 45.13): Determination of whether backup nitrogen supply is controlling the valve position	3.3	15
21	(000077) (APE 77) Generator Voltage and Electric Grid Disturbances					X		(000077AA2.07) Ability to determine and/or interpret the following as they apply to (APE 77) GENERATOR VOLTAGE AND ELECTRIC Grid Disturbances (CFR: 41.10 / 43.5 / 45.13): Status of ESFs	3.9	16
22	(W E04) LOCA Outside Containment					X		(WE04EA2.03) Ability to determine and/or interpret the following as they apply to (W E04) LOCA Outside Containment (CFR: 41.10 / 43.5 / 45.13): RCS pressure	3.9	17

23	(W E11) Loss of Emergency Coolant Recirculation						X	(W E11) Loss of Emergency Coolant Recirculation (G2.1.42) CONDUCT OF OPERATIONS: Knowledge of new and spent fuel movement procedures (SRO Only) (CFR: 43.7 / 45.13)	3.4	81
24	(BW E04; W E05) Inadequate Heat Transfer – Loss of Secondary Heat Sink						X	(BW E04; W E05) Inadequate Heat Transfer – Loss of Secondary Heat Sink (G2.2.39) EQUIPMENT CONTROL: Knowledge of less than or equal to 1 hour TS action statements (does not include action statements of 1 hour or less that follow the expiration of a completion time for a TS condition for which an action statement has already been entered) (CFR: 41.7 / 41.10 / 43.2 / 45.13)	3.9	18
K/A Category Totals:		3	3	3	3	6	6	Group Point Total:	24	

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Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/SRO)

Item #	E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G*	K/A Topic(s)	IR	Q#
25	(000005) (APE 5) Inoperable/Stuck Control Rod			X				(000005AK3.05) Knowledge of the reasons for the following responses and/or actions as they apply to (APE 5) INOPERABLE/STUCK Control Rod (CFR: 41.5 / 41.10 / 45.6 / 45.13): Power limits on rod misalignment	3.9	19
26	(000024) (APE 24) Emergency Boration					X		(000024AA2.09) Ability to determine and/or interpret the following as they apply to (APE 24) EMERGENCY Boration (CFR: 41.10 / 43.5 / 45.13): RWST level	3.3	82
27	(000028) (APE 28) Pressurizer (PZR) Level Control Malfunction						X	(000028) (APE 28) Pressurizer (PZR) Level Control Malfunction (G2.1.6) CONDUCT OF OPERATIONS: Ability to manage the control room crew during plant transients (SRO Only) (CFR: 43.5 / 45.12 / 45.13)	4.8	83
28	(000036) (APE 36; BW/A08) Fuel-Handling Incidents	X						(000036AK1.04) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (APE 36) FUEL HANDLING INCIDENTS (CFR: 41.5 / 41.7 / 45.7 / 45.8): Refueling water level	3.6	20
29	(000037) (APE 37) Steam Generator Tube Leak						X	(000037) (APE 37) Steam Generator Tube Leak (G2.1.8) CONDUCT OF OPERATIONS: Ability to coordinate personnel activities outside the control room (CFR: 41.10 / 43.1 / 45.5 / 45.12 / 45.13)	4.1	84
30	(000051) (APE 51) Loss of Condenser Vacuum	X						(000051AK1.01) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (APE 51) LOSS OF Condenser Vacuum (CFR: 41.5 / 41.7 / 45.7 / 45.8): Relationship of condenser vacuum to circulating water, flow rate, and temperature	3.3	21
31	(000059) (APE 59) Accidental Liquid Radwaste Release				X			(000059AA1.05) Ability to operate and/or monitor the following as they apply to (APE 59) ACCIDENTAL LIQUID Radwaste Release (CFR: 41.5 / 41.7 / 45.5 to 45.8): S/GB	2.9	22
32	(000069) (APE 69; W E14) Loss of Containment Integrity					X		(000069AA2.03) Ability to determine and/or interpret the following as they apply to (APE 69) LOSS OF Containment Integrity (CFR: 41.10 / 43.5 / 45.13): Containment pressure	4.1	23

33	(000076) (APE 76) High Reactor Coolant Activity					X		(000076AA2.09) Ability to determine and/or interpret the following as they apply to (APE 76) HIGH REACTOR COOLANT ACTIVITY (CFR: 41.10 / 43.5 / 45.13): Implement emergency plan for failed fuel	4.1	85
34	(W E01 & E02) Rediagnosis & SI Termination						X	(W E01 & E02) Rediagnosis & SI Termination (G2.2.44) EQUIPMENT CONTROL: Ability to interpret control room indications to verify the status and operation of a system and understand how operator actions and directives affect plant and system conditions (CFR: 41.10 / 43.2 / 45.13)	4.2	24
35	(W E13) Steam Generator Overpressure						X	(W E13) Steam Generator Overpressure (G2.4.17) EMERGENCY PROCEDURES/PLAN: Knowledge of emergency and abnormal operating procedures terms and definitions (CFR: 41.10 / 45.13)	3.9	25
36	(BW E09; CE A13**; W E09 & E10) Natural Circulation		X					(WE10EK2.15) Knowledge of the relationship between (W E10) NATURAL CIRCULATION WITH STEAM VOID IN VESSEL WITH/WITHOUT THE RVLIS and the following systems or components (CFR: 41.8 / 41.10 / 45.3): AFW system	3.8	26
K/A Category Totals:		2	1	1	1	3	4	Group Point Total:		12

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Emergency and Abnormal Plant Evolutions—Tier 2/Group 1 (RO/SRO)															
Ite m #	System / Name	K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G*	K/A Topic(s)	IR	Q#
37	(003) (SF4P RCP) REACTOR COOLANT PUMP SYSTEM							X					(003A1.07) Ability to predict and/or monitor changes in parameters associated with operation of the (SF4P RCP) REACTOR COOLANT PUMP SYSTEM, including (CFR: 41.5 / 45.5): RCS temperature and pressure	3.7	27
38	(003) (SF4P RCP) REACTOR COOLANT PUMP SYSTEM								X				(003A2.04) Ability to (a) predict the impacts of the following on the (SF4P RCP) REACTOR COOLANT PUMP SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): Effects of fluctuation of VCT pressure on RCP seal injection flow	3.2	86
39	(004) (SF1; SF2 CVCS) CHEMICAL AND VOLUME CONTROL SYSTEM											X	(004) (SF1; SF2 CVCS) CHEMICAL AND VOLUME CONTROL SYSTEM (G2.1.23) CONDUCT OF OPERATIONS: Ability to perform general and/or normal operating procedures during any plant condition (CFR: 41.10 / 45.5 / 45. 2 / 45.6)	4.3	28

40	(004) (SF1; SF2 CVCS) CHEMICAL AND VOLUME CONTROL SYSTEM		X									(004K2.02) Knowledge of electrical power supplies to the following (CFR: 41.7): (SF1; SF2 CVCS) CHEMICAL AND VOLUME CONTROL SYSTEM Pumps used to makeup to CVCS	3.0	29
41	(005) (SF4P RHR) RESIDUAL HEAT REMOVAL SYSTEM						X					(005K6.11) Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF4P RHR) RESIDUAL HEAT REMOVAL SYSTEM (CFR: 41.7 / 45.7): Flow control valves	3.8	30
42	(005) (SF4P RHR) RESIDUAL HEAT REMOVAL SYSTEM							X				(005A2.01) Ability to (a) predict the impacts of the following on the (SF4P RHR) RESIDUAL HEAT REMOVAL SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): RHR instrumentation failure	3.6	87
43	(006) (SF2; SF3 ECCS) EMERGENCY CORE COOLING SYSTEM					X						(006K5.04) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF2; SF3 ECCS) EMERGENCY CORE COOLING SYSTEM (CFR: 41.5 / 45.3): Brittle fracture, including causes and preventive actions	3.6	31
44	(006) (SF2; SF3 ECCS) EMERGENCY CORE COOLING SYSTEM									X		(006) (SF2; SF3 ECCS) EMERGENCY CORE COOLING SYSTEM (G2.1.46) CONDUCT OF OPERATIONS: Ability to use integrated control systems to operate plant systems or components (CFR: 41.10 / 45.12 / 45.13)	3.3	88
45	(007) (SF5 PRTS) PRESSURIZER RELIEF/QUENCH TANK SYSTEM								X			(007A3.01) Ability to monitor automatic features of the (SF5 PRTS) PRESSURIZER RELIEF/QUENCH TANK SYSTEM, including (CFR: 41.7 / 45.7): Components that discharge to the PRT/quench tank	3.4	32

46	(007) (SF5 PRTS) PRESSURIZER RELIEF/QUENCH TANK SYSTEM			X								(007K3.01) Knowledge of the effect that a loss or malfunction of the (SF5 PRTS) PRESSURIZER RELIEF/QUENCH TANK SYSTEM will have on the following systems or system parameters (CFR: 41.7 / 45.4): Containment	3.4	33
47	(008) (SF8 CCW) COMPONENT COOLING WATER SYSTEM										X	(008) (SF8 CCW) COMPONENT COOLING WATER SYSTEM (G2.2.36) EQUIPMENT CONTROL: Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operation (CFR: 41.10 / 43.2 / 45.13)	3.1	34
48	(010) (SF3 PZR PCS) PRESSURIZER PRESSURE CONTROL SYSTEM								X			(010A2.07) Ability to (a) predict the impacts of the following on the (SF3 PZR PCS) PRESSURIZER PRESSURE CONTROL SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): ESFAS actuations	4.3	35
49	(010) (SF3 PZR PCS) PRESSURIZER PRESSURE CONTROL SYSTEM					X						(010K5.05) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF3 PZR PCS) PRESSURIZER PRESSURE CONTROL SYSTEM (CFR: 41.5 / 45.3): RCS heatup and cooldown effect on pressure	3.7	36
50	(012) (SF7 RPS) REACTOR PROTECTION SYSTEM			X								(012K3.05) Knowledge of the effect that a loss or malfunction of the (SF7 RPS) REACTOR PROTECTION SYSTEM will have on the following systems or system parameters (CFR: 41.7 / 45.4): RCPS	3.5	37
51	(013) (SF2 ESFAS) ENGINEERED SAFETY FEATURES ACTUATION SYSTEM		X									(013K2.01) Knowledge of electrical power supplies to the following (CFR: 41.7): (SF2 ESFAS) ENGINEERED SAFETY FEATURES ACTUATION SYSTEM ESFAS/safeguards train power supplies	4.0	38

52	(013) (SF2 ESFAS) ENGINEERED SAFETY FEATURES ACTUATION SYSTEM								X				(013A2.08) Ability to (a) predict the impacts of the following on the (SF2 ESFAS) ENGINEERED SAFETY FEATURES ACTUATION SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): Loss of EDG	4.1	89
53	(022) (SF5 CCS) CONTAINMENT COOLING SYSTEM	X											(022K1.01) Knowledge of the physical connections and/or cause and effect relationships between the (SF5 CCS) CONTAINMENT COOLING SYSTEM and the following systems (CFR: 41.2 to 41.9 / 45.7 to 45.8): Cooling water system	3.6	39
54	(026) (SF5 CSS) CONTAINMENT SPRAY SYSTEM								X				(026A2.05) Ability to (a) predict the impacts of the following on the (SF5 CSS) CONTAINMENT SPRAY SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): Failure of chemical addition tanks to inject	3.0	40
55	(026) (SF5 CSS) CONTAINMENT SPRAY SYSTEM	X											(026K1.05) Knowledge of the physical connections and/or cause and effect relationships between the (SF5 CSS) CONTAINMENT SPRAY SYSTEM and the following systems (CFR: 41.2 to 41.9 / 45.7 to 45.8): ESFAS	4.1	41
56	(039) (SF4S MSS) MAIN AND REHEAT STEAM SYSTEM				X								(039K4.06) Knowledge of (SF4S MSS) MAIN AND REHEAT STEAM SYSTEM design features and/or interlocks that provide for the following (CFR: 41.7): Prevent reverse steam flow on steamline break	3.5	42

57	(039) (SF4S MSS) MAIN AND REHEAT STEAM SYSTEM											X	(039) (SF4S MSS) MAIN AND REHEAT STEAM SYSTEM (G2.4.51) EMERGENCY PROCEDURES/PLAN: Knowledge of emergency operating procedure exit conditions (e.g., emergency condition no longer exists or severe accident guideline entry is required) (CFR: 41.10 / 43.5 /45.13)	4.0	90
58	(059) (SF4S MFW) MAIN FEEDWATER SYSTEM										X		(059A4.11) Ability to manually operate and/or monitor the (SF4S MFW) MAIN FEEDWATER SYSTEM in the control room (CFR: 41.7 / 45.5 to 45.8): Recovery from automatic MFW isolation	3.6	43
59	(059) (SF4S MFW) MAIN FEEDWATER SYSTEM	X											(059K1.13) Knowledge of the physical connections and/or cause and effect relationships between the (SF4S MFW) MAIN FEEDWATER SYSTEM and the following systems (CFR: 41.2 to 41.9 / 45.7 to 45.8): S/GB system	2.9	44
60	(061) (SF4S AFW) AUXILIARY / EMERGENCY FEEDWATER SYSTEM									X			(061A3.03) Ability to monitor automatic features of the (SF4S AFW) AUXILIARY/EMERGENCY FEEDWATER SYSTEM, including (CFR: 41.7 / 45.7): Automatic AFW S/G level control	3.8	45
61	(062) (SF6 ED AC) AC ELECTRICAL DISTRIBUTION SYSTEM							X					(062A1.10) Ability to predict and/or monitor changes in parameters associated with operation of the (SF6 ED AC) AC ELECTRICAL DISTRIBUTION SYSTEM, including (CFR: 41.5 / 45.5): Lights and alarms	3.4	46
62	(063) (SF6 ED DC) DC ELECTRICAL DISTRIBUTION SYSTEM					X							(063K5.05) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF6 ED DC) DC ELECTRICAL DISTRIBUTION SYSTEM (CFR: 41.5 / 45.3): Battery capacity as it is affected by discharge rate/individual cell voltages	3.1	47
63	(063) (SF6 ED DC) DC ELECTRICAL DISTRIBUTION SYSTEM						X						(063K6.06) Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF6 ED DC) DC ELECTRICAL DISTRIBUTION SYSTEM (CFR: 41.7 / 45.7): Battery	4.0	48

64	(064) (SF6 EDG) EMERGENCY DIESEL GENERATOR SYSTEM		X										(064K2.01) Knowledge of electrical power supplies to the following (CFR: 41.7): (SF6 EDG) EMERGENCY DIESEL GENERATOR SYSTEM Starting air compressor	3.0	49
65	(073) (SF7 PRM) PROCESS RADIATION MONITORING SYSTEM							X					(073A1.01) Ability to predict and/or monitor changes in parameters associated with operation of the (SF7 PRM) PROCESS RADIATION MONITORING SYSTEM, including (CFR: 41.5 / 45.5): Radiation levels	3.5	50
66	(073) (SF7 PRM) PROCESS RADIATION MONITORING SYSTEM											X	(073) (SF7 PRM) PROCESS RADIATION MONITORING SYSTEM (G2.1.45) Conduct of Operations: Ability to identify and interpret diverse indications to validate the response of another indication.	4.3	51
67	(076) (SF4S SW) SERVICE WATER SYSTEM		X										(076K2.07) Knowledge of electrical power supplies to the following (CFR: 41.7): (SF4S SW) SERVICE WATER SYSTEM Cooling tower fans	2.5	52
68	(078) (SF8 IAS) INSTRUMENT AIR SYSTEM				X								(078K4.04) Knowledge of (SF8 IAS) INSTRUMENT AIR SYSTEM design features and/or interlocks that provide for the following (CFR: 41.7): IAS compressor loading/unloading/starts/trips	2.9	53
69	(103) (SF5 CNT) CONTAINMENT SYSTEM								X				(103A2.10) Ability to (a) predict the impacts of the following on the (SF5 CNT) CONTAINMENT SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): FHS malfunctions	2.6	54
K/A Category Totals:		3	4	2	2	3	2	3	6	2	1	5	Group Point Total:		33

Emergency and Abnormal Plant Evolutions—Tier 2/Group 2 (RO/SRO)

Item #	System / Name	K	K	K	K	K	K	A	A	A	A	G*	K/A Topic(s)	IR	Q#
		1	2	3	4	5	6	1	2	3	4				
70	(001) (SF1 CRDS) CONTROL ROD DRIVE SYSTEM								X				(001A2.24) Ability to (a) predict the impacts of the following on the (SF1 CRDS) CONTROL ROD DRIVE SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): Dropped rod	4.1	91
71	(016) (SF7 NNI) NONNUCLEAR INSTRUMENTATION SYSTEM					X							(016K5.02) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF7 NNI) NONNUCLEAR INSTRUMENTATION SYSTEM (CFR: 41.5 / 45.3): Relationship between meter readings and actual parameter values	3.2	55
72	(017) (SF7 ITM) IN CORE TEMPERATURE MONITOR SYSTEM						X						(017K6.01) Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF7 ITM) IN CORE TEMPERATURE MONITOR SYSTEM (CFR: 41.7 / 45.7): Temperature measuring device (for example thermocouple)	3.2	56
73	(029) (SF8 CPS) CONTAINMENT PURGE SYSTEM										X		(029A4.05) Ability to manually operate and/or monitor the (SF8 CPS) CONTAINMENT PURGE SYSTEM in the control room (CFR: 41.7 / 45.5 to 45.8): Manual isolation of the CPS	3.1	57
74	(033) (SF8 SFPCS) SPENT FUEL POOL COOLING SYSTEM											X	(033) (SF8 SFPCS) SPENT FUEL POOL COOLING SYSTEM (G2.1.20) CONDUCT OF OPERATIONS: Ability to interpret and execute procedure steps (CFR: 41.10 / 43.5 / 45.12)	4.6	92
75	(035) (SF4P SG) STEAM GENERATOR SYSTEM			X									(035K3.06) Knowledge of the effect that a loss or malfunction of the (SF4P SG) STEAM GENERATOR SYSTEM will have on the following systems or system parameters (CFR: 41.7 / 45.4): S/GB system	3.0	58

76	(055) (SF4S CARS) CONDENSER AIR REMOVAL SYSTEM								X				(055A2.02) Ability to (a) predict the impacts of the following on the (SF4S CARS) CONDENSER AIR REMOVAL SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): Loss of gland seal/gland exhaust	3.0	93
77	(056) (SF4S CDS) CONDENSATE SYSTEM				X								(056K4.24) Knowledge of (SF4S CDS) CONDENSATE SYSTEM design features and/or interlocks that provide for the following (CFR: 41.7): Condenser vacuum interlocks/permissives	3.2	59
78	(068) (SF9 LRS) LIQUID RADWASTE SYSTEM										X		(068A4.02) Ability to manually operate and/or monitor the (SF9 LRS) LIQUID RADWASTE SYSTEM in the control room (CFR: 41.7 / 45.5 to 45.8): Remote radwaste release	3.1	60
79	(071) (SF9 WGS) WASTE GAS DISPOSAL SYSTEM									X			(071A3.04) Ability to monitor automatic features of the (SF9 WGS) WASTE GAS DISPOSAL SYSTEM, including (CFR: 41.7 / 45.7): Automatic isolation	3.0	61
80	(072) (SF7 ARM) AREA RADIATION MONITORING SYSTEM								X				(072A2.01) Ability to (a) predict the impacts of the following on the (SF7 ARM) AREA RADIATION MONITORING SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): ARM component failures	3.3	62
81	(075) (SF8 CW) CIRCULATING WATER SYSTEM							X					(075A1.06) Ability to predict and/or monitor changes in parameters associated with operation of the (SF8 CW) CIRCULATING WATER SYSTEM, including (CFR: 41.5 / 45.5): Circulating water temperature (inlet and outlet)	2.6	63
K/A Category Totals:		0	0	1	1	1	1	1	3	1	2	1	Group Point Total:		12

Form 4.1-COMMON Common Examination Outline

ES-4.1-COMMON	COMMON Examination Outline (Summer)

Facility: Summer

Date of Exam: 10/30/2023

Generic Knowledge and Abilities Outline (Tier 3) (RO/SRO)

Category	K/A #	Topic	Item #	RO		SRO-Only	
				IR	Q#	IR	Q#
1. Conduct of Operations	G2.1.40	(G2.1.40) CONDUCT OF OPERATIONS: Knowledge of refueling administrative requirements (CFR: 41.10 / 43.5 / 43.6 / 45.13)	82			3.9	94
	G2.1.43	(G2.1.43) CONDUCT OF OPERATIONS: Ability to use an online power distribution monitoring system and/or procedures to determine the effects on reactivity of plant changes, such as RCS temperature, secondary plant, or fuel depletion	83			4.3	95
	G2.1.36	(G2.1.36) CONDUCT OF OPERATIONS: Knowledge of procedures and limitations involved in core alterations (CFR: 41.10 / 43.6 / 45.7)	84	3	64		
	G2.1.39	(G2.1.39) CONDUCT OF OPERATIONS: Knowledge of conservative decision-making practices (CFR: 41.10 / 43.5 / 45.12)	85	3.6	65		
	Subtotal			N/A	2	N/A	2
2. Equipment Control	G2.2.12	(G2.2.12) EQUIPMENT CONTROL: Knowledge of surveillance procedures (CFR: 41.10 / 43.2 / 45.13)	86	3.7	66		
	G2.2.41	(G2.2.41) EQUIPMENT CONTROL: Ability to obtain and interpret station electrical and mechanical drawings (reference potential) (CFR: 41.10 / 45.12 / 45.13)	87	3.5	67		
	G2.2.18	(G2.2.18) EQUIPMENT CONTROL: Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments and work prioritization (CFR: 41.10 / 43.5 / 45.13)	88			3.9	96
	G2.2.22	(G2.2.22) EQUIPMENT CONTROL: Knowledge of limiting conditions for operation and safety limits (CFR: 41.5 / 43.2 / 45.2)	89			4.7	97
	Subtotal			N/A	2	N/A	2
3. Radiation Control	G2.3.11	(G2.3.11) RADIATION CONTROL: Ability to control radiation releases (CFR: 41.11 / 43.4 / 45.10)	90	3.8	68		
	G2.3.12	(G2.3.12) RADIATION CONTROL: Knowledge of radiological safety principles and procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, or alignment of filters (CFR: 41.12 / 43.4 / 45.9 / 45.10)	91			3.7	98
	Subtotal			N/A	1	N/A	1
4. Emergency Procedures / Plan	G2.4.32	(G2.4.32) EMERGENCY PROCEDURES/PLAN: Knowledge of operator response to loss of annunciators (CFR: 41.10 / 43.5 / 45.13)	92	3.6	69		
	G2.4.29	(G2.4.29) EMERGENCY PROCEDURES/PLAN: Knowledge of the emergency plan implementing procedures (CFR: 41.10 / 43.5 / 45.11)	93			4.4	99
	G2.4.47	(G2.4.47) EMERGENCY PROCEDURES/PLAN: Ability to diagnose and recognize trends in an accurate and timely manner using the appropriate control room reference material (reference potential) (CFR: 41.10 / 43.5 / 45.12)	94			4.2	100

Subtotal	N/A	1	N/A	2
Tier 3 Point Total	N/A	6	N/A	7

Form 4.1-COMMON Common Examination Outline

ES-4.1-COMMON	COMMON Examination Outline (Summer)			
Facility: Summer	Date of Exam: 10/30/2023			

Theory (Tier 4) (RO)

Category	K/A #	Topic	Item #	RO	
				IR	Q#
Reactor Theory	192006	(192006K1.05) FISSION PRODUCT POISONS (CFR: 41.1): Describe the following processes and state their effect on reactor operations: -- equilibrium xenon	95	3.1	70
	192007	(192007K1.05) FUEL DEPLETION AND BURNABLE POISONS (CFR: 41.1): Describe the effects of boration/dilution on reactivity during forced-flow and natural circulation conditions	96	3.2	71
	192008	(192008K1.12) REACTOR OPERATIONAL PHYSICS (CFR: 41.1): (INTERMEDIATE RANGE OPERATION) List parameters that should be monitored and controlled during the intermediate phase of startup (from criticality to the POAH)	97	3.6	72
Subtotal				N/A	3
Thermodynamics	193003	(193003K1.24) STEAM (CFR: 41.14): Explain the usefulness of steam tables to the control room operator	98	3.1	73
	193004	(193004K1.15) THERMODYNAMIC PROCESS (CFR: 41.14): (THROTTLING AND THE THROTTLING PROCESS) Determine the exit conditions for a throttling process based on the use of steam and/or water	99	2.8	74
	193009	(193009K1.05) CORE THERMAL LIMITS (CFR: 41.14): State why thermal limits are necessary.	100	3.5	75
Subtotal				N/A	3
Tier 4 Point Total				N/A	6

Form 3.2-1 Administrative Topics Outline

Facility: VC Summer		Date of Examination: 10/30/202
Examination Level: RO ☒ SRO ☐		Operating Test Number:
Administrative Topic (Step 1)	Activity and Associated K/A (Step 2)	Type Code (Step 3)
Conduct of Operations	Verification of Operator Watchstanding Certification in order to maintain an active license. 2.1.4 Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, and maintenance of active license status, 10 CFR Part 55 (RO 3.3)	R, D
Conduct of Operations	Perform boron change calculations IAW OAP-100.6. 2.1.25 Ability to interpret reference materials, such as graphs, curves, and tables (reference potential) (RO 3.9)	R, M
Equipment Control	Perform Boration system flow path verification and determine if acceptance criteria is met. 2.2.12 Knowledge of surveillance procedures. (RO 3.7)	R, D
Radiation Control	Determine worker exposure and apply administrative exposure limits. Modified from 2019 NRC A3 JPM. 2.3.12 Knowledge of radiological safety principles and procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, or alignment of filters (RO 3.2)	R, M
Emergency Plan	N/A	

Instructions for completing Form 3.2-1, "Administrative Topics Outline"

1. For each license level, determine the number of administrative job performance measures (JPMs) and topic areas as follows:

Topic	Number of JPMs	
	RO*	SRO and RO Retakes
Conduct of Operations	1 (or 2)	2
Equipment Control	1 (or 0)	1
Radiation Control	1 (or 0)	1
Emergency Plan	1 (or 0)	1
Total	4	5

2. Enter the associated knowledge and abilities (K/A) statement and summarize the administrative activities for each JPM.

3. For each JPM, specify the type codes for location and source as follows:

Location:

(C)ontrol room, (S)imulator, or Class(R)oom

Source and Source Criteria:

(P)revious two NRC exams (no more than one JPM that is **randomly selected** from last two NRC exams)

(D)irect from bank (no more than three for ROs, no more than four for SROs and RO retakes)

(N)ew or Significantly (M)odified from bank (no fewer than one)

CONDUCT OF OPERATIONS (A1-a): This is a bank JPM. The candidate will be given watchstanding history which will include non-licensed operator and partial licensed watches and will be required to determine the minimum number of hours, and the latest date by which they must be stood, to maintain an active license.

K/A: 2.1.4 Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10cfr55, etc. (RO 3.3)

VCS Task: 119-003-03-01 Conduct Shift and Relief Turnover

CONDUCT OF OPERATIONS (A1-b): This is a modified JPM. The JPM is modified because the curve book has changed and the values applied from the curve book result in different answers than the original JPM. The candidate will be given a set of values for core life, RCS Boron concentration and Boric Acid Tank concentrations and will be directed to complete attachment IA, Reactivity Control Parameters of OAP-100.6, CONTROL ROOM CONDUCT AND CONTROL OF SHIFT ACTIVITIES.

K/A: 2.1.25 Ability to interpret reference materials, such as graphs, curves, and tables (reference potential) (RO 3.9)

VCS Task: 004-006-01-01 Perform Boron Concentration Change Calculations

EQUIPMENT CONTROL (A2): This is a bank JPM. The candidate will review STP-104.003, BORATION SYSTEM VALVE LINEUP VERIFICATION and determine that the acceptance criteria is met. They will have to determine if they meet all the required Boration flow paths for the given plant conditions.

K/A: 2.2.12 Knowledge of surveillance procedures. (RO 3.7)

VCS Task: 004-001-02-01 Perform Boration System Flow Path Verification

RADIATION CONTROL (A3): This is a modified JPM. The JPM was modified by changing the values of the calculation and changing the fact that they do not need a dose extension. The candidate will be tasked with calculating the exposure to perform work inside the “B” RHR pump room. Based on the exposure from their work, they will need to add this to their current annual exposure and determine if a dose extension is required.

K/A:	2.3.12	Knowledge of radiological safety principles and procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, or alignment of filters (RO 3.2)

VCS Task: 119-010-03-01 Apply radiation and contamination safety procedures

Form 3.2-1 Administrative Topics Outline

Facility: VC Summer		Date of Examination: 10/30/202
Examination Level: RO ☐ SRO ☒		Operating Test Number:
Administrative Topic (Step 1)	Activity and Associated K/A (Step 2)	Type Code (Step 3)
Conduct of Operations	Determine conditions that must be corrected before starting core offload. Modified 2019 NRC A1-b. 2.1.40 Knowledge of refueling administrative requirements. (SRO 3.9)	R, M
Conduct of Operations	Review and calculate a Quadrant Power Tilt Ratio. 2.1.25 Ability to interpret reference materials, such as graphs, curves, and tables (reference potential) (SRO 4.2)	R, M
Equipment Control	Review RHR valve surveillance. 2.2.12 Knowledge of surveillance procedures. (SRO 4.1)	R, D
Radiation Control	Review a release permit prior to approval/release. 2021 NRC A3 JPM 2.3.6 Ability to approve liquid or gaseous release permits (SRO 3.8)	R, P, D
Emergency Plan	Determine evacuation location of non-essential personnel. 2.3.14 Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities. (SRO 3.8)	R, N

Instructions for completing Form 3.2-1, "Administrative Topics Outline"

1. For each license level, determine the number of administrative job performance measures (JPMs) and topic areas as follows:

Topic	Number of JPMs	
	RO*	SRO and RO Retakes
Conduct of Operations	1 (or 2)	2
Equipment Control	1 (or 0)	1
Radiation Control	1 (or 0)	1
Emergency Plan	1 (or 0)	1
Total	4	5

2. Enter the associated knowledge and abilities (K/A) statement and summarize the administrative activities for each JPM.

3. For each JPM, specify the type codes for location and source as follows:

Location:

(C)ontrol room, (S)imulator, or Class(R)oom

Source and Source Criteria:

(P)revious two NRC exams (no more than one JPM that is **randomly selected** from last two NRC exams)

(D)irect from bank (no more than three for ROs, no more than four for SROs and RO retakes)

(N)ew or Significantly (M)odified from bank (no fewer than one)

CONDUCT OF OPERATIONS (A1-a): This JPM is a modified JPM from the 2019 NRC exam, JPM A1-b. The JPM is modified by changing a temperature of the CCW system and therefore changing the correct answer. The candidate will review turnover information and determine why the core offload cannot commence in accordance with V.C. Summer requirements.

K/A: 2.1.40 Knowledge of refueling administrative requirements.
(SRO 3.9)

VCS Task: 341-029-03-02 SUPERVISE REFUELING OPERATIONS AS
REFUELING SUPERVISOR

CONDUCT OF OPERATIONS (A1-b): This JPM is a modified JPM. The JPM is modified because the numbers in the curve book have changed. This now creates new answers based on these new values. The candidate will review STP-108.001, QUADRANT POWER TILT RATIO and determines that QPTR is out of spec and that reactor power must be reduced to either 91% or 88% depending on rounding errors.

K/A: 2.1.25 Ability to interpret reference materials, such as graphs,
curves, and tables (reference potential) (SRO 4.2)

VCS Task: 015-004-02-01 PERFORM A QUADRANT POWER TILT RATIO
(QPTR) CALCULATION PER STP-108.001.

EQUIPMENT CONTROL (A2): This is a bank JPM. The candidate will review an RHR pump surveillance in accordance with STP-205.004, RHR Pump and Valve Operability Test. The candidate will find errors in the conduct of the STP and its documentation, determine that the RHR pump is inoperable, and apply technical specifications.

K/A: 2.2.12 Knowledge of surveillance procedures.

VCS Task: 342-026-03-02 Review results of surveillance tests (SAP-134, GTP-301,
AND GTP-302)

RADIATION CONTROL (A3): This is a bank JPM from the 2021 NRC Exam, JPM A3. The candidate will be required to review a waste gas release permit and determine if the release can commence. There are several faults that will prevent the waste gas release. Candidate will identify discrepancies and document items preventing the commencement of the release.

K/A: 2.3.6 Ability to approve release permits (SRO 3.8)

VCS Task: 341-012-03-02 Approve radioactive waste discharge/release permits
(HPP-709 and HPP-710)

EMERGENCY PLAN (A4): This is a new JPM. The candidate will be given a set of conditions in which a General Emergency has been declared. They must determine where non-essential personnel must be evacuated to according to wind direction and knowing who counts as non-essential personnel.

K/A: 2.3.14 Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities. (SRO 3.8)

VCS Task: 344-034-03-02 EVALUATE PLANT PERSONNEL SAFETY HAZARDS ASSOCIATED WITH THE EMERGENCY EVENT

1.

Given the following plant conditions:

- 100% power initially.
- A spurious Reactor Trip has occurred.
- RCS T_{AVG} is 560°F and decreasing.
- EOP-1.1, ES-0.1 REACTOR TRIP RESPONSE is in progress.

Which ONE of the choices below completes the following statements?

The Main Feedwater pumps ____ (1) ____ receive an automatic trip signal in the conditions above.

EOP-1.1 will verify that the Feedwater Flow Control Valves, FCV-478(488)(498) are ____ (2) ____.

- A. 1) did **not**
2) open.
- B. 1) did **not**
2) closed.
- C. 1) did
2) open.
- D. 1) did
2) closed.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must recognize that there is a Main Feedwater isolation signal in because the reactor is tripped and T_{avg} is $<564^{\circ}\text{F}$ and that this signal closes the Feedwater Flow Control valves but does not trip the Main Feedwater pumps.

- A. Incorrect. Part 1 is correct because there is a Main Feedwater Isolation signal in and this does not trip the Main Feedwater pumps. Part 2 is plausible because the Main Feedwater isolation signal isolates multiple valves and a candidate could make the mistake that this signal isolates only the Feedwater Isolation valves, XVG-1611A/B/C and think that EOP-1.1 will verify the valve is open.
- B. Correct. Part 1 is correct because there is a Main Feedwater Isolation signal in and this does not trip the Main Feedwater pumps. Part 2 is correct because the Feedwater Flow control valves close on a Feedwater Isolation Signal and this is why EOP-1.1 verifies the valves closed.
- C. Incorrect. Part 1 is plausible because there is a Main Feedwater Isolation signal in and it's reasonable to think that this signal would trip the Main Feedwater pumps. Part 2 is plausible because the Main Feedwater isolation signal isolates multiple valves and a candidate could make the mistake that this signal isolates only the Feedwater Isolation valves, XVG-1611A/B/C and think that EOP-1.1 will verify the valve is open.
- D. Incorrect. Part 1 is plausible because there is a Main Feedwater Isolation signal in and it's reasonable to think that this signal would trip the Main Feedwater pumps. Part 2 is correct because the Feedwater Flow control valves close on a Feedwater Isolation Signal and this is why EOP-1.1 verifies the valves closed.

Form 4.2-1 Written Examination Question Worksheet

K/A: 000007EA1.02 Ability to operate and/or monitor the following as they apply to (EPE 7) REACTOR TRIP, STABILIZATION, RECOVERY (CFR: 41.5 / 41.7 / 45.5 to 45.8): MFW system.

K/A Match: The K/A is matched because the candidate must monitor the plant conditions after a reactor trip and determine the status of the Main Feedwater pumps and know based on plant conditions that EOP-1.1 will verify the flow control valves closed.

Selection criteria: New

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.3 **SRO:**

Technical Reference: EOP-1.1, ES-0.1 REACTOR TRIP RESPONSE

Proposed references to be provided to candidates during examination: None

Learning Objective: O-EOP-1.1 – 06: Given a set of plant conditions predict a discrete path through EOP-1.1.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

2.

Given the following plant conditions:

- A Small Break LOCA has occurred.
- All RCPs were secured.
- All Narrow Range steam generator levels are 50% and stable.
- EOP-2.1, ES-1.2 POST-LOCA COOLDOWN AND DEPRESSURIZATION, is in progress.

Which ONE of the choices below completes the following statements?

To verify Natural Circulation is occurring, SG pressures are required to be stable or ____ (1) ____ in accordance with EOP-2.1.

When steam voiding begins to occur in the RCS hot leg, the steam generators will ____ (2) ____.

- A. 1) increasing
2) continue removing heat by reflux boiling.
- B. 1) increasing
2) stop removing heat due to the interruption of natural circulation.
- C. 1) decreasing
2) stop removing heat due to the interruption of natural circulation.
- D. 1) decreasing
2) continue removing heat by reflux boiling.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the Natural Circulation requirements in EOP-2.1 and know the thermodynamics of hot leg voiding and that impact on heat removal.

- A. Incorrect. Part 1 is plausible because when transferring heat from the reactor to the SG, SG pressure would increase. Incorrect because you are steaming the SG to establish natural circulation and cooldown the core. Part 2 is correct because the SG tubes are voiding (on the RCS side) and when this starts to happen, reflux boiling occurs which will continue to remove heat.
- B. Incorrect. Part 1 is plausible because when transferring heat from the reactor to the SG, SG pressure would increase. Incorrect because you are steaming the SG to establish natural circulation and cooldown the core. Part 2 is plausible because forced flow will stop when the RCS hot legs start to void. A candidate could believe that since natural circulation has been interrupted, heat transfer will be interrupted as well.
- C. Incorrect. Part 1 is correct because EOP-2.1 verifies SG pressures are stable or decreasing to verify natural circulation. Part 2 is plausible because forced flow will stop when the RCS hot legs start to void. A candidate could believe that since natural circulation has been interrupted, heat transfer will be interrupted as well.
- D. Correct. Part 1 is correct because EOP-2.1 verifies SG pressures are stable or decreasing to verify natural circulation. Part 2 is correct because the SG tubes are voiding (on the RCS side) and when this starts to happen, reflux boiling occurs which will continue to remove heat.

Form 4.2-1 Written Examination Question Worksheet

K/A: 000009EK1.01 Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (EPE 9) SMALL-Break LOCA (CFR: 41.5 / 41.7 / 45.7 / 45.8): Natural circulation and cooling, including reflux boiling.

K/A Match: The K/A is matched because the candidate must know the requirements for natural circulation and how hot leg voiding will effect natural circulation and cooling.

Selection criteria: Modified, 2011NRC Exam. Question is modified by asking a different question in the first statement. Original question on next page.

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.8 **SRO:**

Technical Reference: EOP-2.1, ES-1.2 POST-LOCA COOLDOWN AND DEPRESSURIZATION

Proposed references to be provided to candidates during examination: None

Learning Objective: EOP-2.1, 06 Given a set of plant conditions, predict a discrete path through EOP-2.1.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

Original question from 2011 NRC Exam

Given the following plant conditions:

- A small break loss of coolant accident has occurred.
- All Reactor Coolant Pumps have been stopped.
- All S/G narrow range levels are approximately 50% and stable.
- Operators are responding using EOP-2.1, POST-LOCA COOLDOWN AND DEPRESSURIZATION.

Which ONE (1) of the choices below completes the following statements?

While natural circulation is occurring _____ will be at saturation temperature for the associated steam generator pressure.

After RCS level decreases to the point that steam voiding has just begun to occur in the RCS hot leg, the steam generators will _____.

- A. Thot stop removing heat due interruption of natural circulation
- B. Tcold stop removing heat due interruption of natural circulation
- C. Thot continue removing heat by reflux boiling
- D. Tcold continue removing heat by reflux boiling

3.

Given the following plant conditions:

- A Large break LOCA occurs.
- EOP-2.0, E-1 LOSS OF REACTOR OR SECONDARY COOLANT is in progress.
- “A” RB Spray pump tripped.

Which ONE of the choices below completes the following statement in accordance with EOP-2.0 and its background document?

The “B” RB Spray pump must be run for a **minimum** of ____ (1) ____ hours in order to assure that ____ (2) ____.

- A. 1) 4
2) RWST volume transferred to the RB sump will support recirculation mode.
- B. 1) 4
2) dose limits to the public are not exceeded.
- C. 1) 8
2) RWST volume transferred to the RB sump will support recirculation mode.
- D. 1) 8
2) dose limits to the public are not exceeded.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know how long EOP-2.0 requires RB Spray pumps to be run for 4 hours after a LOCA and know the reason for this run time.

- A. Incorrect. Part 1 is correct because EOP-2.0 says that at least one RB spray pump has to run for at least 4 hours following a LOCA. Part 2 is plausible because RB Spray transfers water from the RWST to the RB Sump and RB Sump level is necessary to go on recirculation. Incorrect because RB Spray pumps are run for a minimum of 4 hours to limit offsite doses.
- B. Correct. Part 1 is correct because EOP-2.0 says that at least one RB spray pump has to run for at least 4 hours following a LOCA. Part 2 is correct because RB Spray pumps are run for a minimum of 4 hours to limit offsite doses.
- C. Incorrect. Part 1 is plausible because 8 hours is the point after a LOCA at which you transition to hot leg recirculation mode. Incorrect because EOP-2.0 the RB Spray pumps to be run for a minimum of 4 hours. Part 2 is plausible because RB Spray transfers water from the RWST to the RB Sump and RB Sump level is necessary to go on recirculation. Incorrect because RB Spray pumps are run for a minimum of 4 hours to limit offsite doses.
- D. Incorrect. Part 1 is plausible because 8 hours is the point after a LOCA at which you transition to hot leg recirculation mode. Incorrect because EOP-2.0 the RB Spray pumps to be run for a minimum of 4 hours. Part 2 is correct because RB Spray pumps are run for a minimum of 4 hours to limit offsite doses.

Form 4.2-1 Written Examination Question Worksheet

K/A: 000011EK3.12 Knowledge of the reasons for the following responses and/or actions as they apply to (EPE 11) LARGE-Break LOCA (CFR: 41.5 / 41.10 / 45.6 / 45.13): Actions contained in an EOP for large-break LOCA.

K/A Match: The K/A is matched because the candidate must know how long the RB Spray pumps must be ran after a Large Break LOCA and why they must be ran for this long.

Selection criteria: Modified Bank Question. Modified the original question by asking a different first question. The second statement asks the same question as the original.

Tier: 1 **Group:** 1

Importance Rating: **RO:** 4.2 **SRO:**

Technical Reference: EOP-2.0, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.

Proposed references to be provided to candidates during examination: None

Learning Objective: EOP-2.0-04: State the bases or reasons for each action contained in EOP-2.0. Include both the High Level Actions and Alternative Actions.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

CONT SPRAY SYSTEM 087 Original question.

C

Given the following plant conditions:

Time 0700:

- Large break LOCA occurs.
- Both RB Spray pumps start.
- Two RBCUs are running in slow speed.

Time 0715:

- EOP-2.0, E-1 LOSS OF REACTOR OR SECONDARY COOLANT, is implemented.

Time 0805:

- "A" RB Spray pump tripped.
- RB pressure is 6 psig, slowly lowering.
- RWST level is 54%, slowly lowering.

Which ONE of the choices below completes the following statements?

MVG-3003A, SPRAY HDR ISOL LOOP A, must be closed in accordance with EOP-2.0 to ____ (1) ____.

"B" RB spray pump must remain in service until at least time 1100 in order to assure that ____ (2) ____.

- A. 1) prevent flow from being bypassed from Train "B".
2) dose limits to the public are not exceeded.
- B. 1) prevent flow from being bypassed from Train "B".
2) RWST volume transferred to the RB sump will support recirculation mode.
- C. 1) isolate containment.
2) dose limits to the public are not exceeded.
- D. 1) isolate containment.
2) RWST volume transferred to the RB sump will support recirculation mode.

4.

Given the following plant conditions:

- All RCPs tripped.
- RB Pressure is 0.8 psig and stable.
- EOP-1.3, ES-0.2 NATURAL CIRCULATION COOLDOWN is in progress.

Which ONE of the choices below completes the following statement in accordance with EOP-1.3 and its background document?

SG narrow range levels will be maintained greater than a minimum of ____ (1) ____ to ____ (2) ____.

- A. 1) 82%
2) provide a stable heat sink for decay heat removal.
- B. 1) 82%
2) limit rapid changes in steam pressure to prevent safety injection actuation.
- C. 1) 60%
2) provide a stable heat sink for decay heat removal.
- D. 1) 60%
2) limit rapid changes in steam pressure to prevent safety injection actuation.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the SG level requirements for EOP-1.3 and the reason for maintaining this level.

- A. Incorrect. Part 1 is plausible because this is the SG level that you fill SGs to in EOP-4.1A/4.1B/4.1C/4.2/4.3/4.4 for cooling down. Incorrect because EOP-1.3 requires SG levels to be at 62%. Part 2 is correct. The basis for EOP-1.3 says SG levels are maintained at the no-load level to provide a stable heat sink for the decay heat removal.
- B. Incorrect. Part 1 is plausible because this is the SG level that you fill SGs to in EOP-4.1A/4.1B/4.1C/4.2/4.3/4.4 for cooling down. Incorrect because EOP-1.3 requires SG levels to be at 62%. Part 2 is plausible because someone may think a minimum volume gives you an operating band to minimize SG pressure transients. This is also the reason you operate the steam dumps slowly in small increments in EOP-1.3.
- C. Correct. Part 1 is correct. EOP-1.3 requires SG narrow range levels to be maintained at the no-load level to provide a stable heat sink for the decay heat removal. Part 2 is correct. The basis for EOP-1.3 says SG levels are maintained at the no-load level to provide a stable heat sink for the decay heat removal.
- D. Incorrect. Part 1 is correct. EOP-1.3 requires SG narrow range levels to be maintained at the no-load level to provide a stable heat sink for the decay heat removal. Part 2 is plausible because someone may think a minimum volume gives you an operating band to minimize SG pressure transients. This is also the reason you operate the steam dumps slowly in small increments in EOP-1.3.

Form 4.2-1 Written Examination Question Worksheet

K/A: 000015AK3.07 Knowledge of the reasons for the following responses and/or actions as they apply to (APE 15) REACTOR COOLANT Pump Malfunctions (CFR: 41.5 / 41.10 / 45.6 / 45.13): Ensuring that S/G levels are controlled properly for natural circulation enhancement.

K/A Match: The K/A is matched because the candidate must know what SG level to maintain during natural circulation due to RCPs being tripped. The candidate must also know why this SG level is maintained.

Selection criteria: New

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.7 **SRO:**

Technical Reference: EOP-1.3, ES-0.2 NATURAL CIRCULATION COOLDOWN

Proposed references to be provided to candidates during examination: None

Learning Objective: O-EOP-1.3-C04: State the bases or reasons for each action in EOP-1.3.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

5.

Initial conditions:

- 100% power.
- The "A" charging pump is in service.
- The following alarms are received on the Main Control Board:
 - REGEN HX LTDN OUT TEMP HI
 - RCP A (B) (C) #1 SL INJ FLO LO
 - CHG LINE FLO HI/LO
 - CHG PP A/C TRIP

Current conditions:

- AOP-102.2, LOSS OF CHARGING is in progress.
- The crew has ensured "A" charging pump is secured.

Which ONE of the choices below completes the following statement in accordance with AOP-102.2, LOSS OF CHARGING?

A ____ (1) ____ on the "A" charging pump is the cause of the abnormal conditions above.

In the **current conditions**, AOP-102.2 **first** requires operators to ____ (2) ____.

- A. 1) sheared shaft
2) start another charging pump.
- B. 1) sheared shaft
2) close all letdown isolation valves.
- C. 1) ground on motor causes the 50G relay to actuate
2) start another charging pump.
- D. 1) ground on motor causes the 50G relay to actuate
2) close all letdown isolation valves.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must monitor the plant conditions and determine the issue with the charging pump and what action must be taken IAW AOP-102.2.

- A. Incorrect. Part 1 is plausible because three of the four indications are for a sheared shaft. Incorrect because there is an alarm for a charging pump trip which indicates that the pump tripped from the over current relay (50G). Part 2 is plausible because after verifying multiple things, you start a charging pump in AOP-102.2. Incorrect because you isolate letdown first in AOP-102.2.
- B. Incorrect. Part 1 is plausible because three of the four indications are for a sheared shaft. Incorrect because there is an alarm for a charging pump trip which indicates that the pump tripped from the over current relay (50G). Part 2 is correct because AOP-102.2 has you isolate letdown when charging flow is abnormal.
- C. Incorrect. Part 1 is correct because the last alarm regarding the charging pump trip indicates that an over current relay tripped the pump. Part 2 is plausible because after verifying multiple things, you start a charging pump in AOP-102.2. Incorrect because you isolate letdown first in AOP-102.2.
- D. Correct. Part 1 is correct because the last alarm regarding the charging pump trip indicates that an over current relay tripped the pump. Part 2 is correct because AOP-102.2 has you isolate letdown when charging flow is abnormal.

Form 4.2-1 Written Examination Question Worksheet

K/A: 000022AA1.01 Ability to operate and/or monitor the following as they apply to (APE 22) LOSS OF REACTOR Coolant Makeup (CFR: 41.5 / 41.7 / 45.5 to 45.8): CVCS.

K/A Match: The K/A is matched because the candidate must monitor the plant conditions and determine the cause of a charging pump trip and that AOP-102.2 requires you to isolate Letdown in the CVCS system.

Selection criteria: Bank

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.8 **SRO:**

Technical Reference: AOP-102.2, LOSS OF CHARGING.

Proposed references to be provided to candidates during examination: None

Learning Objective: AOP-102.2-3: Given a set of plant conditions, determine the appropriate plant response and operator actions in accordance with AOP-102.2.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

6.

Given the following plant conditions:

- GOP-6 PLANT SHUTDOWN FROM HOT STANDBY TO COLD SHUTDOWN (MODE 3 TO MODE 5) is in progress.
- RCS temperature is 320°F and decreasing.

Which ONE of the choices below completes the following statement?

The RHR suction valves, MVG-8701A(B) and MVG-8702A(B) associated with the **protected train** of RHR will be ____ (1) ____ to ____ (2) ____ in accordance with GOP-6.

- A. 1) energized
2) ensure one train of ECCS will be capable of taking a suction from the RWST
- B. 1) energized
2) allow for immediate train swap upon a loss of RHR
- C. 1) de-energized
2) ensure one train of ECCS will be capable of taking a suction from the RWST
- D. 1) de-energized
2) prevent a loss of RHR due to spurious operation

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know why the RHR suction valves are energized when RHR is in the cooling mode.

- A. Correct. These valves remain energized in order to ensure one train of ECCS will be capable of taking a suction from the RWST.
- B. Incorrect. Part 1 is correct. The RHR suction valves remain energized while RHR is in the cooling mode IAW GOP-6. Part 2 plausible because if they were energized, this would allow for an immediate train swap upon a loss of RHR. Restoration of RHR during a loss of RHR is of the utmost importance while shutdown cooling is in place. Incorrect because the protected train RHR suction valves remain energized so that one train of ECCS will be capable of taking a suction from the RWST and being manually realigned while in MODE 4.
- C. Incorrect. Part 1 is plausible because the operating train of RHR suction valves are de-energized. Incorrect because the statement asks about the RHR suction valves on the protected train. Part 2 is correct. The protected train RHR suction valves remain energized to ensure one train of ECCS will be capable of taking a suction from the RWST.
- D. Incorrect. Part 1 is plausible because the operating train of RHR suction valves are de-energized. Incorrect because the statement asks about the RHR suction valves on the protected train. Part 2 is plausible because this is the reason the RHR suction valves on the operating train of RHR are de-energized.

Form 4.2-1 Written Examination Question Worksheet

K/A: 025 AK3.08: Knowledge of the reasons for the following responses and/or actions as they apply to (APE 25) LOSS OF RESIDUAL Heat Removal System (CFR: 41.5 / 41.10 / 45.6 / 45.13): Verifying capability for ECCS while in RHR cooling mode.

K/A Match: The K/A is matched because the candidate must know the reason that RHR suction valves are in a specific alignment, energized, while RHR is in the shutdown cooling mode.

Selection criteria: New

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.3 **SRO:**

Technical Reference: GOP-6, PLANT SHUTDOWN FROM HOT STANDBY TO COLD SHUTDOWN (MODE 3 TO MODE 5).

Proposed references to be provided to candidates during examination: None

Learning Objective: GOP-6, 03: Explain the NOTE(s) and CAUTION(s) associated with GOP-6.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.5, 41.10

SRO Justification: N/A

Comments:

7.

Given the following plant conditions:

- AOP-118.1, LOSS OF COMPONENT COOLING WATER is in progress.
- A reactor trip has occurred.
- The crew is establishing alternate cooling to the “A” charging pump in accordance with Attachment 1A, CHARGING PUMP A CHILLED WATER ALTERNATE COOLING VALVE LINEUP as seen below:

COMPONENT/ LOCATION	DESCRIPTION	AS FOUND	REQUIRED POSITION	INITIALS	RETURN AS FOUND	INITIALS	VERIFIERS INITIALS
XVG09657A-CC AB-400	CHG PP A OIL CLR CCW INLET VALVE		CLOSED				
XVT19647A-CC AB-400	CHG PP A OIL CLR ALT CLG WTR SUPPLY VLV		OPEN				
XVT09685A-CC AB-400	CHG PP A OIL CLR CCW OUTLET VALVE		CLOSED				
XVT19648A-CC AB-400	CHG PP A OIL CLR ALT CLG WTR RETURN VLV		OPEN				
IPX09062A-HR-VU AB-400	HIGH ROOT TO IPX9062A		OPEN				
IPX09098A-HR-VU AB-400	HIGH ROOT TO IPX9098A		OPEN				
XVT09530A-CC AB-388	CCW SPLY TO CHG PP A OIL CLR BYP VALVE		CLOSED				
XVT19654A-CC AB-388	CHG/SI PUMP A OIL CLR CLG WTR INLET VLV		OPEN				
XVT19655A-CC AB-388	CHG/SI PUMP A GB OIL CLR CLG WTR IN VLV		OPEN				

Which ONE of the choices below completes the following statements?

A Charging Pump can continue to be operated on a loss of Component Cooling Water to its oil coolers for a **maximum** of ____ (1) ____ minutes without local Charging pump temperature monitoring.

A concurrent verification ____ (2) ____ required while Attachment 1A is performed.

REFERENCE PROVIDED

- A. 1) 10
2) is
- B. 1) 10
2) is **not**
- C. 1) 20
2) is
- D. 1) 20
2) is **not**

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know how long a charging pump can be ran without local monitoring IAW AOP-118.1 and be able to read the valve lineup and determine if a concurrent verification is required.

- A. Incorrect. Part 1 is plausible because the RCPs must be tripped if CCW flow is not restored to the RCP within 10 minutes. Incorrect because charging pumps can be run for 20 minutes without local monitoring. Part 2 is plausible because there are a lot of valve lineups that require concurrent verification, however, this valve lineup does not.
- B. Incorrect. Part 1 is plausible because the RCPs must be tripped if CCW flow is not restored to the RCP within 10 minutes. Incorrect because charging pumps can be run for 20 minutes without local monitoring. Part 2 is correct because there is nothing on the valve lineup that indicates a concurrent verification is required.
- C. Incorrect. Part 1 is correct because AOP-118.1 says that charging pumps can be run for a maximum of 20 minutes without local monitoring. Part 2 is plausible because there are a lot of valve lineups that require concurrent verification, however, this valve lineup does not.
- D. Correct. Part 1 is correct because AOP-118.1 says that charging pumps can be run for a maximum of 20 minutes without local monitoring. Part 2 is correct because there is nothing on the valve lineup that indicates a concurrent verification is required.

Form 4.2-1 Written Examination Question Worksheet

K/A: 000026 (APE 26) Loss of Component Cooling Water (G2.1.29) CONDUCT OF OPERATIONS: Knowledge of how to conduct system lineups, such as valves, breakers, or switches (CFR: 41.10 / 45.1 / 45.12).

K/A Match: The K/A is matched because during a loss of CCW, the candidate must know how long a charging pump can be ran without local monitoring and determine from the valve lineup if a concurrent verification is required.

Selection criteria: New

Tier: 1 **Group:** 1

Importance Rating: **RO:** 4.1 **SRO:**

Technical Reference: AOP-118.1, LOSS OF COMPONENT COOLING WATER

Proposed references to be provided to candidates during examination: Reference provided is the picture in the stem.

Learning Objective: AOP-118.1 Given a set of plant conditions, determine the appropriate plant response and operator actions in accordance with AOP-118.1.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

8.

Given the following plant conditions:

- GOP-2 PLANT STARTUP AND HEATUP (MODE 5 TO MODE 3) is in progress.
- RCS temperature is 450°F and increasing.
- The PZR Master Pressure Controller output failed.

Which ONE of the choices below completes the following statement in accordance with T.S. 2.1.2, REACTOR COOLANT SYSTEM PRESSURE?

The RCS pressure shall not exceed a **maximum** of ____ (1) ____ psig.

If maximum pressure is exceeded, the crew must reduce RCS pressure to within limits within a **maximum** of ____ (2) ____.

- A. 1) 2735
2) 5 minutes.
- B. 1) 2735
2) 1 hour.
- C. 1) 3107
2) 5 minutes.
- D. 1) 3107
2) 1 hour.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the T.S. Safety Limit for RCS pressure and if this pressure is exceeded, how long T.S. requires for you to reduce pressure to within limits.

- A. Correct. Part 1 is correct because T.S. 2.1.2 says that RCS pressure shall not exceed 2735 psig. Part 2 is correct because the T.S. says that if this pressure limit is exceeded in MODE 3, which is the current MODE in the stem, says pressure must be restored to within its limit within 5 minutes.
- B. Incorrect. Part 1 is correct because T.S. 2.1.2 says that RCS pressure shall not exceed 2735 psig. Part 2 is plausible because if the plant is in MODE 1, you have to be in HOT STANDBY with RCS Pressure within its limit within 1 hour. Incorrect because the plant is in MODE 3 in the stem and in MODE 3, RCS pressure must be within the limit within 5 minutes.
- C. Incorrect. Part 1 is plausible because this is the hydrostatic test pressure of the RCS, 125% of design pressure. Incorrect because T.S. 2.1.2 says that RCS pressure shall not exceed 2735 psig. Part 2 is correct because the T.S. says that if this pressure limit is exceeded in MODE 3, which is the current MODE in the stem, says pressure must be restored to within its limit within 5 minutes.
- D. Incorrect. Part 1 is plausible because this is the hydrostatic test pressure of the RCS, 125% of design pressure. Incorrect because T.S. 2.1.2 says that RCS pressure shall not exceed 2735 psig. Part 2 is plausible because if the plant is in MODE 1, you have to be in HOT STANDBY with RCS Pressure within its limit within 1 hour. Incorrect because the plant is in MODE 3 in the stem and in MODE 3, RCS pressure must be within the limit within 5 minutes.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000027AK1.05) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (APE 27) PRESSURIZER PRESSURE Control System Malfunction (CFR: 41.5 / 41.7 / 45.7 / 45.8): TS limits for RCS pressure.

K/A Match: The K/A is matched because the candidate must know that with the master pressure controller failing, what the maximum T.S. RCS pressure limit is and the time that is required to reduce RCS pressure to within limits in MODE 3.

Selection criteria: New

Tier: 1 **Group:** 1

Importance Rating: **RO:** 4.1 **SRO:**

Technical Reference: Technical Specifications, Section 2.1.2.

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-2-34 Identify the Technical Specifications associated with the Reactor Coolant System, including LCO, APPLICABILITY, and BASES, for all Technical Specifications with an ACTION of 1 hour or less.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

9.

Given the following plant conditions:

- A steamline break has occurred inside the Reactor Building on "A" SG.
- EOP-3.0, E-2 FAULTED STEAM GENERATOR ISOLATION, is in progress.
- RB Pressure is 19 psig and increasing.
- RCS subcooling is 90°F and increasing.
- Total EFW flow to the INTACT SGs is 200 gpm.
- INTACT SG NR levels are 46% and increasing.
- PZR level is 30% and increasing.

Which ONE of the choices below completes the following statements?

As "A" SG pressure decreases, **the rate** at which RB pressure changes will ____ (1) ____.

Conditions ____ (2) ____ met to reset both trains of SI in accordance with EOP-3.0.

- A. 1) increase.
2) are **not**
- B. 1) increase.
2) are
- C. 1) decrease.
2) are **not**
- D. 1) decrease.
2) are

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the effect that Steam Generator pressure has on the leak rate of the steam out of the Steam Generator as pressure lowers. The candidate must also have knowledge of EOP-3.0, E-2 FAULTED STEAM GENERATOR ISOLATION and the requirements for terminating SI with a Faulted Steam Generator.

- A. Incorrect. Part 1 is plausible if you swap the two pressure values in the equation below. Incorrect because as pressure decreases, steam leak rate will decrease based on the equation below. Part 2 is plausible because EFW flow is less than 450 gpm which is a requirement for a heat sink. Incorrect because SG levels are high enough that EFW flow is not needed.
- B. Incorrect. Part 1 is plausible if you swap the two pressure values in the equation below. Incorrect because as pressure decreases, steam leak rate will decrease based on the equation below. Part 2 is correct because all conditions are met IAW EOP-3.0 to terminate SI.
- C. Incorrect. Part 1 is correct because as pressure decreases, steam leak rate will decrease based on the equation below. Part 2 is plausible because EFW flow is less than 450 gpm which is a requirement for a heat sink. Incorrect because SG levels are high enough that EFW flow is not needed.
- D. Correct. Part 1 is correct because as pressure decreases, steam leak rate will decrease based on the equation below. Part 2 is correct because all conditions are met IAW EOP-3.0 to terminate SI.

$\dot{V} = K\sqrt{P1 - P2}$, by swapping the P1 and P2, initial and final pressures, you get increase.

Form 4.2-1 Written Examination Question Worksheet

K/A: 040 AK1.02: Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (APE 40) STEAM LINE RUPTURE (CFR: 41.5 / 41.7 / 45.7 / 45.8): Leak rate versus pressure change.

K/A Match: The K/A is matched because the candidate must know how the leak rate of the steam coming out of the Steam Generator is effected as Steam Generator pressure changes (lowers).

Selection criteria: New

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.3 **SRO:**

Technical Reference: EOP-3.0, E-2 FAULTED STEAM GENERATOR ISOLATION

Proposed references to be provided to candidates during examination: None

Learning Objective: EOP-3.0, 06: Given a set of plant conditions, predict a discrete path through EOP-3.0.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.5, 41.7

SRO Justification: N/A

Comments:

10.

Given the following plant conditions:

- 100% power.
- “A” Main Feedwater pump trips.
- AOP-210.3, FEEDWATER PUMP MALFUNCTION, is in progress.

Which ONE of the choices below completes the following statements?

The “A” Main Feedwater pump tripping causes the MCB MASTER SPEED CNTRL output to ____ (1) ____.

The crew will reduce power to less than a maximum of ____ (2) ____ power.

- A. 1) increase.
2) 91%
- B. 1) increase.
2) 48%
- C. 1) decrease.
2) 91%
- D. 1) decrease.
2) 48%

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know how the Main Feedwater Master Speed controller reacts to a Main Feedwater pump tripping and know what RX power is required to be reduced to per AOP-210.3 based on one pump tripping.

- A. Correct. Part 1 is correct because when the “A” Main Feedwater pump trips, total feed flow starts to decrease less than steam flow. When this happens, the Steam Generator Water Level Control system tells the Master Speed Controller to increase its output to increase the speed of the “B” and “C” Main Feedwater pumps. Part 2 is correct because AOP-210.3 requires a power reduction to 91% or less.
- B. Incorrect. Part 1 is correct because when the “A” Main Feedwater pump trips, total feed flow starts to decrease less than steam flow. When this happens, the Steam Generator Water Level Control system tells the Master Speed Controller to increase its output to increase the speed of the “B” and “C” Main Feedwater pumps. Part 2 is plausible because AOP-210.3 requires you to reduce reactor power to 48% or less if two Main Feedwater pumps tripped. Incorrect because in the stem, only one Main Feedwater pump has tripped.
- C. Incorrect. Part 1 is plausible if the candidate believes that the controller follows the speed pump speed, which is decreasing. We also have several controllers that work opposite in nature, such as PCV-145, you reduce its output to increase pressure which the candidate could mistake. Part 2 is correct because AOP-210.3 requires a power reduction to 91% or less.
- D. Incorrect. Part 1 is plausible if the candidate believes that the controller follows the speed pump speed, which is decreasing. We also have several controllers that work opposite in nature, such as PCV-145, you reduce its output to increase pressure which the candidate could mistake. Part 2 is plausible because AOP-210.3 requires you to reduce reactor power to 48% or less if two Main Feedwater pumps tripped. Incorrect because in the stem, only one Main Feedwater pump has tripped.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000054AK2.02) Knowledge of the relationship between (APE 54) LOSS OF Main Feedwater and the following systems or components (CFR: 41.8 / 41.10 / 45.3):
Controllers affected by loss of MFW.

K/A Match: The K/A is matched because the candidate must know how the Master Speed Controller reacts to a trip of a main feedwater pump. They must also know what power must be reduced less than in accordance with AOP-210.3.

Selection criteria: New

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.0 **SRO:**

Technical Reference: AOP-210.3, FEEDWATER PUMP MALFUNCTION

Proposed references to be provided to candidates during examination: None

Learning Objective: AOP-210.3: Given a set of plant conditions, predict the following for AOP-210.3: Reactor power limit based on available feedwater system capacity.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.7

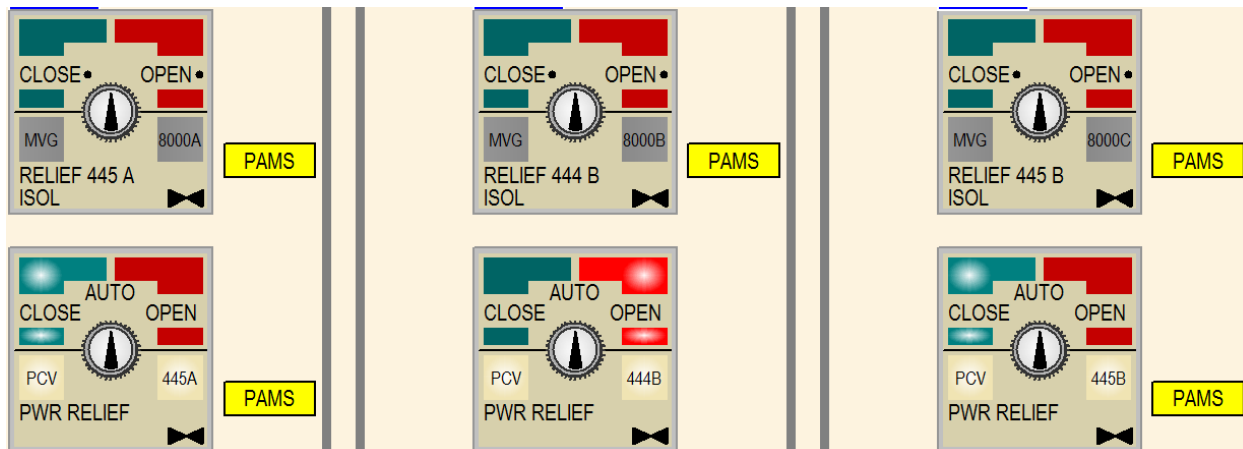
SRO Justification: N/A

Comments:

11.

Given the following plant conditions:

- EOP-6.0, ECA-0.0 LOSS OF ALL ESF AC POWER is in progress.
- PZR pressure is 2300 psig and lowering.
- PZR PORVs and Block Valves are as follows:



Which ONE of the choices below completes the following statements?

The crew will _____ in accordance with EOP-6.0.

REFERENCE PROVIDED

- A. close PCV-444B
- B. open PCV-445A and PCV-445B
- C. close **all** PZR PORV Block Valves
- D. open **all** PZR PORV Block Valves

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that EOP-6.0 requires all PZR PORVs to be closed when PZR Pressure is <2330 psig.

- A. Correct. EOP-6.0 requires all PZR PORVs to be closed with PZR pressure is less than 2330 psig.
- B. Incorrect. Plausible if the candidate believes we are at or above the RCS pressure to have all PORVs open. PCV-444B will normally open prior to PCV-445A/B.
- C. Incorrect. Plausible because the first major action category of EOP-6.0, ECA-0.0 is to isolate the RCS and a candidate could believe that they need to close all PZR PORV Block Valves.
- D. Incorrect. Plausible because the PZR PORV Block Valves are normally open. If the candidate believes they are currently closed because of no indication, they may want to ensure they are all open for RCS overpressure concerns.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000055EK2.01) Knowledge of the relationship between (EPE 55) Station Blackout and the following systems or components (CFR: 41.7 / 45.7): Letdown isolation, RCP seal return, PZR PORVs, or secondary PORVs (atmospheric relief valves).

K/A Match: The K/A is matched because the candidate must know that the PZR PORV is required to be closed for the given plant conditions during a station blackout.

Selection criteria: Bank. 2020 Prairie Island Exam, question 14. Original question is on next page.

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.9 **SRO:**

Technical Reference: EOP-6.0, ECA-0.0 LOSS OF ALL ESF AC POWER

Proposed references to be provided to candidates during examination: Reference provided is the picture in the stem.

Learning Objective: O-EOP-6.0-C07 Given a set of plant conditions, predict a discrete path through EOP-6.0.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

Original question from Prairie Islands 2020 Exam, Question #14.

The crew is performing 1ECA-0.0, Loss of All Safeguards Power.

RCS pressure is 2150 psig and LOWERING.



The crew will...

- A. CLOSE pressurizer PORV 1PCV-430 only.
- B. OPEN pressurizer PORV 1PCV-431C only.
- C. OPEN BOTH pressurizer PORV Block valves.
- D. CLOSE BOTH pressurizer PORV Block valves.

12.

Given the following plant conditions:

- A loss of offsite power (115 KV and 230 KV) occurred.
- EOP-1.0, E-0 REACTOR TRIP OR SAFETY INJECTION is in progress.
- Operators are at step 9, "Check RCS temperature."

Which ONE of the choices below completes the following statement in accordance with EOP-1.0?

EOP-1.0, step 9 will have operators check to ensure that ____ (1) ____ is trending toward ____ (2) ____ to ensure that automatic controls are controlling properly.

- A. 1) T_{AVG}
2) 557°F
- B. 1) T_{COLD}
2) 557°F
- C. 1) T_{AVG}
2) 564°F
- D. 1) T_{COLD}
2) 564°F

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must determine that RCPs are lost due to the loss of offsite power and to recall that observation of TCOLD will be used to determine that plant temperature is trending to the correct condition.

- A. Incorrect. The first part is plausible because TAVG is used if RCPs are running. The second part is correct. Temperature will be verified trending to 557°F. Incorrect because TAVG is not used for the given conditions.
- B. Correct. When responding to a reactor trip with RCPs off, TCOLD is verified trending toward the no-load value of 557°F.
- C. Incorrect. The first part is plausible because TAVG is used if RCPs are running. The temperature in the second part is plausible because this is the setpoint for Feedwater isolation. In EOP-1.0, ES-0.1 REACTOR TRIP RESPONSE, you check RCS Tavg is less than 564°F prior to verifying feedwater isolation. Incorrect because TAVG is not used for the given conditions and temperature is not verified trending to 564°F.
- D. Incorrect. The first part is correct. When responding to a reactor trip with RCPs off, TCOLD is verified. The temperature in the second part is plausible because this is the setpoint for Feedwater isolation. In EOP-1.0, ES-0.1 REACTOR TRIP RESPONSE, you check RCS Tavg is less than 564°F prior to verifying feedwater isolation. Incorrect because TAVG is not used for the given conditions and temperature is not verified trending to 564°F.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000056AK2.12) Knowledge of the relationship between (APE 56) Loss of Offsite Power and the following systems or components (CFR: 41.7 / 45.7): RCS

K/A Match: The KA is matched because the candidate must determine that RCPs are lost due to the loss of offsite power and to recall that observation of TCOLD will be used to determine that plant temperature is trending to the correct condition.

Selection criteria: Bank, EOPS 608 from the 2016 NRC Exam. Original question is on the next page.

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.9 **SRO:**

Technical Reference: EOP-1.0, E-0 REACTOR TRIP OR SAFETY INJECTION

Proposed references to be provided to candidates during examination: None

Learning Objective: EOP-1.0 07 APPLY EOP-1.0 by predicting a discrete path through EOP-1.0 given a set of plant conditions.

Question Cognitive Level:

Memory or Fundamental Knowledge:

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

Original EOPS 608 2016 NRC Exam question:

Given the following plant conditions:

- A loss of offsite power (115 KV and 230 KV) occurred.
- The reactor is tripped.
- EOP-1.0, E-0, REACTOR TRIP OR SAFETY INJECTION in progress.
- Operators are reading step 9, "Check RCS temperature."

Which ONE of the choices below completes the following statement in accordance with EOP-1.0?

Given the conditions above, EOP-1.0, step 9 will have operators check to ensure that ___(1)___ is trending toward ___(2)___ to ensure that automatic controls are controlling properly.

- A. 1) TAVG
2) 557°F.
- B. 1) TCOLD
2) 557°F.
- C. 1) TAVG
2) 564°F.
- D. 1) TCOLD
2) 564°F.

13.

Given the following plant conditions:

- MODE 6.
- XIT-5903 and XIT-5904, 120 VOLT VITAL AC 10KVA UPS are tagged out for maintenance.
- APN-5901, 120 VOLT VITAL AC DISTR PANEL 1 de-energized due to a due to a failed static switch.
- A core off-load is in progress.

Which ONE of the choices below completes the following statement in accordance with T.S. 3.8.3.2, ONSITE POWER DISTRIBUTION – SHUTDOWN?

The crew _____.

- A. is required to immediately suspend all operations involving CORE ALTERATIONS.
- B. can continue CORE ALTERATIONS provided RCS boron concentration is above 2000 ppm prior to the loss of power.
- C. is required to immediately switch the Audio Count Rate to the N-32 Source Range instrument, then may continue with the CORE ALTERATIONS.
- D. can continue CORE ALTERATIONS provided that cavity water level is >23 feet above the reactor vessel flange.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know which of these 1hr or less Tech Spec action statements is required to be applied for a loss of two 120 volt A.C. vital busses.

- A. Correct. T.S. 3.8.3.2 requires immediately suspending all operations involving core alterations.
- B. Incorrect. Plausible because T.S. 3.9.1 (Boron Concentration) applies these actions for MODE 6.
- C. Incorrect. Plausible because N31 was lost when APN-5901 was de-energized. T.S. 3.9.2 requires two Source range NIs to be operable with at least one with an audible indication in the containment and control room in MODE 6. A candidate could misunderstand this and think that if they just switch the audio count rate to N-32, then they could continue core alterations.
- D. Incorrect. Plausible because T.S. 3.8.1.2 requires water level to be >23 feet above the reactor vessel flange as part of the action statement. A candidate could misapply this and think that core alterations can continue if cavity water level is >23 feet above the reactor vessel flange.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000057) (APE 57) Loss of Vital AC Instrument Bus (G2.2.40) EQUIPMENT CONTROL: Ability to apply TS with action statements of less than or equal to 1 hour (CFR: 41.10 / 43.2 / 43.5 / 45.3)

K/A Match: The K/A is matched because the candidate must apply a T.S. action statement that is 1 hour or less for a loss of two 120 volt A.C. Vital busses.

Selection criteria: New

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.4 **SRO:**

Technical Reference: VC Summer Technical Specifications, T.S. 3.8.3.2, ONSITE POWER DISTRIBUTION – SHUTDOWN.

Proposed references to be provided to candidates during examination: None

Learning Objective: GS-2, 032: Identify the Technical Specifications associated with the Safeguards power system, including LCOs, Applicability, and bases, for all Technical Specifications with an ACTION of 1 hour or less.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

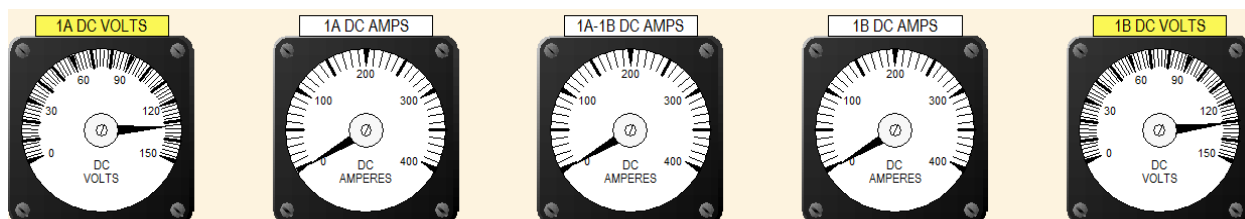
SRO Justification: N/A

Comments:

14.

Given the following plant conditions:

- EOP-6.0, ECA-0.0 LOSS OF ALL ESF AC POWER is in progress.
- An ELAP has been declared.
- Main Control Board indications are as follows:



Which ONE of the choices completes the following statements?

Entry into FSP-7.0, LOSS OF VITAL INSTRUMENTATION OR CONTROL POWER
 ___(1)___ required in accordance with EOP-6.0.

Restoration of power to ___(2)___ will allow XBC1A-1B, BACKUP BATTERY CHRG to be aligned to DPN1HA, BATTERY MAIN DISTRIBUTION PANEL 1HA.

REFERENCE PROVIDED

- A. 1) is
2) XMC1DA2Z
- B. 1) is
2) XMC1DA2Y
- C. 1) is **not**
2) XMC1DA2Z
- D. 1) is **not**
2) XMC1DA2Y

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must determine from the DC volts and amp meter indications that entry requirements for FSP-7.0 are not met because DC volts are >105 volts. They must also know that restoration of power to XMC1DA2Y will allow XBC1A-1B, BACKUP BATTERY CHRG to be aligned to DPN1HA, BATTERY MAIN DISTRIBUTION PANEL 1HA.

- A. Incorrect. Part 1 is plausible because the DC amps indications all read 0. A candidate could think that these are the indicators to determine entry into FSP-7.0. Incorrect because FSP-7.0 is entered from EOP-6.0 if 1A or 1B DC volts are <105 Volts. Part 2 is plausible because this is also a safety related bus with the same voltage. Incorrect because restoring power to XMC1DA2Y will allow XBC1A-1B, BACKUP BATTERY CHRG to be aligned to DPN1HA, BATTERY MAIN DISTRIBUTION PANEL 1HA.
- B. Incorrect. Part 1 is plausible because the DC amps indications all read 0. A candidate could think that these are the indicators to determine entry into FSP-7.0. Incorrect because FSP-7.0 is entered from EOP-6.0 if 1A or 1B DC volts are <105 Volts. Part 2 is correct because restoring power to XMC1DA2Y will allow XBC1A-1B, BACKUP BATTERY CHRG to be aligned to DPN1HA, BATTERY MAIN DISTRIBUTION PANEL 1HA.
- C. Incorrect. Part 1 is correct because 1DA and 1DB DC volts are >105 volts therefore FSP-7.0 is not required to be entered. Part 2 is plausible because this is also a safety related bus with the same voltage. Incorrect because restoring power to XMC1DA2Y will allow XBC1A-1B, BACKUP BATTERY CHRG to be aligned to DPN1HA, BATTERY MAIN DISTRIBUTION PANEL 1HA.
- D. Correct. Part 1 is correct because 1DA and 1DB DC volts are >105 volts therefore FSP-7.0 is not required to be entered. Part 2 is correct because restoring power to XMC1DA2Y will allow XBC1A-1B, BACKUP BATTERY CHRG to be aligned to DPN1HA, BATTERY MAIN DISTRIBUTION PANEL 1HA.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000058AA1.06) Ability to operate and/or monitor the following as they apply to (APE 58) LOSS OF DC Power (CFR: 41.7 / 45.5 / 45.6): DC distribution system.

K/A Match: The K/A is matched because the candidate must monitor multiple DC distribution indications and determine which bus must be restored to restore power to the battery chargers and if entry to FSP-7.0 is required.

Selection criteria: Modified DC ELECT DIST SYSTEM 079 from the 2017 NRC. The question is modified by changing the voltages and now a previous incorrect answer is the correct answer. Original question is on the next page.

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.7 **SRO:**

Technical Reference: EOP-6.0, ECA-0.0 LOSS OF ALL ESF AC POWER

Proposed references to be provided to candidates during examination: Reference provided is the picture in the stem.

Learning Objective: O-EOP-6.0-C07 Given a set of plant conditions, predict a discrete path through EOP-6.0.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

Original DC ELECT DIST SYSTEM 079 from the 2017 NRC:

B

Given the following plant conditions:

- A sustained loss of offsite and onsite power has occurred.
- An ELAP has been declared.
- EOP-6.0, ECA-0.0 LOSS OF ALL ESF AC POWER is in progress.
- The following annunciators are noted to be in alarm:
 - XCP-636, 4-4, TRAIN A BATT CHGR TRBL XBC1A/1A-1B.
 - XCP-637, 4-4, TRAIN B BATT CHGR TRBL XBC1B/1A-1B.
- Meters on the Main Control Board read as follows:
 - 1A DC VOLTS 104 VDC and decreasing.
 - 1A DC AMPS 0 amps and stable.
 - 1A-1B DC AMPS 0 amps and stable.
 - 1B DC AMPS 0 amps and stable.
 - 1B DC VOLTS 104 VDC and decreasing.

Which ONE of the choices completes the following statements?

Entry into FSP-7.0, LOSS OF VITAL INSTRUMENTATION OR CONTROL POWER
__(1)__ required in accordance with EOP-6.0.

Restoration of power to __(2)__ will allow the TRAIN A BATT CHGR TRBL XBC1A/1A-1B alarm to clear.

- A. 1) is
2) XMC1DA2Z
- B. 1) is
2) XMC1DA2X
- C. 1) is **not**
2) XMC1DA2Z
- D. 1) is **not**
2) XMC1DA2X

15.

Given the following plant conditions:

- 100% power.
- The running station instrument air compressor trips.
- The crew has entered AOP-220.1, LOSS OF INSTRUMENT AIR.
- The standby station instrument air compressor fails to start.
- XAC-12, SUPP INST AIR COMPRESSOR, fails to start.
- Instrument air pressure continues to decrease.

Which ONE of the choices below answers the following questions?

- 1) What is the air pressure at which the Diesel Driven Air Compressor should first receive a start signal?
 - 2) What is a condition that **requires** a reactor trip, in accordance with AOP-220.1?
- A. 1) 90 psig
2) Instrument Air header pressure decreases to 60 psig.
- B. 1) 65 psig
2) An MSIV indicates off its open seat.
- C. 1) 65 psig
2) Instrument Air header pressure decreases to 60 psig.
- D. 1) 90 psig
2) An MSIV indicates off its open seat.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know at what Instrument air header pressure the Diesel Driven Air compressor receives an automatic start signal and what requires a manual reactor trip in accordance with AOP-220.1.

- A. Incorrect. Part 1 is plausible because at 90 psig, the standby Station Instrument Air compressor automatically starts. Incorrect because the question is asking when the Diesel Driven Air Compressor receives a start signal and that is at 65 psig. Part 2 is plausible because there is a reactor trip on low instrument air header pressure, however, it is at 50 psig. 60 psig is plausible because this is when IPV-8324 fully closes to isolate instrument air from the service air system.
- B. Correct. Part 1 is correct because at 65 psig, the Diesel Driven Air compressor receives a start signal. Part 2 is correct because AOP-220.1 requires a manual reactor trip if a MSIV indicates off its open seat.
- C. Incorrect. Part 1 is correct because at 65 psig, the Diesel Driven Air compressor receives a start signal. Part 2 is plausible because there is a reactor trip on low instrument air header pressure, however, it is at 50 psig. 60 psig is plausible because this is when IPV-8324 fully closes to isolate instrument air from the service air system.
- D. Incorrect. Part 1 is plausible because at 90 psig, the standby Station Instrument Air compressor automatically starts. Incorrect because the question is asking when the Diesel Driven Air Compressor receives a start signal and that is at 65 psig. Part 2 is correct because AOP-220.1 requires a manual reactor trip if a MSIV indicates off its open seat.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000065AA2.09) Ability to determine and/or interpret the following as they apply to (APE 65) LOSS OF Instrument Air (CFR: 41.10 / 43.5 / 45.13): Automatic IAS responses as air header pressure lowers.

K/A Match: The K/A is matched because the candidate must know when the Diesel Driven Air compressor will automatically start and determine from the indications given, when a reactor trip is required in accordance with AOP-220.1.

Selection criteria: Modified question 65 from the 2019 NRC Exam. Question was modified by asking a different question for the second statement. The original question is on the next page.

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.3 **SRO:**

Technical Reference: AOP-220.1, LOSS OF INSTRUMENT AIR.

Proposed references to be provided to candidates during examination: None

Learning Objective: AOP-220.1-04: Given a set of plant conditions, DETERMINE the following for AOP-220.1: If a reactor trip is required due to a loss of instrument air.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

Original question 65 from the 2019 NRC Exam:

D

Given the following plant conditions:

- 100% power.
- The running station instrument air compressor trips.
- The crew has entered AOP-220.1, LOSS OF INSTRUMENT AIR.
- The standby station instrument air compressor fails to start.
- XAC-12, SUPP INST AIR COMPRESSOR, fails to start.
- Instrument air pressure continues to decrease.

Which ONE of the choices below answers the following questions?

- 1) What is the air pressure at which the Diesel Driven Air Compressor will **first** receive a start signal?
 - 2) What is the **lowest** air pressure specified in AOP-220.1 at which a manual reactor trip will be required?
- A. 1) 70 psig
2) 55 psig
- B. 1) 70 psig
2) 50 psig
- C. 1) 65 psig
2) 55 psig
- D. 1) 65 psig
2) 50 psig

16.

Given the following plant conditions:

- 30% power.
- XTF-4 and XTF-6 are out of service for maintenance.
- XTF-5 is in service.
- A grid disturbance occurs causing the following line voltages:
 - 230 KV source is at 236.1 KV.
 - 115 KV source is at 115.4 KV.
- 7.2KV Bus 1 C is aligned to its alternate source of power.
- VARs are at 235 MVARs lagging at the request of the System Controller.

Which ONE of the following identifies the 7.2 KV ESF busses that have **inoperable** offsite sources, if any, in accordance with AOP-301.1, RESPONSE TO ELECTRICAL GRID ISSUES?

REFERENCE PROVIDED

- A. 1DA **only**.
- B. 1DB **only**.
- C. **Both** 1DA and 1DB.
- D. **Neither** bus.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must correctly determine that no ESF busses have inoperable offsite sources given a unique electric plant lineup and several offsite voltages from Attachment 3 of AOP-301.1.

- A. Incorrect. Plausible if the candidate misapplies attachment 3 and utilizes the Generator on line with MVAR >330. Incorrect because MVARs are ≤ 330 .
- B. Incorrect. Plausible if the candidate misapplies attachment 3 and utilizes the Generator on line with MVAR >330, misunderstanding where bus 1DB is getting its power from. Incorrect because MVARs are ≤ 330 and bus 1 DB is currently receiving power from XTF-31.
- C. Incorrect. Plausible if the candidate misapplies attachment 3 and thinks that both 1DA and 1DB are connected. Incorrect because they are not currently connected. Bus 1 DB is currently receiving power from XTF-31 and Bus 1 DA is receiving power from XTF-5 via bus 1DX.
- D. Correct. Interpreting the correct electric plant lineup, both 230KV and 115KV lines are currently operable.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000077AA2.07) Ability to determine and/or interpret the following as they apply to (APE 77) GENERATOR VOLTAGE AND ELECTRIC Grid Disturbances (CFR: 41.10 / 43.5 / 45.13): Status of ESFs

K/A Match: The K/A is matched because the candidate must interpret the electric plant lineup based on grid disturbances and determine if any ESF busses are inoperable.

Selection criteria: Modified AOPS 613. The question is modified by changing conditions in the stem and making a previous incorrect answer, correct.

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.9 **SRO:**

Technical Reference: AOP-301.1, RESPONSE TO ELECTRICAL GRID ISSUES.

Proposed references to be provided to candidates during examination: AOP-301.1, Attachment 3, pages 1 and 2.

Learning Objective: AOP-301.1-04: Given a set of plant conditions, determine the following for AOP-301.1: Operability of offsite power sources.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

Original AOPS 613 Question:

Given the following plant conditions:

- 100% power.
- XTF-4 and XTF-6 are out of service for maintenance.
- XTF-5 is in service.
- A grid disturbance occurs causing the following line voltages:
 - 230 KV source is at 236.1 KV.
 - 115 KV source is at 115.4 KV.
 - The normal feeder for bus 1C opens spuriously.
 - VARs are at 335 MVARs lagging at the request of the System Controller.

Which ONE of the following identifies the 7.2 KV ESF busses that have inoperable offsite sources in accordance with AOP-301.1, RESPONSE TO ELECTRICAL GRID ISSUES?

REFERENCE PROVIDED

- A. 1DA only.
- B. 1DB only.
- C. Both 1DA and 1DB.
- D. Neither bus.

17.

Given the following plant conditions:

- A LOCA outside the RB has occurred.
- EOP-2.5, ECA-1.2 LOCA OUTSIDE CONTAINMENT is in progress.
- The crew closed MVG-8888B, RHR LP B TO COLD LEGS to attempt to isolate the break.
- PZR level is 0%.
- RCS pressure is 850 psig and increasing.

Which ONE of the choices below completes the following statements?

When closing MVG-8888B, turning a POWER LOCKOUT switch ____ (1) ____ required before operating the valve.

In accordance with EOP-2.5, the break ____ (2) ____ isolated.

- A. 1) was
2) is
- B. 1) was
2) is **not**
- C. 1) was **not**
2) is
- D. 1) was **not**
2) is **not**

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that a power lockout switch is required to be operated in order to close MVG-8888B. The candidate must also know what parameters EOP-2.5 looks at to determine that the leak is isolated.

- A. Correct. Part 1 is correct because in order to operate MVG-8888B, you must use a power lockout switch prior to opening or closing this valve. Part 2 is correct because RCS pressure is increasing and this is the only parameter that EOP-2.5 looks at to determine if the leak is isolated.
- B. Incorrect. Part 1 is correct because in order to operate MVG-8888B, you must use a power lockout switch prior to opening or closing this valve. Part 2 is plausible because PZR level is 0% and there are numerous procedures in which PZR level is a parameter used to indicate something of significance such as when you can terminate SI in EOP-2.0 and when level has reached a specific setpoint to reestablish Pressure control in EOP-2.1.
- C. Incorrect. Part 1 is plausible because the majority of valves on the Main Control Board do not require a power lockout switch to operate prior to opening or closing the valve. Incorrect because MVG-8888B requires the operation of a power lockout switch prior to operating MVG-8888B. Part 2 is correct because RCS pressure is increasing and this is the only parameter that EOP-2.5 looks at to determine if the leak is isolated.
- D. Incorrect. Part 1 is plausible because the majority of valves on the Main Control Board do not require a power lockout switch to operate prior to opening or closing the valve. Incorrect because MVG-8888B requires the operation of a power lockout switch prior to operating MVG-8888B. Part 2 is plausible because PZR level is 0% and there are numerous procedures in which PZR level is a parameter used to indicate something of significance such as when you can terminate SI in EOP-2.0 and when level has reached a specific setpoint to reestablish Pressure control in EOP-2.1.

Form 4.2-1 Written Examination Question Worksheet

K/A: (WE04EA2.03) Ability to determine and/or interpret the following as they apply to (W E04) LOCA Outside Containment (CFR: 41.10 / 43.5 / 45.13): RCS pressure

K/A Match: The K/A is matched because determine from parameters that are given whether or not the LOCA outside of containment is isolated based on RCS pressure.

Selection criteria: Modified question 16 of the 2019 NRC Exam by adding new bullets in the stem and making the candidate determine if the leak is isolated, which was not previously asked in the original question. Original question is on the next page.

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.9 **SRO:**

Technical Reference: EOP-2.5, ECA-1.2 LOCA OUTSIDE CONTAINMENT

Proposed references to be provided to candidates during examination: None

Learning Objective: EOP-2.5-06: Given a set of plant conditions, PREDICT a discrete path through EOP-2.5.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

Original question 16 from the 2019 NRC Exam:

Given the following plant conditions:

- A LOCA outside the RB has occurred.
- The crew is at an action in EOP-2.5, LOCA OUTSIDE CONTAINMENT that directs closure of RHR discharge isolation valves.

Which ONE of the choices below completes the following statement?

During leak isolation, ____ (1) ____ will be closed and turning a POWER LOCKOUT switch ____ (2) ____ be required before operating the valve.

- A. 1) MVG-8887A, RHR LP A TO HOT LEGS
2) will **not**
- B. 1) MVG-8887A, RHR LP A TO HOT LEGS
2) will
- C. 1) MVG-8888A, RHR LP A TO COLD LEGS
2) will **not**
- D. 1) MVG-8888A, RHR LP A TO COLD LEGS
2) will

18.

Initial conditions:

- 100% power.
- All three Emergency Feedwater pumps were declared inoperable.

Current conditions:

- An inadvertent Safety Injection signal occurred.
- EOP-15.0, FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK is in progress.

Which ONE of the choices below completes the following statements?

In the **initial conditions**, T.S. 3.7.1.2, EMERGENCY FEEDWATER SYSTEM requires the crew to immediately ____ (1) ____.

In the **current conditions**, EOP-15.0 will **first** attempt to restore a secondary heat sink using ____ (2) ____.

- A. 1) open the reactor trip breakers.
2) Main Feedwater pumps.
- B. 1) initiate corrective actions to restore at least one EFW pump.
2) Main Feedwater pumps.
- C. 1) open the reactor trip breakers.
2) Main Feedwater Booster pumps.
- D. 1) initiate corrective actions to restore at least one EFW pump.
2) Main Feedwater Booster pumps.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that T.S. 3.7.1.2 requires immediate action to restore at least one EFW pump and that EOP-15.0 will attempt to first restore feedwater using the Main Feedwater pumps.

- A. Incorrect. Part 1 is plausible because there are actions in Tech Specs that required the immediate opening of the reactor trip breakers, e.g. T.S. 3.10.5. Incorrect because T.S. 3.7.1.2 requires immediate action to restore at least one emergency feedwater pump. Part 2 is correct because EOP-15.0 first attempts to restore feedwater using the Main Feedwater pumps.
- B. Correct. Part 1 is correct because T.S. 3.7.1.2 requires immediate action to restore at least one emergency feedwater pump. Part 2 is correct because EOP-15.0 first attempts to restore feedwater using the Main Feedwater pumps.
- C. Incorrect. Part 1 is plausible because there are actions in Tech Specs that required the immediate opening of the reactor trip breakers, e.g. T.S. 3.10.5. Incorrect because T.S. 3.7.1.2 requires immediate action to restore at least one emergency feedwater pump. Part 2 is plausible because EOP-15 does use Main Feedwater Booster pumps to restore feedwater, however, this is not the first method that it tries.
- D. Incorrect. Part 1 is correct because T.S. 3.7.1.2 requires immediate action to restore at least one emergency feedwater pump. Part 2 is plausible because EOP-15 does use Main Feedwater Booster pumps to restore feedwater, however, this is not the first method that it tries.

Form 4.2-1 Written Examination Question Worksheet

K/A: (W E05) Inadequate Heat Transfer – Loss of Secondary Heat Sink (G2.2.39)
EQUIPMENT CONTROL: Knowledge of less than or equal to 1 hour TS action statements (does not include action statements of 1 hour or less that follow the expiration of a completion time for a TS condition for which an action statement has already been entered) (CFR: 41.7 / 41.10 / 43.2 / 45.13)

K/A Match: The K/A is matched because the candidate must know the immediate actions of T.S. 3.7.1.2 for all three EFW pumps being inoperable, which is what gets them into the second part of the question regarding how to restore feedwater during a loss of secondary heat sink.

Selection criteria: New

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.9 **SRO:**

Technical Reference: Technical Specification 3.7.1.2, EMERGENCY FEEDWATER SYSTEM.

Proposed references to be provided to candidates during examination: None

Learning Objective: IB-3-29: Identify the Technical Specifications associated with the EFW system, including LCOs, Applicability, and Bases, for all Technical Specifications with an ACTION of 1 hour or less.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

19.

Given the following plant conditions:

- All Power Range NIs on IPCS read 4.8% power.
- Control Bank "D" Group 1 demand counter reads 98 steps.
- Control Bank "D" Group 1 rod H-14 indicates 114 steps on DRPI.
- AOP-403.5, STUCK OR MISALIGNED CONTROL ROD is in progress.

Which ONE of the choices below completes the following statements in accordance with AOP-403.5?

AOP-403.5 requires T_{AVG} to be maintained within a maximum of ____ (1) ____ of T_{REF} .

The crew is required perform a plant shut down to MODE 3 because ____ (2) ____.

- A. 1) 5°F
2) Control Bank D rods are less than 100 steps.
- B. 1) 10°F
2) Control Bank D rods are less than 100 steps.
- C. 1) 5°F
2) rod alignment steps could result in a mode change.
- D. 1) 10°F
2) rod alignment steps could result in a mode change.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the maximum temperature difference between T_{avg} and T_{ref} that AOP-403.5 requires and the reason AOP-403.5 requires the plant to be shut down to MODE 3 in this specific case.

- A. Incorrect. Part 1 is correct because AOP-403.5 requires T_{avg} and T_{ref} to be maintained within 5°F. Part 2 is plausible because the stem has control bank D demand counter less than 100 steps and 100 steps is associated with where we expect to go critical at based on the estimated critical boron concentration (REP-109.001). A candidate could believe that power is too high with control bank d rods below 100 steps and require a shutdown to MODE 3.
- B. Incorrect. Part 1 is plausible because in GOP-Appendix A has requirements for the reactor to be tripped if T_{avg}/T_{ref} mismatch exceeds 10°F. Part 2 is plausible because the stem has control bank D demand counter less than 100 steps and 100 steps is associated with where we expect to go critical at based on the estimated critical boron concentration (REP-109.001). A candidate could believe that power is too high with control bank d rods below 100 steps and require a shutdown to MODE 3.
- C. Correct. Part 1 is correct because AOP-403.5 requires T_{avg} and T_{ref} to be maintained within 5°F. Part 2 is correct because AOP-403.5 has a caution that states "IF rod alignment could result in a mode change or a subcritical Reactor reaching criticality, then the plant shall be shut down to Mode 3.
- D. Incorrect. Part 1 is plausible because in GOP-Appendix A has requirements for the reactor to be tripped if T_{avg}/T_{ref} mismatch exceeds 10°F. Part 2 is correct because AOP-403.5 has a caution that states "IF rod alignment could result in a mode change or a subcritical Reactor reaching criticality, then the plant shall be shut down to Mode 3.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000005AK3.05) Knowledge of the reasons for the following responses and/or actions as they apply to (APE 5) INOPERABLE/STUCK Control Rod (CFR: 41.5 / 41.10 / 45.6 / 45.13): Power limits on rod misalignment

K/A Match: The K/A is matched because the candidate must know the reason the plant must be shutdown during this stuck rod casualty based on the current plant power.

Selection criteria: New

Tier: 1 **Group:** 2

Importance Rating: **RO:** 3.9 **SRO:**

Technical Reference: AOP-403.5, STUCK OR MISALIGNED CONTROL ROD

Proposed references to be provided to candidates during examination: None

Learning Objective: AOP-403.5-04: Given a set of plant conditions, determine the plant response and appropriate operator actions in accordance with AOP-403.5

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

20.

Given the following plant conditions:

- MODE 6 with core off-load in progress.
- XCP-609 2-6, REFUEL CAV LVL HI/LO is in alarm.
- AOP-123.1, DECREASING LEVEL IN THE SPENT FUEL POOL OR REFUELING CAVITY DURING REFUELING, is in progress.

Which ONE of the choices below completes the following statement in accordance with AOP-123.1?

An **immediate** evacuation of the RB and FHB is required when ____ (1) ____ **first** reaches ____ (2) ____ R/hr.

- A. 1) RM-G17A(B), RB MANIP CRANE AREA GAMMA
2) 2
- B. 1) RM-G8, FHB REFUELING BRIDGE AREA GAMMA
2) 2
- C. 1) RM-G17A(B), RB MANIP CRANE AREA GAMMA
2) 20
- D. 1) RM-G8, FHB REFUELING BRIDGE AREA GAMMA
2) 20

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that AOP-123.1 requires immediate evacuation of the Reactor Building and the Fuel Handling Building if RM-G17A9B) reads greater than 20 R/hr.

- A. Incorrect. Part 1 is correct because AOP-123.1 has you immediately evacuate the RB and FHB when RM-G17A(B) reaches a setpoint of 20 R/hr. Part 2 is plausible because this is the administrative dose limit at VC Summer IAW RP-AA-105. Incorrect because the AOP says at 20 R/hr, the Reactor Building and the Fuel Handling Building will be evacuated.
- B. Incorrect. Part 1 is plausible because this rad monitor is monitored in AOP-123.1 and with these conditions in the stem, the Spent Fuel Pool and the cavity are connected. Incorrect because RM-G17A(B) is monitored for evacuation in AOP-123.1. Part 2 is plausible because this is the administrative dose limit at VC Summer IAW RP-AA-105. Incorrect because the AOP says at 20 R/hr, the Reactor Building and the Fuel Handling Building will be evacuated.
- C. Correct. Part 1 is correct because AOP-123.1 has you immediately evacuate the RB and FHB when RM-G17A(B) reaches a setpoint of 20 R/hr. Part 2 is correct because AOP-123.1 requires the RB and FHB to be evacuated at 20 R/hr.
- D. Incorrect. Part 1 is plausible because this rad monitor is monitored in AOP-123.1 and with these conditions in the stem, the Spent Fuel Pool and the cavity are connected. Incorrect because RM-G17A(B) is monitored for evacuation in AOP-123.1. Part 2 is correct because AOP-123.1 requires the RB and FHB to be evacuated at 20 R/hr.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000036AK1.04) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (APE 36) FUEL HANDLING INCIDENTS (CFR: 41.5 / 41.7 / 45.7 / 45.8): Refueling water level

K/A Match: The K/A is matched because the candidate must know that during a loss of refueling water level, AOP-123.1 requires an immediate evacuation of the Fuel Handling Building and the Reactor Building when RM-G17A(B) reads >20 R/hr.

Selection criteria: New

Tier: 1 **Group:** 2

Importance Rating: **RO:** 3.6 **SRO:**

Technical Reference: AOP-123.1, DECREASING LEVEL IN THE SPENT FUEL POOL OR REFUELING CAVITY DURING REFUELING.

Proposed references to be provided to candidates during examination: None

Learning Objective: AOP-123.1-03: Given a set of plant conditions, determine the appropriate plant response and operator actions in accordance with AOP-123.1

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

21.

Initial conditions:

- 75% power.
- AOP-206.1, DECREASING MAIN CONDENSER VACUUM has been entered.
- The crew is starting the standby Main Condenser Vacuum pump.

Which ONE of the choices below completes the following statement?

A condition that would cause Main Condenser Vacuum to degrade would be lowering of Circulating Water ____ (1) ____.

AOP-206.1 requires MAIN CVP C to be aligned to ____ (2) ____.

- A. 1) inlet temperature.
2) either Main Condenser A **or** B.
- B. 1) flow.
2) either Main Condenser A **or** B.
- C. 1) inlet temperature.
2) **both** Main Condenser A and B.
- D. 1) flow.
2) **both** Main Condenser A and B.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know how a change in Circulating Water flow through the main condenser will impact Vacuum and they must know how the standby condenser vacuum pump is aligned to the main condensers in accordance with AOP-206.1.

- A. Incorrect. Part 1 is plausible because Circulating water inlet temperature would impact vacuum, however, lowering of circulating water inlet temperature would cause vacuum to improve, not degrade. Part 2 is correct because AOP-206.1 has you align Main Condenser vacuum pump “C” to either “A” or “B” Main condenser.
- B. Correct. Part 1 is correct because if you lower mass flowrate of Circulating water through the condenser, vacuum will lower. Part 2 is correct because AOP-206.1 has you align Main Condenser vacuum pump “C” to either “A” or “B” Main condenser.
- C. Incorrect. Part 1 is plausible because Circulating water inlet temperature would impact vacuum, however, lowering of circulating water inlet temperature would cause vacuum to improve, not degrade. Part 2 is plausible because the step has you align the vacuum pump to Condenser “A” or Condenser “B”. This could easily be mistaken for Condenser “A” and Condenser “B” in order to aid in improving vacuum.
- D. Incorrect. Part 1 is correct because if you lower mass flowrate of Circulating water through the condenser, vacuum will lower. Part 2 is plausible because the step has you align the vacuum pump to Condenser “A” or Condenser “B”. This could easily be mistaken for Condenser “A” and Condenser “B” in order to aid in improving vacuum.

$$\dot{Q} = \dot{m}c_p\Delta T$$

Utilizing this equation, if the inlet temperature were to drop, the ΔT would get bigger and therefore $\dot{Q}$ would get larger, assuming $\dot{m}$ and c_p stayed constant. This would create more heat transfer in the main condenser which would increase vacuum.

By lowering Circulating water flow, $\dot{m}$ in the equation above, assuming ΔT and c_p stayed constant, you decrease the amount of heat transfer in the main condenser and therefore lower vacuum.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000051AK1.01) Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (APE 51) LOSS OF Condenser Vacuum (CFR: 41.5 / 41.7 / 45.7 / 45.8): Relationship of condenser vacuum to circulating water, flow rate, and temperature

K/A Match: The K/A is matched because the candidate must know the operational implications of circulating water flow being reduced, how this impacts vacuum, and which condenser to align the standby vacuum pump to during a loss of condenser vacuum.

Selection criteria: New

Tier: 1 **Group:** 2

Importance Rating: **RO:** 3.3 **SRO:**

Technical Reference: AOP-206.1, DECREASING MAIN CONDENSER VACUUM

Proposed references to be provided to candidates during examination: None

Learning Objective: AOP-206.1-04: Given a set of plant conditions, determine the appropriate plant response and operator actions in accordance with AOP-206.1.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

22.

Given the following plant conditions:

- A release is in progress from the Steam Generator Blowdown system to the Circulating Water System.
- XCP-645 4-3, SG BLDN EFF RM-L10 HI RAD is in alarm.
- RM-L10, SG BLOWDOWN CW DISCHARGE LIQUID MONITOR alarm is valid.
- **No** automatic actions occurred.

NOTE the following valves:

PVT-547, CW SYS STM GEN BD INLET FLOW ISOL VALVE.

PVT-524, TO CW.

PVG-525, DIVERT TO NB.

Which one of the choices below completes the following statement?

XCP-645 4-3 requires manual closing of _____ to terminate the release.

- A. PVT-524 **only**
- B. PVT-547 **only**
- C. PVG-525 **only**
- D. **both** PVT-547 and PVG-524

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that XCP-645 requires PVT-547 to be manually closed since no automatic actions occurred.

- A. Incorrect. Plausible because PVT-524 is closed automatically based on a rad monitor in alarm. Incorrect because RM-L3 sends a close sign to PVT-524, not RM-L10. RM-L3 monitors SG blowdown and diverts flow to a holdup tank.
- B. Correct. When RM-L10 alarms, a signal is generated to close PVT-547. Because no automatic actions occurred, XCP-645 requires the manual closing of PVT-547.
- C. Incorrect. Plausible because this is a valve in the SG blowdown line and receives a signal from a rad monitor. Incorrect because this valve receives an automatic signal to open from RM-L3 to divert SG blowdown flow to the Holdup Tank.
- D. Incorrect. Plausible because both valves are in the SG blowdown line and both valves receive signals from rad monitors. Incorrect because RM-L3 sends a signal to close PVT-524. RM-L3 is not in alarm in the stem.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000059AA1.05) Ability to operate and/or monitor the following as they apply to (APE 59) ACCIDENTAL LIQUID Radwaste Release (CFR: 41.5 / 41.7 / 45.5 to 45.8): S/GB

K/A Match: The K/A is matched because the candidate must know which valve in the SG blowdown system to manually closed based on the Radiation Monitor that is in alarm.

Selection criteria: New

Tier: 1 **Group:** 2

Importance Rating: **RO:** 2.9 **SRO:**

Technical Reference: XCP-645 4-3, SG BLDN EFF RM-L10 HI RAD

Proposed references to be provided to candidates during examination: None

Learning Objective: GS-09-014: DESCRIBE the normal operation of the radiation monitoring system.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

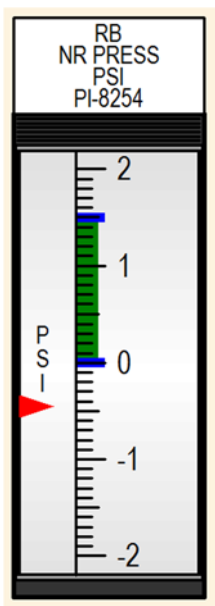
SRO Justification: N/A

Comments:

23.

Given the following plant conditions:

- 100% power.
- Reactor building internal pressure is as indicated below:



Which ONE of the choices below completes the following statements?

LCO 3.6.1.4, INTERNAL PRESSURE is currently ____ (1) ____.

If RB pressure is outside the T.S. 3.6.1.4 limit, the crew is required to restore pressure to within limits within a **maximum** of ____ (2) ____.

REFERENCE PROVIDED

- A. 1) met.
2) 15 minutes.
- B. 1) met.
2) 1 hour.
- C. 1) **not** met.
2) 15 minutes.
- D. 1) **not** met.
2) 1 hour.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that based on the RB Pressure instrument, RB pressure is out of spec and T.S. will require the restoration of RB pressure within an hour.

- A. Incorrect. Part 1 is plausible because a common mistake at VC Summer is that RB pressure lower limit is -1 psig, vice the T.S. lower limit of -0.1 psig. Part 2 is plausible because T.S. has action statements that have 15 minute requirements such as restoring RCS Tavg to above 551°F within 15 minutes.
- B. Incorrect. Part 1 is plausible because a common mistake at VC Summer is that RB pressure lower limit is -1 psig, vice the T.S. lower limit of -0.1 psig. Part 2 is correct because T.S. 3.6.1.4 requires RB pressure to be restored within 1 hour.
- C. Incorrect. Part 1 is correct because T.S. lower limit is -0.1 psig. Part 2 is plausible because T.S. has action statements that have 15 minute requirements such as restoring RCS Tavg to above 551°F within 15 minutes.
- D. Correct. Part 1 is correct because T.S. lower limit is -0.1 psig. Part 2 is correct because T.S. 3.6.1.4 requires RB pressure to be restored within 1 hour.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000069AA2.03) Ability to determine and/or interpret the following as they apply to (APE 69) LOSS OF Containment Integrity (CFR: 41.10 / 43.5 / 45.13):
Containment pressure.

K/A Match: The K/A is matched because the basis for 3.6.1.4 states that the RB structure is prevented from exceeding its design negative pressure differential with respect to outside atmosphere of 3.5 psig. So the candidate must determine that RB Pressure is less than the minimum T.S. pressure allowed to prevent a loss of containment integrity.

Selection criteria: New

Tier: 1 **Group:** 2

Importance Rating: **RO:** 4.1 **SRO:**

Technical Reference: LCO 3.6.1.4, INTERNAL PRESSURE

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-13 027: IDENTIFY the Technical Specification(s) associated with the Reactor Building, including LCO, APPLICABILITY, and BASES, for all Technical Specification(s) with an ACTION of 1 hour or less.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

24.

Initial conditions:

- "C" Steam Generator is faulted to atmosphere.
- Actions of EOP-3.0, FAULTED STEAM GENERATOR ISOLATION, are complete.

Current conditions:

- EOP-1.2, ES-1.1 SAFETY INJECTION TERMINATION, is in progress.
- Pressurizer level is 32%, increasing.
- "A" Charging Pump is running in injection mode.
- The crew secured "B" Charging Pump five (5) seconds ago.
- Operators are now checking RCS pressure.
- RCS pressure is 2100 psig, increasing.

Which ONE of the choices below completes the following statements in accordance with EOP-1.2?

In the **current conditions**, operators are checking RCS pressure to ____ (1) ____.

The **next** action that will be taken is to establish ____ (2) ____.

- A. 1) confirm that flow from "A" charging pump is adequate to control RCS inventory.
2) normal charging.
- B. 1) confirm that flow from "A" charging pump is adequate to control RCS inventory.
2) letdown.
- C. 1) verify that the faulted steam generator is no longer blowing down.
2) normal charging.
- D. 1) verify that the faulted steam generator is no longer blowing down.
2) letdown.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that checking RCS pressure status after securing a Charging pump running in the injection mode (SI Pump) is to ensure one charging pump is adequate for inventory control and the next action based on this is to establish normal charging.

- A. Correct. Part 1 is correct because the basis for EOP-1.2 states that RCS pressure increasing confirms that SI flow is adequate for the operator to maintain control using one charging/SI pump. Part 2 is correct because once you verify that RCS pressure is stable or increasing, the next action in the procedure is to establish normal charging.
- B. Incorrect. Part 1 is correct because the basis for EOP-1.2 states that RCS pressure increasing confirms that SI flow is adequate for the operator to maintain control using one charging/SI pump. Part 2 is plausible because EOP-1.2 will put Letdown in service. Incorrect because normal charging must be established prior to placing Letdown back in service.
- C. Incorrect. Part 1 is plausible because after a SG is finished blowing down, RCS pressure will be increasing, which is what is occurring in the stem. Incorrect because in this scenario, RCS pressure increasing after securing a charging pump is indication that a single charging pump is adequate for inventory control. Part 2 is correct because once you verify that RCS pressure is stable or increasing, the next action in the procedure is to establish normal charging.
- D. Incorrect. Part 1 is plausible because after a SG is finished blowing down, RCS pressure will be increasing, which is what is occurring in the stem. Incorrect because in this scenario, RCS pressure increasing after securing a charging pump is indication that a single charging pump is adequate for inventory control. Part 2 is plausible because EOP-1.2 will put Letdown in service. Incorrect because normal charging must be established prior to placing Letdown back in service.

Form 4.2-1 Written Examination Question Worksheet

K/A: (W E01 & E02) Rediagnosis & SI Termination (G2.2.44) EQUIPMENT CONTROL:
Ability to interpret control room indications to verify the status and operation of a system and understand how operator actions and directives affect plant and system conditions (CFR: 41.10 / 43.2 / 45.13)

K/A Match: The K/A is matched because the candidate must use the indications given and understand the status of the plant to determine what actions the procedure requires to be performed.

Selection criteria: Bank EOPS 2 708

Tier: 1 **Group:** 2

Importance Rating: **RO:** 4.2 **SRO:**

Technical Reference: EOP-1.2, ES-1.1 SAFETY INJECTION TERMINATION

Proposed references to be provided to candidates during examination: None

Learning Objective: EOP-1.2 06: Given a set of plant conditions, predict a discrete path through EOP-1.2.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

25.

Given the following plant conditions:

- EOP-15.1, FR-H.2 RESPONSE TO STEAM GENERATOR OVERPRESSURE is in progress.
- Operators are at the step to dump steam from the "AFFECTED" SG.

Which ONE of the choices below completes the following statements in accordance with EOP-15.1?

The term "AFFECTED" refers to any SG with pressure greater than ____ (1) ____ psig.

EOP-15.1 tries to utilize ____ (2) ____ **first** to dump steam from the "AFFECTED" SG.

- A. 1) 1090
2) Steam Dumps
- B. 1) 1090
2) SG PORVs
- C. 1) 1230
2) SG PORVs
- D. 1) 1230
2) Steam Dumps

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that the term “affected” refers to a SG with pressure greater than 1230 psig and what method is used to dump steam from the affected SG in accordance with EOP-15.1.

- A. Incorrect. Part 1 is plausible because when the PORV setpoint is adjusted in the EOP network, e.g. EOP-1.2 Safety Injection Termination, the PORV controller is set to 8.4 which is equivalent to 1090 psig. A candidate could believe that “affected” refers to any SG with its pressure greater than the PORV setpoint. Part 2 is correct because the first method in EOP-15.1 to dump steam from the affected SGs is with the Steam Dumps.
- B. Incorrect. Part 1 is plausible because when the PORV setpoint is adjusted in the EOP network, e.g. EOP-1.2 Safety Injection Termination, the PORV controller is set to 8.4 which is equivalent to 1090 psig. A candidate could believe that “affected” refers to any SG with its pressure greater than the PORV setpoint. Part 2 is plausible because this is the backup method to dumping steam if Steam Dumps are not available.
- C. Incorrect. Part 1 is correct because the note in EOP-15.1 states that the term “affected” refers to any SG with pressure greater than 1230 psig. Part 2 is plausible because this is the backup method to dumping steam if Steam Dumps are not available.
- D. Correct. Part 1 is correct because the note in EOP-15.1 states that the term “affected” refers to any SG with pressure greater than 1230 psig. Part 2 is correct because the first method in EOP-15.1 to dump steam from the affected SGs is with the Steam Dumps.

Form 4.2-1 Written Examination Question Worksheet

K/A: (W E13) Steam Generator Overpressure (G2.4.17) EMERGENCY
PROCEDURES/PLAN: Knowledge of emergency and abnormal operating
procedures terms and definitions (CFR: 41.10 / 45.13)

K/A Match: The K/A is matched because the candidate must know the definition for
“affected” SG when that SG is overpressurized in accordance with EOP-
15.1, FR-H.2 RESPONSE TO STEAM GENERATOR OVERPRESSURE.

Selection criteria: New

Tier: 1 **Group:** 2

Importance Rating: **RO:** 3.9 **SRO:**

Technical Reference: EOP-15.1, FR-H.2 RESPONSE TO STEAM GENERATOR
OVERPRESSURE

Proposed references to be provided to candidates during examination: None

Learning Objective: EOP-15.1 05: Describe each CAUTION and NOTE in EOP-15.1
and its corresponding step including the bases or
reasons for the CUATION or NOTE.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

26.

Given the following plant conditions:

- A loss of 230 KV power occurred.
- EOP-1.4, ES-0.3 NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL is in progress.
- SG levels are 66% and rising.
- RCS cooldown rate is currently 105°F/hr.

Which ONE of the choices below completes the following statements?

EOP-1.4 ____ (2) ____ limit the cooldown to a **maximum** of 100°F/hour.

EFW flow ____ (2) ____ required to be reduced.

- A. 1) does **not**
2) is
- B. 1) does **not**
2) is **not**
- C. 1) does
2) is
- D. 1) does
2) is **not**

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the cooldown rate required by EOP-1.4 and know that EFW flow is required to be reduced because SG levels are above the 60-65% required by procedure and the RCS cooldown rate is greater than 100°F/hr.

- A. Incorrect. Part 1 is plausible because there are times in the EOP network where we cooldown at maximum rate, EOP-4.0 STEAM GENERATOR TUBE RUPTURE, and we are in a procedure that allows for a void to form in the head during the cooldown which could be formed from an excessive cooldown rate. Part 2 is correct because SG levels are greater than the 60-65% required by procedure and the EFW flow is impacting the cooldown rate as noted by the >105°F/hr in the stem.
- B. Incorrect. Part 1 is plausible because there are times in the EOP network where we cooldown at maximum rate, EOP-4.0 STEAM GENERATOR TUBE RUPTURE, and we are in a procedure that allows for a void to form in the head during the cooldown which could be formed from an excessive cooldown rate. Part 2 is plausible because there are times in the EOP network in which we are allowed to have a >100°F/hr cooldown rate and SG levels are maintained above the normal band of 60-65%. E.g. EOP-4.1A, ES-3.1 POST-SGTR COOLDOWN BY BACKFILLING THE REACTOR COOLANT SYSTEM where SG level is controlled between 40-82%.
- C. Correct. Part 1 is correct because EOP-1.4 requires a maximum cooldown rate of 100°F/hr. Part 2 is correct because SG levels are greater than the 60-65% required by procedure and the EFW flow is impacting the cooldown rate as noted by the >105°F/hr in the stem.
- D. Incorrect. Part 1 is correct because EOP-1.4 requires a maximum cooldown rate of 100°F/hr. Part 2 is plausible because there are times in the EOP network in which we are allowed to have a >100°F/hr cooldown rate and SG levels are maintained above the normal band of 60-65%. E.g. EOP-4.1A, ES-3.1 POST-SGTR COOLDOWN BY BACKFILLING THE REACTOR COOLANT SYSTEM where SG level is controlled between 40-82%.

Form 4.2-1 Written Examination Question Worksheet

K/A: (WE10EK2.15) Knowledge of the relationship between (W E10) NATURAL CIRCULATION WITH STEAM VOID IN VESSEL WITH/WITHOUT THE RVLIS and the following systems or components (CFR: 41.8 / 41.10 / 45.3): AFW system.

K/A Match: The K/A is matched because the candidate must know that during a natural circulation cooldown, the cooldown rate is limited and must understand that they are required to throttle EFW (AFW) to reduce the cooldown rate.

Selection criteria: New

Tier: 1 **Group:** 2

Importance Rating: **RO:** 3.8 **SRO:**

Technical Reference: EOP-1.4, ES-0.3 NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL.

Proposed references to be provided to candidates during examination: None

Learning Objective: EOP-1.4 C06: Apply EOP-1.4 by predicting a discrete path through EOP-1.4 given a set of plant conditions.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

27.

Given the following plant conditions:

- A plant startup is in progress in accordance with GOP-2, PLANT STARTUP AND HEATUP (MODE 5 TO MODE 3).
- The RCS is solid.
- RCS temperature is 190°F.
- The crew is starting an additional Reactor Coolant pump.

Which ONE of the choices below completes the following statements?

PCV-145, LO PRESS LTDN will be in ____ (1) ____ when starting the RCP.

When establishing RCS flow through an idle loop, RCS temperature will initially ____ (2) ____.

- A. 1) MAN
2) increase.
- B. 1) MAN
2) decrease.
- C. 1) AUTO
2) increase.
- D. 1) AUTO
2) decrease.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the position of PCV-145 and how RCS temperature will react when starting an additional Reactor Coolant pump.

- A. Incorrect. Part 1 is correct because SOP-101 will have you place PCV-145 in manual when starting a RCP with the RCS solid. Part 2 is incorrect. Plausible because the reason you are starting the reactor coolant pumps is for forced flow and to heat up the RCS. Note 3.2.e of GOP-2 mentions the initial RCS temperature decrease when establish RCS flow through an idle loop.
- B. Correct. Part 1 is correct because SOP-101 will have you place PCV-145 in manual when starting a RCP with the RCS solid. Part 2 is correct because there is an initial slug of colder water from that loop that is being pushed through into the core and will lower RCS temperature. Note 3.2.e of GOP-2 mentions the initial RCS temperature decrease when establish RCS flow through an idle loop.
- C. Incorrect. Part 1 is plausible because the normal position of PCV-145 in this condition is in AUTO. Incorrect because SOP-101 has you place this valve in MAN when starting the RCP. Part 2 is incorrect. Plausible because the reason you are starting the reactor coolant pumps is for forced flow and to heat up the RCS. Note 3.2.e of GOP-2 mentions the initial RCS temperature decrease when establish RCS flow through an idle loop.
- D. Incorrect. Part 1 is plausible because the normal position of PCV-145 in this condition is in AUTO. Incorrect because SOP-101 has you place this valve in MAN when starting the RCP. Part 2 is correct because there is an initial slug of colder water from that loop that is being pushed through into the core and will lower RCS temperature. Note 3.2.e of GOP-2 mentions the initial RCS temperature decrease when establish RCS flow through an idle loop.

Form 4.2-1 Written Examination Question Worksheet

K/A: (003A1.07) Ability to predict and/or monitor changes in parameters associated with operation of the (SF4P RCP) REACTOR COOLANT PUMP SYSTEM, including (CFR: 41.5 / 45.5): RCS temperature and pressure.

K/A Match: The K/A is matched because the candidate must predict what will happen to RCS temperature when a RCP is started in an idle loop.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.7 **SRO:**

Technical Reference: GOP-2, PLANT STARTUP AND HEATUP (MODE 5 TO MODE3)

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-04-025: Explain the operation of the Reactor Coolant pump when the RCS is "Solid".

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.5

SRO Justification: N/A

Comments:

28.

Given the following plant conditions:

- GOP-6, PLANT SHUTDOWN FROM HOT STANDBY TO COLD SHUTDOWN (MODE 3 TO MODE 5) is in progress.
- Cold Overpressure protection is in service.

Which ONE of the choices below completes the following statements in accordance with GOP-6?

Cold Overpressure protection must be in service when RCS cold leg is less than or equal to a **maximum** temperature of ____ (1) ____.

When establishing Cold Overpressure protection in GOP-6, a **maximum** of ____ (2) ____ aligned and capable of injecting into the RCS.

- A. 1) 200°F.
2) one charging pump is
- B. 1) 200°F.
2) two charging pumps are
- C. 1) 300°F.
2) one charging pump is
- D. 1) 300°F.
2) two charging pumps are

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know what temperature and how many charging pumps are in service when Cold Overpressure Protection is put in service IAW GOP-6.

- A. Incorrect. Part 1 is plausible because this is when you enter MODE 5 which is "COLD SHUTDOWN", so it's reasonable for a candidate to think you need cold overpressure protection at this point. Incorrect because GOP-6 requires Cold Overpressure Protection to be in service anytime RCS temperature is less than 300°F. Part 2 is correct because GOP-6 has you maintain one charging pump aligned and capable of injecting into the RCS.
- B. Incorrect. Part 1 is plausible because this is when you enter MODE 5 which is "COLD SHUTDOWN", so it's reasonable for a candidate to think you need cold overpressure protection at this point. Incorrect because GOP-6 requires Cold Overpressure Protection to be in service anytime RCS temperature is less than 300°F. Part 2 is plausible because prior to reaching 300°F, there are two charging pumps energized and capable of injecting into the RCS.
- C. Correct. Part 1 is correct because Caution 3.5.e.4) and 5) states that anytime RCS temperature is less than 300°F, Cold Overpressure protection should be in service. Part 2 is correct because GOP-6 has you maintain one charging pump aligned and capable of injecting into the RCS.
- D. Incorrect. Part 1 is correct because Caution 3.5.e.4) and 5) states that anytime RCS temperature is less than 300°F, Cold Overpressure protection should be in service. Part 2 is plausible because prior to reaching 300°F, there are two charging pumps energized and capable of injecting into the RCS.

Form 4.2-1 Written Examination Question Worksheet

K/A: (004) (SF1; SF2 CVCS) CHEMICAL AND VOLUME CONTROL SYSTEM (G2.1.23)
CONDUCT OF OPERATIONS: Ability to perform general and/or normal operating
procedures during any plant condition (CFR: 41.10 / 45.5 / 45. 2 / 45.6)

K/A Match: The K/A is matched because the candidate must know at what temperature
the GOP requires Cold Overpressure Protection to be established and how
many Charging pumps are in service during this time.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 4.3 **SRO:**

Technical Reference: GOP-6, PLANT SHUTDOWN FROM HOT STANDBY TO COLD
SHUTDOWN (MODE 3 TO MODE 5)

Proposed references to be provided to candidates during examination: None

Learning Objective: GOP-6 3: Explain the NOTE(s) and CAUTION(s) associated with
GOP-6.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

29.

Given the following plant conditions:

- RX MU WTR PP A has tripped.
- An AO was sent to investigate the breaker.

Which ONE of the choices below completes the following statement?

The AO was sent to _____ switchgear to investigate the breaker for RX MU WTR PP A?

- A. 1EA
- B. 1DA
- C. 1EA1
- D. 1DA1

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the power supply to the “A” Reactor Makeup Water pump.

- A. Incorrect. Plausible 1EA is a safeguards bus and the Reactor Makeup water pumps are powered by a safeguards bus. Incorrect because “A” Reactor Makeup water pump is powered by 1DA1.
- B. Incorrect. Plausible 1DA is a safeguards bus and the Reactor Makeup water pumps are powered by a safeguards bus. Incorrect because “A” Reactor Makeup water pump is powered by 1DA1.
- C. Incorrect. Plausible 1EA1 is a safeguards bus and the Reactor Makeup water pumps are powered by a safeguards bus. Incorrect because “A” Reactor Makeup water pump is powered by 1DA1.
- D. Correct. “A” Reactor Makeup water pump is powered by 1DA1.

Form 4.2-1 Written Examination Question Worksheet

K/A: (004K2.02) Knowledge of electrical power supplies to the following (CFR: 41.7):
(SF1; SF2 CVCS) CHEMICAL AND VOLUME CONTROL SYSTEM Pumps used
to makeup to CVCS.

K/A Match: The K/A is matched because the candidate must know the power supply to
the "A" Reactor Makeup Water pump.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.0 **SRO:**

Technical Reference: AB-5, REACTOR MAKEUP SYSTEM.

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-5 13: IDENTIFY power supplies for the following Reactor
Makeup system components: 1. Reactor Makeup water
pumps.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.6

SRO Justification: N/A

Comments:

30.

Given the following plant conditions:

- Plant is in MODE 6.
- "A" RHR train is in the cooldown mode.
- RHR flow control valves were adjusted.
- FI-602A, RESIDUAL HEAT REMOVAL PUMP A FLOW INDICATOR reads 900 gpm.

Which ONE of the choices below completes the following statement?

RHR pump run time at this flow rate is limited to a **maximum** of _____ minutes in accordance with SOP-115, RESIDUAL HEAT REMOVAL.

CONSIDER NO OPERATOR ACTIONS

- A. 5
- B. 10
- C. 15
- D. 30

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that the RHR pump can only run for less than a maximum of thirty minutes when FI-602A reads less than 1000 gpm.

- A. Incorrect. Plausible because the RHR heat exchanger must be warmed up for 5 minutes prior to adjusting flow for the desired cooldown rate.
- B. Incorrect. Plausible because this is the time associated with a requirement to sample for boron in the RHR train that has been on recirculation for 10 minutes.
- C. Incorrect. Plausible because this is the RHR pump starting duty requirement for a subsequent restart, after 15 minutes of pump run time.
- D. Correct. SOP-115 states that RHR pump run time with flow less than 1000 gpm on FI-602A should be limited to less than thirty minutes.

Form 4.2-1 Written Examination Question Worksheet

K/A: (005K6.11) Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF4P RHR) RESIDUAL HEAT REMOVAL SYSTEM (CFR: 41.7 / 45.7): Flow control valves.

K/A Match: The K/A is matched because the candidate must know that with the RHR flow control valves throttled such that flow is less than 1000 gpm, the RHR pumps can only be ran for a maximum of 30 minutes.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.8 **SRO:**

Technical Reference: SOP-115, RESIDUAL HEAT REMOVAL

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-7: Describe the normal operation of the following RHR system components. Include component types and applicable setpoints. RHR pump miniflow valves, MVG-602A(B).

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

31.

Given the following plant condition:

- Operators entered EOP-16.0, RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK, due to a RED status on Critical Safety Function Status Trees.
- Safety injection has been terminated.
- Operators have determined that a soak is required.

Which ONE of the choices below completes the following statements?

A cooldown greater than 100°F in one hour ____ (1) ____ required to cause a pressurized thermal shock concern with a RED status on the INTEGRITY Critical Safety Function Status Tree.

The conditions for the soak will be maintained for a minimum period of ____ (2) ____ to relieve thermal stresses.

- A. 1) is
2) one hour
- B. 1) is
2) four hours
- C. 1) is not
2) one hour
- D. 1) is not
2) four hours

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must recall a contributing condition to a severe challenge to the INTEGRITY critical safety function and recall that a one-hour soak period is required to relieve vessel thermal stresses to prevent brittle fracture.

- A. Correct. A cooldown greater than 100°F in one hour was required to create a RED status on INTEGRITY. A soak will be maintained for one hour.
- B. Incorrect. Part 1 is correct because a cooldown greater than 100°F in one hour was required to create a RED status on INTEGRITY. Part 2 is plausible because many EOPs such as EOP-2.0, have a requirement to maintain pressurizer spray for at least four hours. Incorrect because the soak period is not four hours.
- C. Incorrect. Part 1 is plausible because there is a path for cold overpressure events on the INTEGRITY CSFST that does not require a cooldown in excess of 100°F in one hour and will result in using the same procedure on ORANGE path. Part 2 is correct because a soak will be maintained for one hour. Incorrect because a red path does required a cooldown in excess of 100°F in one hour.
- D. Incorrect. Part 1 is plausible because there is a path for cold overpressure events on the INTEGRITY CSFST that does not require a cooldown in excess of 100°F in one hour and will result in using the same procedure on ORANGE path. The second part is plausible because many EOPs such as EOP-2.0, have a requirement to maintain pressurizer spray for at least four hours. Incorrect because a red path does required a cooldown in excess of 100°F in one hour and the soak period is not four hours.

Form 4.2-1 Written Examination Question Worksheet

K/A: (006K5.04) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF2; SF3 ECCS) EMERGENCY CORE COOLING SYSTEM (CFR: 41.5 / 45.3): Brittle fracture, including causes and preventive actions.

K/A Match: The K/A is matched because the candidate must recall a contributing condition to a severe challenge to the INTEGRITY critical safety function and recall that a one-hour soak period is required to relieve vessel thermal stresses to prevent brittle fracture.

Selection criteria: Bank, EOPS 2 771, 2017 NRC

Tier: 1 **Group:** 1

Importance Rating: **RO:** 3.6 **SRO:**

Technical Reference: EOP-12.0 MONITORING OF CRITICAL SAFETY FUNCTIONS and EOP-16.0, FR-P.1 RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK.

Proposed references to be provided to candidates during examination: None

Learning Objective: EOP-16.0 04: STATE the bases or reasons for each action contained in EOP-16.0.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

32.

Given the following plant conditions:

- 100% power.
- FCV-122 has failed closed.
- VCT level 75% and increasing.
- PRT level is increasing.
- “A” Charging pump is running.

Which ONE of the choices below completes the following statement?

PRT level is increasing because there is coolant flowing from _____.

- A. LCV-115A, LTDN DIVERT.
- B. XVR-8116A-CS, RH HDR CHG/SI PUMP A RELIEF VLV.
- C. XVR-8120-CS, VOLUME CONTROL TANK RELIEF VALVE.
- D. XVR-8117-CS, LETDOWN FLOW CONTROL HDR RELIEF VALVE.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know which of these valves will relieve to the PRT.

- A. Incorrect. Plausible because VCT is at 75% and therefore LCV-115A is diverting. LCV-115A starts diverting at 70%. Incorrect because LCV-115A diverts to the Recycle Holdup Tank.
- B. Incorrect. Plausible this relieve valve is in the CVCS system. Incorrect because it relieves to the Recycle Holdup Tank.
- C. Incorrect. Plausible because this is the Volume Control Tank relief valve. Incorrect because this relieve valve relieves water to the Recycle Holdup tank.
- D. Correct. XVR-8117 is the letdown relieve valve and it relieves to the PRT.

Form 4.2-1 Written Examination Question Worksheet

K/A: (007A3.01) Ability to monitor automatic features of the (SF5 PRTS) PRESSURIZER RELIEF/QUENCH TANK SYSTEM, including (CFR: 41.7 / 45.7): Components that discharge to the PRT/quench tank.

K/A Match: The K/A is matched because the candidate must determine which valve is automatically relieving to the PRT.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.4 **SRO:**

Technical Reference:

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-03 04: DESCRIBE the CVCS interfaces with the following systems and/or subsystems: 2. Pressurizer and Relief System.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

33.

007 K3.01 C

Given the following plant conditions:

New

- A Pressurizer Code Safety is open and will **not** reseal.
- A Safety Injection and Reactor trip have occurred.

Low

Which ONE of the choices below completes the following statement?

When the PRT ruptures, _____ level will increase.

- A. Reactor Coolant Drain Tank
- B. Waste Holdup Tank
- C. Containment Sump
- D. Excess Liquid Waste Tank

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that the PRT spills into the Containment Sump when the rupture disc ruptures.

- A. Incorrect. Plausible because the PRT can be drained if level is high to the Reactor Coolant Drain Tank.
- B. Incorrect. Plausible because the Waste Holdup Tank provides a collection point for equipment drains, Reactor Building sumps, valve leakoffs.
- C. Correct. The PRT ruptures to the containment floor where the water would drain into the Containment Sump.
- D. Incorrect. Plausible because this tank is inside of the Reactor Building and collects radioactive or potentially radioactive liquid.

Form 4.2-1 Written Examination Question Worksheet

K/A: (007K3.01) Knowledge of the effect that a loss or malfunction of the (SF5 PRTS) PRESSURIZER RELIEF/QUENCH TANK SYSTEM will have on the following systems or system parameters (CFR: 41.7 / 45.4): Containment

K/A Match: The K/A is matched because the candidate must know that the PRT ruptures to containment causing the containment sump to rise.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.4 **SRO:**

Technical Reference: AB-02, Reactor Coolant System

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-02 27: Explain the effect of the following failures of the Reactor Coolant System: 5. Pressurizer Relief Tank failure.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

34.

Given the following plant conditions:

Time 0800:

- 100% power.
- “A” Train of CCW is the active loop.
- “B” CCW booster pump was removed from service for emergent bearing replacement.
- “A” CCW Booster pump tripped.
- “C” CCW Booster pump is running.

Time 0806:

- MVG-9600, TO THERM BARR ISOL was de-energized.

Which ONE of the choices below answers the following questions?

1) At time **0800**, was LCO 3.7.3, COMPONENT COOLING WATER SYSTEM met?

2) At time **0806**, what is the status of the “C” CCW Booster pump?

A. 1) No.

2) “C” pump is running.

B. 1) Yes.

2) “C” pump received a trip signal.

C. 1) No.

2) “C” pump received a trip signal.

D. 1) Yes.

2) “C” pump is running.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that the CCW booster pumps are not part of T.S. 3.7.3 and therefore the two of them being removed from service does not impact T.S. 3.7.3. The candidate must also know that de-energizing MVG-9600 trips the CCW Booster pumps.

- A. Incorrect. Part 1 is plausible because T.S. 3.7.3 requires two independent CCW loops to be operable and a candidate could think that the CCW booster pumps are required for this T.S. Incorrect because CCW Booster pumps are not required to be operable for T.S. 3.7.3. Part 2 is plausible because it is a motor operated valve and the flow path still exists therefore a candidate could think that the pumps will not receive a trip signal.
- B. Correct. Part 1 is correct because T.S. 3.7.3 does not require CCW booster pumps to be operable. Part 2 is correct because when MVG-9600 is de-energized, the CCW booster pumps receive a trip signal.
- C. Incorrect. Part 1 is plausible because T.S. 3.7.3 requires two independent CCW loops to be operable and a candidate could think that the CCW booster pumps are required for this T.S. Incorrect because CCW Booster pumps are not required to be operable for T.S. 3.7.3. Part 2 is correct because when MVG-9600 is de-energized, the CCW booster pumps receive a trip signal.
- D. Incorrect. Part 1 is correct because T.S. 3.7.3 does not require CCW booster pumps to be operable. Part 2 is plausible because it is a motor operated valve and the flow path still exists therefore a candidate could think that the pumps will not receive a trip signal.

Form 4.2-1 Written Examination Question Worksheet

K/A: (008) (SF8 CCW) COMPONENT COOLING WATER SYSTEM (G2.2.36)
EQUIPMENT CONTROL: Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operation (CFR: 41.10 / 43.2 / 45.13)

K/A Match: The K/A is matched because the candidate must determine if removing two CCW booster pumps from service for maintenance activities will require entering an action statement for T.S. 3.7.3, COMPONENT COOLING WATER SYSTEM.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.1 **SRO:**

Technical Reference: T.S. 3.7.3, COMPONENT COOLING WATER SYSTEM.

Proposed references to be provided to candidates during examination: None

Learning Objective: IB-2 32: Identify the Technical Specifications associated with the CCW system, including LCO, APPLICABILITY, and BASES, for all Technical Specifications with an ACTION of 1 hour or less.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

35.

Given the following plant conditions:

Time 0700:

- 75% power initially.
- All Pressurizer heaters are energized.

Time 0701:

- A safety injection occurs.

Time 0703:

- Pressurizer level is 14% and lowering.

Time 0735:

- Safety Injection has been reset.
- Both ESF Loading Sequencers have been reset.
- Pressurizer level is 12% and increasing.
- The crew is at a step that requires PZR heaters to be used to saturate the PZR water.

Which ONE of the choices below completes the following statements?

Backup Group 1 and 2 Pressurizer heaters were **first** de-energized at time ____ (1) ____.

At **time 0735**, Backup Group 1 and 2 Pressurizer heaters ____ (2) ____ be re-energized.

- A. 1) 0701.
2) can
- B. 1) 0701.
2) can **not**
- C. 1) 0703.
2) can
- D. 1) 0703.
2) can **not**

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that the Safety Injection signal caused a trip of the Pressurizer heaters and that Pressurizer heaters can not be reset at time 0735 despite the ESFLS being reset because Pressurizer level is <17%.

- A. Incorrect. Part 1 is correct because Output 4 of the ESF Loading Sequencer has been actuated by the Safety Injection signal and this output trips the Pressurizer Backup Group heaters. Part 2 is plausible because the ESF Loading Sequencer has been reset. Incorrect because Pressurizer level is <17%, therefore a trip signal is still in for the Backup Group heaters based on low Pressurizer level.
- B. Correct. Part 1 is correct because Output 4 of the ESF Loading Sequencer has been actuated by the Safety Injection signal and this output trips the Pressurizer Backup Group heaters. Part 2 is correct because Pressurizer level is <17%, therefore a trip signal is still in for the Backup Group heaters.
- C. Incorrect. Part 1 is plausible because Pressurizer level is below the level (17%) to trip Pressurizer backup group heaters. Incorrect because the Safety Injection signal has already tripped the heaters. Part 2 is plausible because the ESF Loading Sequencer has been reset. Incorrect because Pressurizer level is <17%, therefore a trip signal is still in for the Backup Group heaters based on low Pressurizer level.
- D. Incorrect. Part 1 is plausible because Pressurizer level is at the level (17%) to trip Pressurizer backup group heaters. Incorrect because the Safety Injection signal has already tripped the heaters. Part 2 is correct because Pressurizer level is <17%, therefore a trip signal is still in for the Backup Group heaters.

Form 4.2-1 Written Examination Question Worksheet

K/A: (010A2.07) Ability to (a) predict the impacts of the following on the (SF3 PZR PCS) PRESSURIZER PRESSURE CONTROL SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): ESFAS actuations

K/A Match: The K/A is matched because the candidate must predict when the Pressurizer heaters were tripped based on an ESFAW actuation and determine if they can be reset when the procedure tells them to reset the heaters.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 4.3 **SRO:**

Technical Reference: IC-3, PRESSURIZER PRESSURE AND LEVEL CONTROL

Proposed references to be provided to candidates during examination: None

Learning Objective: IC-3 024: DESCRIBE how the PZR PCS and LCS would respond to a SI or blackout.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

36.

Given the following plant conditions:

- The plant is in MODE 5.
- Pressurizer is solid.
- PCV-145, LO PRESS LTDN, is in AUTO.
- RCS temperature increases by 1°F.

Which ONE of the choices below completes the following statements?

RCS pressure will initially ____ (1) ____ because of the RCS temperature change.

After the transient, RCS pressure will have ____ (2) ____ pressure.

CONSIDER NO OPERATOR ACTIONS

- A. 1) increase
2) stabilized at a new higher
- B. 1) decrease
2) stabilized at a new lower
- C. 1) increase
2) decreased to its original
- D. 1) decrease
2) increased to its original

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that water expands when it heats up causing RCS pressure to rise and that PCV-145 will automatically throttle accordingly to adjust RCS pressure back to its original value.

- A. Incorrect. Part 1 is correct because as water temperature increases it expands resulting in an initial rise in pressure. Part 2 is plausible because this is what would happen if PCV-145 only controlled based on a set flow.
- B. Incorrect. Part 1 is plausible if candidate does not understand that water at high temperatures expands as it heats up. Part 2 is plausible because this is what would happen if PCV-145 only controlled based on a set flow.
- C. Correct. Part 1 is correct because as water temperature increases it expands resulting in an initial rise in pressure. Part 2 is correct because PCV-145 will adjust in AUTO to return to the original pressure.
- D. Incorrect. Part 1 is plausible if candidate does not understand that water at high temperatures expands as it heats up. Part 2 is correct because PCV-145 will adjust in AUTO to return to the original pressure.

Form 4.2-1 Written Examination Question Worksheet

K/A: (010K5.05) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF3 PZR PCS) PRESSURIZER PRESSURE CONTROL SYSTEM (CFR: 41.5 / 45.3): RCS heatup and cooldown effect on pressure.

K/A Match: The K/A is matched because the candidate must know the effect of RCS temperature rising one degree on RCS pressure and based on this rise, how RCS pressure will automatically be adjusted.

Selection criteria: Bank

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.7 **SRO:**

Technical Reference: AB-03, CHEMICAL AND VOLUME CONTROL SYSTEM.

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-03 014: DESCRIBE the Operation of the following Control Systems. Include function, instrumentation, and setpoints: 2. PCV-145 Pressure Control.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.5

SRO Justification: N/A

Comments:

37.

Given the following plant conditions:

- 12% power.
- A Reactor Protection system failure results in the Underfrequency relays actuating on the “B” and “C” RCPs.

Which ONE of the choices below completes the following statements?

The RCP “A” Breaker is currently ____ (1) ____.

The RCP Underfrequency trip has a setpoint of ____ (2) ____ Hz.

- A. 1) open.
2) 59.3
- B. 1) open.
2) 57.5
- C. 1) closed.
2) 59.3
- D. 1) closed.
2) 57.5

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the RCP underfrequency setpoint and that when 2/3 RCP underfrequency trips come in, the signal trips all RCP breakers.

- A. Incorrect. Part 1 is correct because 2/3 Underfrequency setpoints have been reached and reactor power is above 10%, therefore, all RCP breakers are opened. Part 2 is plausible because 59.3 Hz grid frequency is the setpoint at which 10% of distribution loads are shed automatically.
- B. Correct. Part 1 is correct because 2/3 Underfrequency setpoints have been reached and reactor power is above 10%, therefore, all RCP breakers are opened. Part 2 is correct because the RCP Underfrequency trip setpoint is 57.5 Hz.
- C. Incorrect. Part 1 is plausible because the RCP Undervoltage trip on 2/3 RCPs does not trip all RCP breakers. Part 2 is plausible because 59.3 Hz grid frequency is the setpoint at which 10% of distribution loads are shed automatically.
- D. Incorrect. Part 1 is plausible because the RCP Undervoltage trip on 2/3 RCPs does not trip all RCP breakers. Part 2 is correct because the RCP Underfrequency trip setpoint is 57.5 Hz.

Form 4.2-1 Written Examination Question Worksheet

K/A: (012K3.05) Knowledge of the effect that a loss or malfunction of the (SF7 RPS) REACTOR PROTECTION SYSTEM will have on the following systems or system parameters (CFR: 41.7 / 45.4): RCPS

K/A Match: The K/A is matched because based on the failure of RPS, the candidate must know that when 2/3 RCP underfrequency setpoints are reached, this trips all RCP breakers.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.5 **SRO:**

Technical Reference: IC-9, REACTOR PROTECTION AND SAFEGUARDS ACTUATION SYSTEM.

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-4 020: DESCRIBE the following trips associated with the Reactor Coolant pump. Include purpose and setpoints:
2. RCP Motor Low Frequency.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

38.

Which ONE of the following identifies the power supply to "A" Train Engineered Safety Features Loading Sequencer?

- A. APN-5901
- B. APN-5903
- C. APN-1DA2
- D. DPN-1HA1

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the power supply to the "A" Train Engineered Safety Features Loading Sequencer.

- A. Correct. "A" Train Engineered Safety Features Loading Sequencer power supply is APN-5901.
- B. Incorrect. This answer is plausible because this is the power supply to the "B" Train Engineered Safety Features Loading Sequencer.
- C. Incorrect. This answer is plausible because APN-1DA2 is a 480V/120V step down transformer that powers ESF related loads.
- D. Incorrect. This answer is plausible because DPN-1HA1 is the "A" Safety-related DC train power supply to the "A" diesel.

Form 4.2-1 Written Examination Question Worksheet

K/A: (013K2.01) Knowledge of electrical power supplies to the following (CFR: 41.7):
(SF2 ESFAS) ENGINEERED SAFETY FEATURES ACTUATION SYSTEM
ESFAS/safeguards train power supplies

K/A Match: The K/A is matched because the candidate must know the electrical power supply to the "A" Train ESF Loading Sequencer.

Selection criteria: Bank question from 2021 NRC, Question 4.

Tier: 2 **Group:** 1

Importance Rating: **RO:** 4.0 **SRO:**

Technical Reference: GS-02A, ENGINEERED SAFETY FEATURES LOADING SEQUENCER.

Proposed references to be provided to candidates during examination: None

Learning Objective: IC-15 010: Identify the power supplies for the 7300 process instrumentation and solid-state protection cabinets I through IV.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

39.

Initial conditions:

- 100% power.
- Industrial Cooling is aligned to the RBCUs.

Current conditions:

- XCP-610 1-6, IND CLG WTR PP A/B TRIP, is in alarm.
- XCP-610 2-6, IND CLG WTR FLO LO, is in alarm.

Which ONE of the choices below completes the following statements?

To ensure Technical Specification 3.6.1.5, AIR TEMPERATURE, is met, operators use ____ (1) ____.

In the **current conditions**, containment temperature ____ (2) ____.

- A. 1) **only** the RB Temperature gauge on the HVAC Panel.
2) will increase until the standby Industrial Cooling Pump is **manually** started.
- B. 1) **only** the RB Temperature gauge on the HVAC Panel.
2) is lowering because Service Water **automatically** aligned to the RBCUs.
- C. 1) an average of RB Temperatures taken at multiple locations.
2) will increase until the standby Industrial Cooling Pump is **manually** started.
- D. 1) an average of RB Temperatures taken at multiple locations.
2) is lowering because Service Water **automatically** aligned to the RBCUs.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that T.S. 3.6.1.5 requires the use of the average RB temperature and that Industrial Cooling is required to be manually restarted, there are not automatic actions when the running pump trips.

- A. Incorrect. Part 1 is plausible because this is an actual gauge of RB temperature that gets looked at on the HVAC Panel. Incorrect because the T.S. requires an average of several RB temperatures taken at multiple spots. Part 2 is correct because temperatures will rise until cooling is restored manually.
- B. Incorrect. Part 1 is plausible because this is an actual gauge of RB temperature that gets looked at on the HVAC Panel. Incorrect because the T.S. requires an average of several RB temperatures taken at multiple spots. Part 2 is plausible because Service Water does automatically realign to the RBCUs on a Safety Injection, however, not anytime there is low or a loss of flow.
- C. Correct. Part 1 is correct because T.S. 3.6.1.5 requires the average RB temperature to not exceed 120°F. Part 2 is correct because temperatures will rise until cooling is restored manually.
- D. Incorrect. Part 1 is correct because T.S. 3.6.1.5 requires the average RB temperature to not exceed 120°F. Part 2 is plausible because Service Water does automatically realign to the RBCUs on a Safety Injection, however, not anytime there is low or a loss of flow.

Form 4.2-1 Written Examination Question Worksheet

K/A: (022K1.01) Knowledge of the physical connections and/or cause and effect relationships between the (SF5 CCS) CONTAINMENT COOLING SYSTEM and the following systems (CFR: 41.9 / 45.7 / 45.8): Cooling water system

K/A Match: The K/A is matched because the candidate determine how the tripping of an industrial cooling water pump effects Reactor Building Cooling units and therefore containment temperature.

Selection criteria: Bank

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.6 **SRO:**

Technical Reference: AB-17, REACTOR BUILDING VENTILATION SYSTEM

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-17 -23: DESCRIBE the response of the Reactor Building Ventilation system to the following: 3. Loss of Industrial Cooling Water.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

40.

Given the following plant conditions:

- A Large Break LOCA has occurred.
- XCP-612 3-2, RB SPR ACT is in alarm.
- XCP-612 4-2, PHASE B ISOL is in alarm.
- EOP-1.0, E-0 REACTOR TRIP OR SAFETY INJECTION, is in progress.
- **Both** MVG-3002A(B) NAOH TK TO RB SPR PP A(B) failed to automatically open.

Which ONE of the choices below completes the following statement?

Operators will ____ (1) ____ MVG-3002A(B) in order to reduce ____ (2) ____ content inside the Reactor Building.

- A. 1) actuate Phase A to open
2) hydrogen
- B. 1) actuate Phase A to open
2) iodine
- C. 1) manually open from the MCB
2) hydrogen
- D. 1) manually open from the MCB
2) iodine

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know how to open MVG-3002A(B) after it failed to open automatically. They must also know one of the purposes of NAOH being added to RB Spray.

- A. Incorrect. Part 1 is plausible because MVG-3002A(B) open on a Phase A signal. Incorrect because EOP-1.0 does not have you actuate phase A to open these valves. EOP-1.0 has you manually open these valves. Part 2 is plausible because Hydrogen is a concern during a large break LOCA. Incorrect because RB Spray includes a source of NAOH which helps to reduce Iodine content inside the Reactor Building.
- B. Incorrect. Part 1 is plausible because MVG-3002A(B) open on a Phase A signal. Incorrect because EOP-1.0 does not have you actuate phase A to open these valves. EOP-1.0 has you manually open these valves. Part 2 is correct because NAOH is added to RB Spray to reduce Iodine content in the Reactor Building atmosphere.
- C. Incorrect. Part 1 is correct because EOP-1.0 has you manually open MVG-3002A(B) in the step to verify RB Spray has actuated and is aligned properly. Part 2 is plausible because Hydrogen is a concern during a large break LOCA. Incorrect because RB Spray includes a source of NAOH which helps to reduce Iodine content inside the Reactor Building.
- D. Correct. Part 1 is correct because EOP-1.0 has you manually open MVG-3002A(B) in the step to verify RB Spray has actuated and is aligned properly. Part 2 is correct because NAOH is added to RB Spray to reduce Iodine content in the Reactor Building atmosphere.

Form 4.2-1 Written Examination Question Worksheet

K/A: (026A2.05) Ability to (a) predict the impacts of the following on the (SF5 CSS) CONTAINMENT SPRAY SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): Failure of chemical addition tanks to inject

K/A Match: The K/A is matched because the candidate must know how the procedure will open MVG-3002A(B) after a failure to inject from the NAOH tank.

Selection criteria: Modified CONT SPRAY SYSTEM 091 question from the 2015 NRC exam. Question is modified by asking a different part 2 of the question. This created a new correct answer.

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.0 **SRO:**

Technical Reference: EOP-1.0, E-0 REACTOR TRIP OR SAFETY INJECTION

Proposed references to be provided to candidates during examination: None

Learning Objective: EOP-1.0 – 07: Given a set of plant conditions, predict a discrete path through EOP-1.0.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

Original CONT SPRAY SYSTEM 091 question from the 2015 NRC exam.

D

Which ONE of the choices below completes the following statements?

Sodium Hydroxide (NaOH) is added to Reactor Building (RB) Spray flow in order to reduce the concentration of ____ (1) ____ in the RB atmosphere after a LOCA.

MVG-3002A and MVG-3002B, NaOH suction line isolation valves, are **directly** interlocked to automatically open in response to a _____ (2) _____ .

- A. 1) explosive hydrogen
2) RB spray actuation signal
- B. 1) explosive hydrogen
2) phase 'A' containment isolation signal
- C. 1) radioactive iodine
2) RB spray actuation signal
- D. 1) radioactive iodine
2) phase 'A' containment isolation signal**

41.

Given the following plant conditions:

- 100% power initially.
- A LOCA has occurred.
- The following annunciators are in alarm
 - XCP-612 3-2 RB SPR ACT.
 - XCP-612 4-2 PHASE B ISOL.

Which ONE of the choices below completes the following statements?

XCP-612 3-2 **first** alarmed at ____ (1) ____ psig.

MVG-3001A, RWST TO SPRAY PUMP A SUCT ____ (2) ____ reposition when the Phase "B" signal was received.

- A. 1) 6.35
2) did **not**
- B. 1) 6.35
2) did
- C. 1) 12.05
2) did **not**
- D. 1) 12.05
2) did

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that XCP-612 3-2 alarms at 12.05 psig and that MVG-3001A is already open and therefore did not reposition on the Phase B signal.

- A. Incorrect. Part 1 is plausible because 6.35 psig is the HI-2 alarm setpoint for RB pressure. At this pressure, the MSIVs automatically close. Incorrect because XCP-612 3-2 alarms at 12.05 psig. Part 2 is correct because MVG-3001A is open and therefore does not reposition on the Phase B signal.
- B. Incorrect. Part 1 is plausible because 6.35 psig is the HI-2 alarm setpoint for RB pressure. At this pressure, the MSIVs automatically close. Incorrect because XCP-612 3-2 alarms at 12.05 psig. Part 2 is plausible because MVG-3001A does receive a Phase B signal and would auto open if the valve was closed. Incorrect because the valve is open and therefore would not reposition.
- C. Correct. Part 1 is correct because XCP-612 3-2 alarms at 12.05 psig. Part 2 is correct because MVG-3001A is open and therefore does not reposition on the Phase B signal.
- D. Incorrect. Part 1 is correct because XCP-612 3-2 alarms at 12.05 psig. Part 2 is plausible because MVG-3001A does receive a Phase B signal and would auto open if the valve was closed. Incorrect because the valve is open and therefore would not reposition.

Form 4.2-1 Written Examination Question Worksheet

K/A: (026K1.05) Knowledge of the physical connections and/or cause and effect relationships between the (SF5 CSS) CONTAINMENT SPRAY SYSTEM and the following systems (CFR: 41.2 to 41.9 / 45.7 to 45.8): ESFAS

K/A Match: The K/A is matched because the candidate must know the effect on the RB Spray pump suction valve when it receives a Phase B signal from ESFAS.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 4.1 **SRO:**

Technical Reference: AB-08, REACTOR BUILDING SPRAY SYSTEM

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-08 19: Describe the following actuation signals associated with the Reactor Building Spray System. Include purpose and setpoints: RB Spray Actuation Signals.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

42.

Which ONE of the choices below completes the following statement?

Each MSIV is interlocked with ____ (1) ____ to prevent an ____ (2) ____.

- A. 1) its associated main steam bypass isolation valve
2) inadvertent Safety Injection.
- B. 1) its associated main steam bypass isolation valve
2) uncontrolled RCS cooldown.
- C. 1) PT-464, Main Steam Header Pressure transmitter
2) inadvertent Safety Injection.
- D. 1) PT-464, Main Steam Header Pressure transmitter
2) uncontrolled RCS cooldown.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that the MSIVs are interlocked with their associated main steam bypass isolation valve and this is to prevent an inadvertent Safety Injection.

- A. Correct. Part 1 is correct because the MSIV is interlocked with its associated main steam bypass isolation valve. Part 2 is correct because this interlock is meant to prevent an inadvertent Safety Injection based on VC Summer OE.
- B. Incorrect. Part 1 is correct because the MSIV is interlocked with its associated main steam bypass isolation valve. Part 2 is plausible because without the main steam bypass valves being there, opening of the MSIV by itself could potentially create a very large and sudden steam demand that could cause an uncontrolled cooldown. Incorrect because the purpose of this interlock is to prevent an inadvertent Safety Injection.
- C. Incorrect. Part 1 is plausible because when warming up the main steam lines, PIT-464 is used to ensure main steam header pressure is within 25 psig of the individual SG pressures. Part 2 is correct because this interlock is meant to prevent an inadvertent Safety Injection based on VC Summer OE.
- D. Incorrect. Part 1 is plausible because when warming up the main steam lines, PIT-464 is used to ensure main steam header pressure is within 25 psig of the individual SG pressures. Part 2 is plausible because without the main steam bypass valves being there, opening of the MSIV by itself could potentially create a very large and sudden steam demand that could cause an uncontrolled cooldown. Incorrect because the purpose of this interlock is to prevent an inadvertent Safety Injection.

Form 4.2-1 Written Examination Question Worksheet

K/A: (039K4.08) Knowledge of (SF4S MSS) MAIN AND REHEAT STEAM SYSTEM design features and/or interlocks that provide for the following (CFR: 41.7):
Interlocks on MSIVs and bypass valves

K/A Match: The K/A is matched because the candidate must know the interlock associated with the MISV and their bypass valves and the reason for this interlock.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.5 **SRO:**

Technical Reference: TB-02, MAIN STEAM SYSTEM

Proposed references to be provided to candidates during examination: None

Learning Objective: TB-02 016: DESCRIBE the following Main Steam Interlocks.
Specify purpose and setpoints: MSIV and MSIV
bypass interlock.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

43.

Which ONE of the choices below completes the following statement?

The FW ISOL Train A and Train B reset switches located ____ (1) ____ **reset** the ____ (2) ____ feedwater isolation signal.

- A. 1) on the Main Control Board
2) P-4 with Low T_{AVG}
- B. 1) on the Main Control Board
2) Safety Injection
- C. 1) in the Cable Spreading Room (CB-448)
2) P-4 with Low T_{AVG}
- D. 1) in the Cable Spreading Room (CB-448)
2) Safety Injection

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know where to reset the Feedwater Isolation signals from and these switches only reset the P-4 with Low T_{avg} feedwater isolation signal.

- A. Correct. Part 1 is correct because the FW ISOL Train A and Train B switches are on the Main Control Board. Part 2 is correct because these switches can only reset the P-4 with Low T_{avg} feedwater isolation signal.
- B. Incorrect. Part 1 is correct because the FW ISOL Train A and Train B switches are on the Main Control Board. Part 2 is plausible because a Safety Injection will create a feedwater isolation signal. Incorrect because the feedwater isolation signal generated by the Safety Injection stays locked in even after Safety Injection has been reset. The SI signal must be removed to restore feedwater.
- C. Incorrect. Part 1 is plausible because in the Cable Spreading Room there are bypass switches for all three Feedwater Isolation valves, XVG-1611A, B, C. Incorrect because FW ISOL Train A and Train B switches are located on the MCB. Part 2 is correct because these switches can only reset the P-4 with Low T_{avg} feedwater isolation signal.
- D. Incorrect. Part 1 is plausible because in the Cable Spreading Room there are bypass switches for all three Feedwater Isolation valves, XVG-1611A, B, C. Incorrect because FW ISOL Train A and Train B switches are located on the MCB. Part 2 is plausible because a Safety Injection will create a feedwater isolation signal. Incorrect because the feedwater isolation signal generated by the Safety Injection stays locked in even after Safety Injection has been reset. The SI signal must be removed to restore feedwater.

Form 4.2-1 Written Examination Question Worksheet

K/A: (059A4.11) Ability to manually operate and/or monitor the (SF4S MFW) MAIN FEEDWATER SYSTEM in the control room (CFR: 41.7 / 45.5 to 45.8): Recovery from automatic MFW isolation

K/A Match: The K/A is matched because the candidate must know that you manually operate the Feedwater Isolation reset switches inside the Main Control Room and know which specific feedwater isolation these switches will reset.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.6 **SRO:**

Technical Reference: IC-09, REACTOR PROTECTION AND SAFEGUARDS ACTUATION SYSTEM.

Proposed references to be provided to candidates during examination: None

Learning Objective: IC-09 033: DESCRIBE the actions that occur on a feedwater isolation signal, specify equipment affected and its status.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

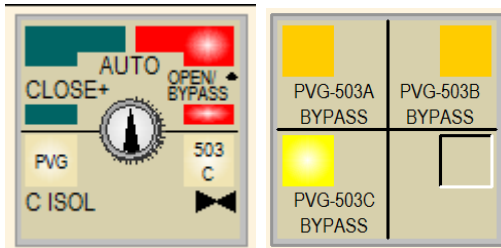
44.

Initial conditions:

- 100% power initially.
- A spurious signal from P-14, STEAM GENERATOR HI-HI LEVEL has been generated.
- The Motor Driven EFW pumps have started.

Current conditions:

- PVG-503C, SG Blowdown Isolation valve indicates as follows:



Which ONE of the choices below completes the following statements?

In the **initial conditions**, PVG-503A(B)(C) valves directly receive a closed signal from the ____ (1) ____.

In the **current conditions**, to clear the PVG-503C BYPASS light, operators are required to ____ (2) ____.

REFERENCE PROVIDED

- 1) Main feedwater pumps tripping.
2) turn the switch to OPEN/BYPASS.
- 1) Main feedwater pumps tripping.
2) push down on the switch.
- 1) Motor Driven EFW pump breakers closing.
2) turn the switch to OPEN/BYPASS.
- 1) Motor Driven EFW pump breakers closing.
2) push down on the switch.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that the P-14 signal trips the Main Feedwater pumps, which in turn auto starts the Motor Driven EFW pumps. The candidate must know that the 503s get a close signal from the Motor Driven EFW pumps starting and not the Main Feedwater pumps tripping. They must also know how to re-instate, the automatic closing signal.

- A. Incorrect. Part 1 is plausible because tripping the Main Feedwater pumps causes several automatic actions, including starting of the Motor Driven EFW pumps. The start of the Motor Driven EFW pumps is what sends a signal to close the 503s. There are multiple signal being initiated here and the candidate could easily mistake the 503s getting a close signal from the Main Feedwater pumps. Part 2 is plausible because the switch position is titled, OPEN/BYPASS. Incorrect because taking the switch to this position prevents the automatic close of the 503s when EFW is required to be feeding the steam generators.
- B. Incorrect. Part 1 is plausible because tripping the Main Feedwater pumps causes several automatic actions, including starting of the Motor Driven EFW pumps. The start of the Motor Driven EFW pumps is what sends a signal to close the 503s. There are multiple signal being initiated here and the candidate could easily mistake the 503s getting a close signal from the Main Feedwater pumps. Part 2 is correct because pushing down on the 503 switch re-instates the automatic close based on the Motor Driven EFW pumps starting.
- C. Incorrect. Part 1 is correct because when the Motor Driven EFW pumps are started, a signal is sent to close the 503s. Part 2 is plausible because the switch position is titled, OPEN/BYPASS. Incorrect because taking the switch to this position prevents the automatic close of the 503s when EFW is required to be feeding the steam generators.
- D. Correct. Part 1 is correct because when the Motor Driven EFW pumps are started, a signal is sent to close the 503s. Part 2 is correct because pushing down on the 503 switch re-instates the automatic close based on the Motor Driven EFW pumps starting.

Form 4.2-1 Written Examination Question Worksheet

K/A: 059 K1.13 Knowledge of the physical connections and/or cause and effect relationships between the (SF4S MFW) MAIN FEEDWATER SYSTEM and the following systems (CFR: 41.2 to 41.9 / 45.7 to 45.8): S/GB system.

K/A Match: The K/A is matched because the candidate must know cause and effect relationship between a Feedwater isolation signal from the spurious P-14 which starts a domino effect of starting the Motor Driven EFW pumps which in turn isolates the Steam Generator Blowdown system.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 2.9 **SRO:**

Technical Reference: TB-01, STEAM GENERATOR AND BLOWDOWN course handout.

Proposed references to be provided to candidates during examination: Indications of PVG-503.

Learning Objective: TB-01, 024: Describe the component operation associated with each position of the following switches/controls of the Steam Generator Blowdown System: 1. PVG-503A(B)(C), Steam Generator Nuclear Blowdown isolation Valves.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.4

SRO Justification: N/A

Comments:

45.

Given the following plant conditions:

Time 0605:

- 90% power.
- “B” emergency diesel generator is tagged out for maintenance.

Time 0607:

- Normal feed breaker to Bus 1DA automatically trips open.

Time 0610:

- A failure has caused Steam Generator (SG) narrow range levels to decrease to the following values:
 - “A” S/G is 28%.
 - “B” S/G is 40%.
 - “C” S/G is 37%.

Which ONE of the choices below completes the following statement?

At time **0610**, **both** Motor Driven EFW pumps ____ (1) ____ be running, and the turbine driven EFW pump ____ (2) ____ be running.

CONSIDER NO OPERATOR ACTIONS

- A. 1) will
2) will **not**
- B. 1) will **not**
2) will **not**
- C. 1) will
2) will
- D. 1) will **not**
2) will

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that a Blackout on only one ESF bus causes only the MDEFW pumps to start and that 1/3 SGs with level below 35% results in starting only the MEDFW pumps.

- A. Correct. Part 1 is correct because both MDEFW pumps received a start signal at time 0607 when there was a blackout on bus 1DA and all main feedwater pumps tripped. Part 2 is correct because there was only a blackout on 1 ESF but, not both, and only 1/3 SGs have level <35%, therefore there has been no start signal for the TDEFW pump.
- B. Incorrect. Part 1 is plausible because there is a start signal for the TDEFW pump that requires a blackout on both ESF busses, 1DA and 1DB. A candidate could mix these up or think that the requirement is a blackout on both busses. Part 2 is correct because there was only a blackout on 1 ESF but, not both, and only 1/3 SGs have level <35%, therefore there has been no start signal for the TDEFW pump.
- C. Incorrect. Part 1 is correct because both MDEFW pumps received a start signal at time 0607 when there was a blackout on bus 1DA and all main feedwater pumps tripped. Part 2 is plausible because there is a blackout signal, a trip of all Main Feedwater pumps and SG level indications with one being less than 35%. These are all start signals for EFW. Incorrect because none of these signals start the TDEFW pump.
- D. Incorrect. Part 1 is plausible because there is a start signal for the TDEFW pump that requires a blackout on both ESF busses, 1DA and 1DB. A candidate could mix these up or think that the requirement is a blackout on both busses. Part 2 is plausible because there is a blackout signal, a trip of all Main Feedwater pumps and SG level indications with one being less than 35%. These are all start signals for EFW. Incorrect because none of these signals start the TDEFW pump.

Form 4.2-1 Written Examination Question Worksheet

K/A: (061A3.01) Ability to monitor automatic features of the (SF4S AFW) AUXILIARY/EMERGENCY FEEDWATER SYSTEM, including (CFR: 41.7 / 45.7): AFW system automatic start

K/A Match: The K/A is matched because the candidate must determine which EFW pumps are running after several events have occurred that will automatically start the MDEFW pumps but not the TDEFW pump.

Selection criteria: Bank, EFW System 182 (2015 NRC)

Tier: 2 **Group:** 1

Importance Rating: **RO:** 4.2 **SRO:**

Technical Reference: IB-03, EMERGENCY FEEDWATER SYSTEM

Proposed references to be provided to candidates during examination: None

Learning Objective: IB-03 013: DESCRIBE the following Emergency Feedwater System Interlocks/Auto-Start signals. Specify purpose and setpoint: 3. MD EFW Pump Auto-Start, 4. TD EFW Pump Auto-Start.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

46.

Initial conditions:

- 100% power.
- The electric plant is in a normal lineup.
- The following conditions are present:



Current conditions:

- The crew has aligned Bus 1DA to its alternate feed.

Which ONE of the choices below completes the following statements?

In the **initial conditions**, Bus 1DA amber indicating light is lit because there is ____ (1) ____ that exists.

In the **current conditions**, transformer ____ (2) ____ is providing power to Bus 1DA.

REFERENCE PROVIDED

- A. 1) an overcurrent condition
2) XTF-31, EMERGENCY AUXILIARY TRANSFORMER #1
- B. 1) an overcurrent condition
2) XTF-5, ESF TRANSFORMER
- C. 1) a switch/breaker disagreement
2) XTF-31, EMERGENCY AUXILIARY TRANSFORMER #1
- D. 1) a switch/breaker disagreement
2) XTF-5, ESF TRANSFORMER

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that the amber indicating light on this breaker means there is a switch/breaker disagreement and that the alternate feed for bus 1DA is from XTF-31.

- A. Incorrect. Part 1 is plausible because on pumps such as the CCW pumps, this amber light means there is an overcurrent condition. Incorrect because on feeder breakers for the electric plant, the amber indicating light indicates a switch/breaker disagreement. Part 2 is correct because XTF-31 is the alternate feed to bus 1DA.
- B. Incorrect. Part 1 is plausible because on pumps such as the CCW pumps, this amber light means there is an overcurrent condition. Incorrect because on feeder breakers for the electric plant, the amber indicating light indicates a switch/breaker disagreement. Part 2 is plausible because XTF-5 is an alternate transformer for bus 1DX which supplies power to bus 1DA. Incorrect because XTF-31 is the alternate feed to bus 1DA.
- C. Correct. Part 1 is correct because on feeder breakers for the electric plant, the amber indicating light indicates a switch/breaker disagreement. Part 2 is correct because XTF-31 is the alternate feed to bus 1DA.
- D. Incorrect. Part 1 is correct because on feeder breakers for the electric plant, the amber indicating light indicates a switch/breaker disagreement. Part 2 is plausible because XTF-5 is an alternate transformer for bus 1DX which supplies power to bus 1DA. Incorrect because XTF-31 is the alternate feed to bus 1DA.

Form 4.2-1 Written Examination Question Worksheet

K/A: (062A1.10) Ability to predict and/or monitor changes in parameters associated with operation of the (SF6 ED AC) AC ELECTRICAL DISTRIBUTION SYSTEM, including (CFR: 41.5 / 45.5): Lights and alarms

K/A Match: The K/A is matched because the candidate must monitor the indications to determine why the amber light is lit for bus 1DA normal feeder breaker.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.4 **SRO:**

Technical Reference: GS-01, SERVICE POWER SYSTEM

Proposed references to be provided to candidates during examination: Picture of bus 1DA NORM FEED.

Learning Objective: GS-01 015: STATE the reason for the following indicators available for the Service Power System. 1. 7.2 KV Breaker Position (local and remote) 3. 7.2 KV Bus Status Lights.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.5

SRO Justification: N/A

Comments:

47.

Initial conditions:

- All offsite power has been lost (115 KV and 230 KV).
- The EDG's did not start.
- EOP-6.0, ECA-0.0 LOSS OF ALL ESF AC POWER is in progress.
- Additional loads have been started on Battery XBA-1A, DC DISTRIBUTION BUS 1A BATTERY.

Current conditions:

- All power has been restored.
- Batteries are currently at their design minimum voltage.

Which ONE of the choices below completes the following statements?

In the **initial conditions**, the battery will maintain voltage for a ____ (1) ____ amount of time after the additional loads have been started.

In the **current conditions**, the battery chargers have sufficient capacity to charge the batteries to a fully charged state within a **maximum** of ____ (2) ____ hours.

- A. 1) longer
2) 4
- B. 1) longer
2) 12
- C. 1) shorter
2) 4
- D. 1) shorter
2) 12

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that the ESF batteries do not load shed and therefore adding additional loads will cause the batteries to maintain voltage for less time. They must also know how long it takes a battery charger to restore voltage from minimum voltage to fully charged in 12 hours.

- A. Incorrect. Part 1 is plausible because on a blackout, load shedding occurs, however, not on 120 Volt DC. A candidate may think that load shedding has occurred and the loads that were started are less than the normal loads which would cause voltage to be maintained for a longer period of time. The general idea here being we load shed and restart less equipment than it originally had to maximize the time the batteries will last. Part 2 is plausible because 4 hours is the amount of time the ESF batteries are sized to carry instrumentation loads following a loss of AC.
- B. Incorrect. Part 1 is plausible because on a blackout, load shedding occurs, however, not on 120 Volt DC. A candidate may think that load shedding has occurred and the loads that were started are less than the normal loads which would cause voltage to be maintained for a longer period of time. The general idea here being we load shed and restart less equipment than it originally had to maximize the time the batteries will last. Part 2 is correct because the battery chargers for XBA-1A have sufficient capacity to charge a battery from design minimum voltage to the fully charged state within 12 hours.
- C. Incorrect. Part 1 is correct because no load stripping occurs on 120V DC and therefore the addition of any loads will cause the battery to maintain voltage for a shorter period of time. Part 2 is plausible because 4 hours is the amount of time the ESF batteries are sized to carry instrumentation loads following a loss of AC.
- D. Correct. Part 1 is correct because no load stripping occurs on 120V DC and therefore the addition of any loads will cause the battery to maintain voltage for a shorter period of time. Part 2 is correct because the battery chargers for XBA-1A have sufficient capacity to charge a battery from design minimum voltage to the fully charged state within 12 hours.

Form 4.2-1 Written Examination Question Worksheet

K/A: (063K5.05) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF6 ED DC) DC ELECTRICAL DISTRIBUTION SYSTEM (CFR: 41.5 / 45.3): Battery capacity as it is affected by discharge rate/individual cell voltages

K/A Match: The K/A is matched because the candidate must understand the effect on voltage of adding additional plant loads onto the DC bus.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.1 **SRO:**

Technical Reference: GS-3, DC POWER

Proposed references to be provided to candidates during examination: None

Learning Objective: GS-03 04: DESCRIBE the DC power system interfaces with the following systems and/or subsystems: 2. Battery charger and battery.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.5

SRO Justification: N/A

Comments:

48.

Given the following plant conditions:

- DPN1HA M, BATTERY 1A FEED TO DPN1HA opened due to a mechanical fault.
- All offsite power has been lost (115 KV and 230 KV).
- **Both** EDG's did not start.

Which ONE of the choices below completes the following statement?

DC power to inverter _____ has been lost.

- A. XIT-5901, 120 VOLT VITAL AC 10 KVA UPS
- B. XIT-5903, 120 VOLT VITAL AC 10 KVA UPS
- C. XIT-5909, 120 VOLT INVERTER 9
- D. XIT-5910, 120 VOLT INVERTER 10

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that with no onsite or offsite power and DPN1HA M opening, XIT-5901 has been lost.

- A. Correct. XIT-5901 has no power from offsite, onsite or its DC backup from DPN1HA M.
- B. Incorrect. XIT-5903 is plausible because this is a DC powered ESF inverter. Incorrect because DPN1HB battery is feeding it.
- C. Incorrect. Plausible because XIT-5909 is a 120V inverter coming from ESF power. Incorrect because DC power is being supplied to this inverter from the station battery.
- D. Incorrect. Plausible because XIT-5910 is a 120V inverter coming from ESF power. Incorrect because DC power is being supplied to this inverter from the station battery.

Form 4.2-1 Written Examination Question Worksheet

K/A: (063K6.06) Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF6 ED DC) DC ELECTRICAL DISTRIBUTION SYSTEM (CFR: 41.7 / 45.7): Battery

K/A Match: The K/A is matched because the candidate must know the effect on XIT-5901 because of a spurious breaker opening on the battery combined with a loss of offsite and onsite power.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 4.0 **SRO:**

Technical Reference: GS-02, SAFEGUARDS POWER

Proposed references to be provided to candidates during examination: None

Learning Objective: GS-02 08: DESCRIBE the normal operation of the following subsystems of the Safeguards Power Systems: 3. 120VAC Subsystem.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

49.

Which ONE of the following identifies the power source where the supply breakers for "A" Emergency Diesel Generator Starting Air Compressors are located?

- A. XSW1DA2
- B. XMC1DA2Y
- C. XMC1DA2X
- D. XMC1DA2Z

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the power supply to the "A" Emergency Diesel Generator Starting Air Compressors.

- A. Incorrect. Plausible because this is a "A" Train 480V ESF power supply.
- B. Incorrect. Plausible because this is a "A" Train 480V ESF power supply.
- C. Incorrect. Plausible because this is a "A" Train 480V ESF power supply.
- D. Correct. The "A" Emergency Diesel Generator Starting Air Compressor power supply is XMC1DA2Z.

Form 4.2-1 Written Examination Question Worksheet

K/A: (064K2.01) Knowledge of electrical power supplies to the following (CFR: 41.7):
(SF6 EDG) EMERGENCY DIESEL GENERATOR SYSTEM Starting air
compressor

K/A Match: The K/A is matched because the candidate must know the power supply to
the "A" Emergency Diesel Generator Starting Air Compressors.

Selection criteria: Bank, EMERGENCY DIESEL GEN 085

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.0 **SRO:**

Technical Reference: AOP-900 Appendix A, OPERATIONAL IMPACTS OF LOSS OF
ELECTRICAL BUSES DUE TO FIRE.

Proposed references to be provided to candidates during examination: None

Learning Objective: IB-05 20: IDENTIFY the power supplies/primary motive force for
the following Emergency Diesel Generator System
Components: 1. Air Start Compressors.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

50.

Given the following plant conditions:

- 100% power.
- A 5 gpm RCS leak is in progress.
- RM-L2A(B) COMPONENT COOLING LIQUID MONITOR readings are increasing.

Which ONE of the choices below completes the following statements?

RM-L2A(B) readings increasing is indication of a leak in the ____ (1) ____.

When RM-L2A(B) alarms, the leaking heat exchanger will be ____ (2) ____ isolated.

- A. 1) Seal Return HX.
2) automatically
- B. 1) Seal Return HX.
2) manually
- C. 1) Letdown HX.
2) automatically
- D. 1) Letdown HX.
2) manually

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know in which heat exchanger RCS water will leak into and that RM-L2 does not isolate the heat exchanger when it alarms.

- A. Incorrect. Part 1 is plausible because CCW cools the Seal Return heat exchanger. Incorrect because CCW would leak into this heat exchanger. Part 2 is plausible because RM-L2 does have automatic actions associated with it when it alarms. Incorrect because RM-L2 in alarm automatically closes the CCW Surge tank vent valve.
- B. Incorrect. Part 1 is plausible because CCW cools the Seal Return heat exchanger. Incorrect because CCW would leak into this heat exchanger. Part 2 is correct. The heat exchanger will have to be manually isolated since there are not automatic actions to isolate it.
- C. Incorrect. Part 1 is correct because a leak in the Letdown heat exchanger would cause radioactive RCS water to leak into the CCW system. Part 2 is plausible because RM-L2 does have automatic actions associated with it when it alarms. Incorrect because RM-L2 in alarm automatically closes the CCW Surge tank vent valve.
- D. Correct. Part 1 is correct because a leak in the Letdown heat exchanger would cause radioactive RCS water to leak into the CCW system. Part 2 is correct. The heat exchanger will have to be manually isolated since there are not automatic actions to isolate it.

Form 4.2-1 Written Examination Question Worksheet

K/A: (073A1.01) Ability to predict and/or monitor changes in parameters associated with operation of the (SF7 PRM) PROCESS RADIATION MONITORING SYSTEM, including (CFR: 41.5 / 45.5): Radiation levels

K/A Match: The K/A is matched because the candidate must predict what heat exchanger is leaking and whether or not it will be automatically isolated based on increasing radiation levels on RM-L2.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.5 **SRO:**

Technical Reference: IB-2, COMPONENT COOLING WATER (CCW) SYSTEM

Proposed references to be provided to candidates during examination: None

Learning Objective: IB-2 018: DESCRIBE the following trips associated with the CCW System. Include purpose and setpoint: 3. RM-L2 Auto Action.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

51.

Given the following plant conditions:

0700:

- 100% power.
- "A" SG level is increasing.
- FCV-478, is throttling closed.
- XCP-646 2-1, MN STM LINE RM-G19 HI RAD is lit.

0730:

- XCP-645 1-3, CNDSR EXH RM-A9 HI RAD is lit.
- The following response was seen on RM-G19A:

Reading: Before trip
39.7 mREM/hr

Which ONE of the choices below completes the following statements?

At **time 0730**, XCP-645 1-3, CNDSR EXH RM-A9 HI RAD ____ (1) ____ be lit.

RM-G19A will read ____ (2) ____ than 39.7 mREM/hr 10 minutes after the reactor trip.

- A. 1) should
2) higher
- B. 1) should
2) lower
- C. 1) should **not**
2) higher
- D. 1) should **not**
2) lower

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know why the RM-G19 values decrease post trip and that RM-A9 is the more sensitive radiation monitor and will be in alarm within 30 minutes of the initiation of a tube leak.

- A. Incorrect. Part 1 is correct because RM-A9 is the most sensitive radiation monitor for SG tube leaks and is expected to alarm within 15 minutes of a very small tube leak, approximately 30 gal/day which is 0.02 gpm. Part 2 is plausible because after a reactor trip, the leak rate would decrease because of the higher SG pressure at no load.
- B. Correct. Part 1 is correct because RM-A9 is the most sensitive radiation monitor for SG tube leaks and is expected to alarm within 15 minutes of a very small tube leak, approximately 30 gal/day which is 0.02 gpm. Part 2 is correct. RM-G19 reads lower due to N-16 gammas, which are short lived, that are no longer being produced because the reactor is tripped.
- C. Incorrect. Part 1 is plausible because the time difference in the stem is 30 minutes and on a small leak, RM-G19 is not expected to alarm for 45 minutes. A candidate could mix up the expected time to alarm for RM-G19(45 minutes) and RM-A9(15 minutes). Part 2 is incorrect. Plausible because after a reactor trip, the leak rate would decrease because of the higher SG pressure at no load.
- D. Incorrect. Part 1 is plausible because the time difference in the stem is 30 minutes and on a small leak, RM-G19 is not expected to alarm for 45 minutes. A candidate could mix up the expected time to alarm for RM-G19(45 minutes) and RM-A9(15 minutes). Part 2 is correct. RM-G19 reads lower due to N-16 gammas, which are short lived, that are no longer being produced because the reactor is tripped.

Form 4.2-1 Written Examination Question Worksheet

K/A: (073) (SF7 PRM) PROCESS RADIATION MONITORING SYSTEM (G2.1.45)

Conduct of Operations: Ability to identify and interpret diverse indications to validate the response of another indication.

K/A Match: The K/A is matched because the candidate must use the indications given to validate the expected radiation monitor readings.

Selection criteria: Modified question 9 of the 2021 NRC Exam. Question was modified by asking a different second question. This created a new correct answer. The original question is on the following page.

Tier: 2 **Group:** 1

Importance Rating: **RO:** 4.3 **SRO:**

Technical Reference: GS-09, RADIATION MONITORING SYSTEM

Proposed references to be provided to candidates during examination: None

Learning Objective: GS-09 04: DESCRIBE the radiation monitoring system interfaces with the following systems and/or components: 3.
Steam Generators.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

Original question from the 2021 NRC Exam.

Given the following plant conditions:

- 100% power initially.
- Blowdown return flow is aligned to the condenser.
- XCP-646 2-1, MN STM LINE RM-G19 HI RAD is in alarm.
- An automatic Reactor Trip and Safety Injection occurred.
- EOP-1.0, E-0 REACTOR TRIP OR SAFETY INJECTION is in progress.
- The following response was seen on RM-G19A:

Before trip

Reading: 39.7 mREM/hr

Which ONE of the choices below completes the following statements?

RM-G19A will read ____ (1) ____ than 39.7 mREM/hr 10 minutes after the reactor trip.

Based on the conditions above, in accordance with EOP-1.0, ____ (2) ____ is another radiation monitor that can be used to diagnose a transition to EOP-4.0, E-3 STEAM GENERATOR TUBE RUPTURE.

- A. 1) higher
2) RM-L3, STEAM GENERATOR BLOWDOWN LIQUID MONITOR
- B. 1) lower
2) RM-L3, STEAM GENERATOR BLOWDOWN LIQUID MONITOR
- C. 1) higher
2) RM-A9, CNDSR EXHAUST GAS ATMOS MONITOR
- D. 1) lower
2) RM-A9, CNDSR EXHAUST GAS ATMOS MONITOR

52.

Which ONE of the following buses directly provides power to Service Water Pump “C” (XPP-0039C) when aligned to Service Water Loop “B” per SOP-117, SERVICE WATER SYSTEM?

- A. 1EA
- B. 1DB
- C. 1EB
- D. 1C

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the power supply to the “C” Service Water pump when aligned to the “B” Train.

- A. Incorrect. Plausible because this is a 7.2 KV bus that provides power to the “C” Service Water pump when it is aligned to the “A” Train.
- B. Incorrect. Plausible because this is a 7.2 KV Safety related bus on the “B” Train that supplies power to ESF components.
- C. Correct. When aligned to the “B” Train, 1EB provides power to the “C” Service Water pump.
- D. Incorrect. Plausible because this is a 7.2KV bus that supplies power to other major pumps.

Form 4.2-1 Written Examination Question Worksheet

K/A: (076K2.01) Knowledge of electrical power supplies to the following (CFR: 41.7):
SWS pumps (Class 1E)

K/A Match: The K/A is matched because the candidate must know the power supply to the C Service Water pump when it is aligned to the "B" Train.

Selection criteria: Bank, Service Water System 086, 2015 NRC Exam

Tier: 2 **Group:** 1

Importance Rating: **RO:** 3.8 **SRO:**

Technical Reference: IB-1, Service Water System

Proposed references to be provided to candidates during examination: None

Learning Objective: IB-1 015: IDENTIFY power supplies for the following Service
Water System Components: 1. Service Water Pumps

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

53.

Given the following plant conditions:

- 100% power.
- Instrument Air Compressor “A” has tripped on high lube oil temperature.
- Instrument Air Compressor “B” started automatically.

Which ONE of the choices below completes the following statements?

The Instrument Air Compressor high lube oil temperature was caused from a loss of ____ (1) ____ cooling.

Instrument Air Compressor “B” is maintaining Instrument Air Header pressure between ____ (2) ____ psig.

CONSIDER NO OPERATOR ACTIONS

- A. 1) Turbine Building Closed Cycle
2) 110-120
- B. 1) Turbine Building Closed Cycle
2) 105-115
- C. 1) Industrial
2) 110-120
- D. 1) Industrial
2) 105-115

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that Turbine Building Closed Cycle cooling cools the instrument air compressors and that the standby instrument air compressor maintains air header pressure between 105-115 psig.

- A. Incorrect. Part 1 is correct because the Turbine Building Closed Cycle cooling cools the instrument air compressor oil coolers. Part 2 is plausible because this is the normal pressure band that the "A" Instrument air compressor was maintain. Incorrect because when the standby instrument air compressor started, it now maintains header pressure at 105-115 psig.
- B. Correct. Part 1 is correct because the Turbine Building Closed Cycle cooling cools the instrument air compressor oil coolers. Part 2 is correct because the standby instrument air compressor has started and it maintains header pressure at 105-115 psig.
- C. Incorrect. Part 1 is plausible because Industrial cooling water cools the RB Air compressors. Incorrect because Turbine Building Closed Cycle cooling cools the instrument air compressors. Part 2 is plausible because this is the normal pressure band that the "A" Instrument air compressor was maintain. Incorrect because when the standby instrument air compressor started, it now maintains header pressure at 105-115 psig.
- D. Incorrect. Part 1 is plausible because Industrial cooling water cools the RB Air compressors. Incorrect because Turbine Building Closed Cycle cooling cools the instrument air compressors. Part 2 is correct because the standby instrument air compressor has started and it maintains header pressure at 105-115 psig.

Form 4.2-1 Written Examination Question Worksheet

K/A: (078K4.04) Knowledge of (SF8 IAS) INSTRUMENT AIR SYSTEM design features and/or interlocks that provide for the following (CFR: 41.7): IAS compressor loading/unloading/starts/trips

K/A Match: The K/A is matched because the candidate must know at what pressure the standby instrument air compressor will load and unload at.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 2.9 **SRO:**

Technical Reference: TB-12, Station Service and Instrument Air System

Proposed references to be provided to candidates during examination: None

Learning Objective: TB-12 017:DESCRIBE the Station and Instrument Air System response to a: 1. Continued decrease in air pressure, include actuation and alarm setpoint

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

54.

Initial conditions:

- Core unloading was in progress.
- The Equipment Hatch is currently open.
- The Refueling SRO reported that a fuel assembly is stuck and that bubbles were observed coming from the assembly.
- Radiation levels on RM-G17A(B), RB MANIP CRANE AREA GAMMA are increasing.
- AOP-123.3, POTENTIAL FUEL ASSEMBLY DAMAGE WHILE HANDLING FUEL, is in progress.

Current conditions:

- Containment closure is set.

Which ONE of the choices below completes the following statements?

In the **initial conditions**, radioactive gasses from the damaged fuel are exiting through the __ (1) __.

In the **current conditions**, AOP-123.3 __ (2) __ require the Fuel Transfer Tube Valve to be closed.

- A. 1) purge exhaust filter plenum.
2) does
- B. 1) purge exhaust filter plenum.
2) does **not**
- C. 1) equipment hatch.
2) does
- D. 1) equipment hatch.
2) does **not**

Mike, We had to change the 4th bullet to say that RM-G17 radiation levels are increasing vice in alarm. With it in alarm, the purge exhaust filter plenum is isolated. So the question was technically incorrect. This is the only change we made.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that the RB is maintained at a lower pressure than outside the RB in order to prevent any potentially contaminated air from being released through the hatch. They must also know that AOP-123.3 requires the Fuel Transfer Tube to be closed.

- A. Correct. Part 1 is correct because the RB must be maintained at a lower pressure than outside the RB to prevent potentially contaminated air from being released through the hatch. This air is going out through the Exhaust Filter Plenum. Part 2 is correct because AOP-123.3 requires the Fuel Transfer Tube to be closed.
- B. Incorrect. Part 1 is correct because the RB must be maintained at a lower pressure than outside the RB to prevent potentially contaminated air from being released through the hatch. This air is going out through the Exhaust Filter Plenum. Part 2 is plausible because if the damaged fuel assembly is inside the Spent Fuel pool, you do not close the Fuel Transfer Tube valve. Incorrect because the damaged fuel assembly is located inside the RB.
- C. Incorrect. Part 1 is plausible because the hatch is open inside the stem. A candidate could think that since it is open, the contaminated air would escape out the hatch. Incorrect because the RB is kept at a lower pressure to prevent this. Part 2 is correct because AOP-123.3 requires the Fuel Transfer Tube to be closed.
- D. Incorrect. Part 1 is plausible because the hatch is open inside the stem. A candidate could think that since it is open, the contaminated air would escape out the hatch. Incorrect because the RB is kept at a lower pressure to prevent this. Part 2 is plausible because if the damaged fuel assembly is inside the Spent Fuel pool, you do not close the Fuel Transfer Tube valve. Incorrect because the damaged fuel assembly is located inside the RB.

Form 4.2-1 Written Examination Question Worksheet

K/A: 103 A2.10: Ability to (a) predict the impacts of the following on the (SF5 CNT) CONTAINMENT SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): FHS malfunctions.

K/A Match: The K/A is matched because the candidate must know that with the hatch open, containment is kept at a lower pressure to keep air flowing from outside the RB to inside the RB and that this air exits through the Exhaust Filter Plenum. The candidate must know that AOP-123.3 requires the isolation of the Spent Fuel Pool and the Refueling Cavity because of the damaged fuel assembly.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** 2.6 **SRO:**

Technical Reference: AOP-123.3, POTENTIAL FUEL ASSEMBLY DAMAGE WHILE HANDLING FUEL.

Proposed references to be provided to candidates during examination: None

Learning Objective: AOP-123.3, 03: Given a set of plant conditions, determine the appropriate plant response and operator actions in accordance with AOP-123.3.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.5

SRO Justification: N/A

Comments:

55.

Given the following plant conditions:

- 50% power.
- TREF 1st STG PRESS switch is selected to P446.
- PT-446, TURBINE 1ST STAGE PRESSURE fails high.

NOTE the following transmitter name:

PT-447, TURBINE 1ST STAGE PRESSURE

Which ONE of the choices below completes the following statement?

RCS T_{AVG} will _____.

- A. stay the same, PT-446 does not feed into rod control.
- B. increase until the power range rod stop (C-2), is reached.
- C. increase until the Bank D rod stop limit (C-11), is reached.
- D. stay the same, PT-447 automatically swaps to be the controlling channel.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that PT-446 failing high will cause rods to withdraw to the point that C-11 setpoint is reached.

- A. Incorrect. Plausible because a candidate could misunderstand how Tref gets its input.
- B. Incorrect. Plausible because PT-446 failing high will cause rods to withdraw, however, C-11 the bank D rod stop limit will be reached prior to C-2, power range rod stop at 103% reactor power is reached.
- C. Correct. RCS T_{avg} will increase because rods will withdraw until the C-11 setpoint is reached.
- D. Incorrect. Plausible because PT-447 does input into rod control, however, it has to be manually selected. Automatically swapping over is plausible because other items such as RCS T_{avg} has median select which means the failed channel is automatically kicked out of the input.

Form 4.2-1 Written Examination Question Worksheet

K/A: (016K5.02) Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF7 NNI) NONNUCLEAR INSTRUMENTATION SYSTEM (CFR: 41.5 / 45.3): Relationship between meter readings and actual parameter values

K/A Match: The K/A is matched because the candidate must know effect of PT-446 failing high has on rod control and what parameter values will automatically stop this rod motion.

Selection criteria: New

Tier: 2 **Group:** 2

Importance Rating: **RO:** 3.2 **SRO:**

Technical Reference: IC-05, Rod Control

Proposed references to be provided to candidates during examination: None

Learning Objective: IC-5 011: DESCRIBE the normal operation of the following control systems. Include function, instrumentation and setpoints: 7. C11

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.5

SRO Justification: N/A

Comments:

56.

Given the following plant conditions:

- 100% power.
- Several Incore Thermocouples have failed in one quadrant of the core.

Which ONE of the choices below completes the following statements?

The accuracy of the heat balance using the Integrated Plant Computer System, QCORE1, ____ (1) ____ affected by the failed thermocouples.

The **LCO** for T.S. 3.3.3.6, ACCIDENT MONITORING INSTRUMENTATION requires ____ (2) ____ /**quadrant/channel** OPERABLE thermocouples.

- A 1) is
2) 2
- B. 1) is
2) 4
- C. 1) is **not**
2) 2
- D. 1) is **not**
2) 4

017 K6.01 D

Bank

2021 NRC
#58

High

Modified

2021 NRC
#58

Low

Rev 1,
Major

Post NRC
Exam
review

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that the loss of incore thermocouples does not impact the sensors and detectors that automatically calculate the heat balance. They must also know the minimum number of tech spec required in core thermocouples.

- A. Incorrect. Part 1 is incorrect. Plausible because the candidate may think that the core exit temperature is part of the calorimetric calculation for the heat balance since it can be used to derive an enthalpy rise across the core. Part 2 is incorrect. Plausible because 2/core/quadrant/channel is the minimum channels operable requirement for this LCO.

Incorrect because feedwater temperature is the primary temperature input for the calorimetric calculation.

- B. Incorrect. Part 1 is incorrect. Plausible because the candidate may think that the core exit temperature is part of the calorimetric calculation for the heat balance since it can be used to derive an enthalpy rise across the core. Part 2 is correct. Tech Spec 3.3.3.6 requires 4/core/quadrant/channel.

Incorrect because feedwater temperature is the primary temperature input for the calorimetric calculation.

- C. Incorrect. Part 1 is correct. Thermocouples are not part of the calorimetric calculation. Part 2 is incorrect. Plausible because 2/core/quadrant/channel is the minimum channels operable requirement for this LCO.

Incorrect because the TS requires 4/core/quadrant/channel.

- D. Correct. Part 1 is correct. Thermocouples are not part of the calorimetric calculation. Part 2 is correct. Tech Spec 3.3.3.6 requires 4/core/quadrant/channel.

Form 4.2-1 Written Examination Question Worksheet

K/A: (017K6.01) Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF7 ITM) IN CORE TEMPERATURE MONITOR SYSTEM (CFR: 41.7 / 45.7): Temperature measuring device (for example thermocouple)

K/A Match: The K/A is matched because the candidate must have knowledge of the sensors and detectors that are used to automatically calculate the heat balance and know if this calculation is effected from a loss of In-core thermocouples.

Selection criteria: Modified Question 58 from the 2021 NRC Exam. The original question is on the following page.

Tier: 2 **Group:** 2

Importance Rating: **RO:** 3.2 **SRO:**

Technical Reference: Technical Specification 3.3.3.11, POWER DISTRIBUTION MONITORING SYSTEM.

Proposed references to be provided to candidates during examination: None

Learning Objective: IC-7 21: IDENTIFY the Technical Specifications associated with Incore Instrumentation System, including LCO, APPLICABILITY, ACTION, and BASES for all Technical Specifications with an ACTION of 1 hour or less.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

Original question 58 from the 2021 NRC Exam:

Given the following plant conditions:

- 100% power.
- Several Incore Thermocouples have failed in one quadrant of the core.
 - There is one OPERABLE thermocouple in that quadrant.
- All thermocouples in the other three quadrants are OPERABLE.

Which ONE of the choices below completes the following statements?

The accuracy of the heat balance using the Integrated Plant Computer System, QCORE1, ____ (1) ____ affected by the failed thermocouples.

The requirements of TS 3.3.3.11, POWER DISTRIBUTION MONITORING SYSTEM ____ (2) ____ met.

- A 1) is
2) are
- B. 1) is
2) are **not**
- C. 1) is **not**
2) are
- D. 1) is **not**
2) are **not**

57.

Given the following plant conditions:

- Core off-load was in progress.
- A complete loss of RHR cooling has occurred.
- The Reactor Building has been evacuated.
- XVB-2B, RB PURGE EXHAUST ISOLATION VALVE was closed.
- XVB-2A, RB PURGE EXHAUST ISOLATION VALVE, will **not** close.
- All other containment penetrations have been isolated.

Which ONE of the choices below answers the following questions?

- 1) Is containment closure satisfied in accordance with OAP-108.4, OPERATIONS OUTAGE CONTROL OF CONTAINMENT PENETRATIONS?
 - 2) While isolating containment, where were XVB-2A and XVB-2B operated from?
- A. 1) No.
2) HVAC Panel.
- B. 1) No.
2) MCB.
- C. 1) Yes.
2) HVAC Panel.
- D. 1) Yes.
2) MCB.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that only one of these two valves are required to be closed to set containment IAW OAP-108.4 and that these valves are controlled from the HVAC Panel.

- A. Incorrect. Part 1 is plausible because one of the two valves in series is still open. Incorrect because OAP-108.4 only requires one of these two valves to be closed. Part 2 is correct because XVB-2A is operated from the HVAC Panel.
- B. Incorrect. Part 1 is plausible because one of the two valves in series is still open. Incorrect because OAP-108.4 only requires one of these two valves to be closed. Part 2 is plausible because the majority of containment isolation valves that are operated from the Main Control Room are on the MCB. Incorrect because XVB-2A is operated from the HVAC Panel.
- C. Correct. Part 1 is correct because OAP-108.4 only requires one of these two valves to be closed. Part 2 is correct because XVB-2A is operated from the HVAC Panel.
- D. Incorrect. Part 1 is correct because OAP-108.4 only requires one of these two valves to be closed. Part 2 is plausible because the majority of containment isolation valves that are operated from the Main Control Room are on the MCB. Incorrect because XVB-2A is operated from the HVAC Panel.

Form 4.2-1 Written Examination Question Worksheet

K/A: (029A4.05) Ability to manually operate and/or monitor the (SF8 CPS)
CONTAINMENT PURGE SYSTEM in the control room (CFR: 41.7 / 45.5 to 45.8):
Manual isolation of the CPS

K/A Match: The K/A is matched because the candidate must know where to manually isolate the RB Purge Exhaust Isolation valves.

Selection criteria: New

Tier: 2 **Group:** 2

Importance Rating: **RO:** 3.1 **SRO:**

Technical Reference: OAP-108.4, OPERATIONS OUTAGE CONTROL OF
CONTAINMENT PENETRATIONS

Proposed references to be provided to candidates during examination: None

Learning Objective: OAP-108.4 04: DESCRIBE the penetration status requirements
for the following conditions: Modes 5, 6, and
defueled.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

58.

Given the following plant conditions:

- 100% power.
- Steam Generator blowdown is aligned to the main condenser.
- One tube on Steam Generator "B" has just completely ruptured.

Which ONE of the choices below completes the following statement?

The return of blowdown to the condenser is terminated by automatic action provided by _____.

- A. RM-L3, STEAM GENERATOR BLOWDOWN LIQUID.
- B. RM-L7, NUCLEAR BLOWDOWN WASTE EFFLUENT LIQUID.
- C. RM-L9, LIQUID WASTE EFFLUENT RADIATION MONITOR.
- D. RM-L10, NUCLEAR BLOWDOWN.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that RM-L7 will isolate blowdown return to the condenser on a tube rupture.

- A. Incorrect. RM-L3 is plausible because because it monitors flow in the SG Blowdown line. Incorrect because this monitor redirects flow to the Nuclear Blowdown holdup tank.
- B. Correct. RM-L7 monitors the SG Blowdown line and when it alarms, it sends a signal to isolate the discharge path to the "A" condenser, closing PVD-6121.
- C. Incorrect. Plausible because this is a rad monitor that monitors blowdown, however, it is the nuclear blowdown system. A candidate could easily mix this up for the SG Blowdown lines.
- D. Incorrect. Plausible because RM-L10 monitors the SG Blowdown lines. Incorrect because this rad monitor isolates flow going to the Circulating water system.

Form 4.2-1 Written Examination Question Worksheet

K/A: (035K3.06) Knowledge of the effect that a loss or malfunction of the (SF4P SG) STEAM GENERATOR SYSTEM will have on the following systems or system parameters (CFR: 41.7 / 45.4): S/GB system

K/A Match: The K/A is matched because the candidate must know how a SG Tube rupture will affect the SG Blowdown system based on a rad monitor alarming.

Selection criteria: Bank. The original bank question had two parts. The second part asked this same question. It is from question 21 of the 2016 NRC Exam.

Tier: 2 **Group:** 2

Importance Rating: **RO:** 3.0 **SRO:**

Technical Reference: TB-01, STEAM GENERATOR AND BLOWDOWN

Proposed references to be provided to candidates during examination: None

Learning Objective: TB-01 017: Identify the Steam Generator Blowdown System interfaces with the following systems and/or subsystems: 1. Condensate System

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

59.

Given the following plant conditions:

- 100% power.
- The crew just started the idle condensate pump.
- The following conditions came in after the condensate pump was started:
 - XCP-627 4-1, DEAER STOR TK LVL HI/HI-HI is in alarm.
 - Deaerator Wide Range Level is 11' 6".

Which ONE of the choices below states the number of condensate pump(s), if any, that are running?

- A. 0
- B. 1
- C. 2
- D. 3

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that all condensate pumps are tripped when DA level reaches 11'.

- A. Correct. Because Deaerator wide range level is above 11', all condensate pumps that were running have now tripped.
- B. Incorrect. Plausible if the candidate mixed up the levels, at 10' 6", one condensate pump is tripped which would leave one running in the current plant lineup.
- C. Incorrect. Plausible if the candidate believes that pumps only trip on Deaerator low level the was Feedwater Booster pumps and Feedwater pumps do.
- D. Incorrect. Plausible because there are several sets of pumps in which all pumps are running, e.g. feedwater pumps and feedwater booster pumps at 100% power and the Dearator level is high so a candidate could believe pumps don't trip on high level, only on low level. On low level, the Feedwater Booster pumps and Feedwater pumps trip.

Form 4.2-1 Written Examination Question Worksheet

K/A: (056K4.19) Knowledge of (SF4S CDS) CONDENSATE SYSTEM design features and/or interlocks that provide for the following (CFR: 41.7): Setpoints and trip levels for condensate pump and booster pump operations

K/A Match: The K/A is matched because the candidate must know how many Condensate pumps are running for the given power level and know that when DA level reaches the high setpoint, all condensate pumps will be tripped.

Selection criteria: New

Tier: 2 **Group:** 2

Importance Rating: **RO:** 3.0 **SRO:**

Technical Reference: TB-06, CONDENSATE SYSTEM

Proposed references to be provided to candidates during examination: None

Learning Objective: TB-06 015:DESCRIBE the following trips associated with the Condensate System. Include the purpose and setpoint: 2.
Deaerator storage tank level trips

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

60.

Given the following plant conditions:

- Release of Waste Monitor Tank “A” is in progress.

Which ONE of the choices below completes the following statements?

RM-L5, LIQUID WASTE EFFLUENT LIQUID RADIATION MONITOR ____ (1) ____
monitored from inside the control room during the release.

Waste Monitor Tank “A” is being released to the ____ (2) ____.

- A. 1) is
2) Penstocks.
- B. 1) is
2) Circulating Water System.
- C. 1) is not
2) Penstocks.
- D. 1) is not
2) Circulating Water System.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know what the release path is and which radiation monitors this release.

- A. Correct. Part 1 is correct because RM-L5 is monitored on the Liquid Waste Release permit in the main control room during the release. Part 2 is correct because the Waste Monitor tanks are released to the Penstocks.
- B. Incorrect. Part 1 is correct because RM-L5 is monitored on the Liquid Waste Release permit in the main control room during the release. Part 2 is plausible because we release SG blowdown to the Circulating water system through RM-L10.
- C. Incorrect. Part 1 is plausible because on the Liquid Waste Release permit for a Steam Generator Blowdown release, you do not monitor RM-L5. Part 2 is correct because the Waste Monitor tanks are released to the Penstocks.
- D. Incorrect. Part 1 is plausible because on the Liquid Waste Release permit for a Steam Generator Blowdown release, you do not monitor RM-L5. Part 2 is plausible because we release SG blowdown to the Circulating water system through RM-L10.

Form 4.2-1 Written Examination Question Worksheet

K/A: (068A4.02) Ability to manually operate and/or monitor the (SF9 LRS) LIQUID RADWASTE SYSTEM in the control room (CFR: 41.7 / 45.5 to 45.8): Remote radwaste release

K/A Match: The K/A is matched because the candidate must know if RM-L5 is monitored during a release of the Waste Monitor Tank.

Selection criteria: New

Tier: 2 **Group:** 2

Importance Rating: **RO:** 3.1 **SRO:**

Technical Reference: AB-16, LIQUID WASTE PROCESSING.

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-15 016: DESCRIBE the process of making a Liquid Waste Release from the Waste Monitoring Tanks.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

61.

Which ONE of the choices below completes the following statements?

HCV-014 is interlocked with the ____ (1) ____ of RM-A3.

To reset all interlocks for HCV-014, ____ (2) ____ and the radiation monitor alarm is cleared.

- A. 1) Gas channel **only**
2) the **selector switch** must be cycled to CLOSE
- B. 1) Gas, Particulate, **and** Iodine channels
2) the **selector switch** must be cycled to CLOSE
- C. 1) Gas channel **only**
2) operators must reset its **controller** to zero
- D. 1) Gas, Particulate, **and** Iodine channels
2) operators must reset its **controller** to zero

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know which channel of RM-A3 HCV-014 is interlocked with and how to reset the interlock to allow operation of the valve.

- A. Incorrect. Part 1 is correct because HCV-014 goes closed only when the Gas Channel of RM-A3 is in alarm. Part 2 is plausible because the HCV-014 controller must be taken to ZERO (0), which is the closed output demand. Incorrect because taking HCV-014 selector switch to close will not satisfy the controller permissive required to re-open the valve.
- B. Incorrect. Part 1 is plausible because there is a separate trouble alarm for each channel. A candidate could believe that all three channels are interlocked with HCV-014. Incorrect because only the gas channel of RM-A3 is interlocked with HCV-014. Part 2 is plausible because the HCV-014 controller must be taken to ZERO (0), which is the closed output demand. Incorrect because taking HCV-014 selector switch to close will not satisfy the controller permissive required to re-open the valve.
- C. Correct. Part 1 is correct because HCV-014 goes closed only when the Gas Channel of RM-A3 is in alarm. Part 2 is correct because In accordance with a note in SOP-119, WASTE GAS PROCESSING, HCV-014 controller must be taken to ZERO (0), then the valve can be re-opened.
- D. Incorrect. Part 1 is plausible because there is a separate trouble alarm for each channel. A candidate could believe that all three channels are interlocked with HCV-014. Incorrect because only the gas channel of RM-A3 is interlocked with HCV-014. Part 2 is correct because In accordance with a note in SOP-119, WASTE GAS PROCESSING, HCV-014 controller must be taken to ZERO (0), then the valve can be re-opened.

Form 4.2-1 Written Examination Question Worksheet

K/A: (071A3.04) Ability to monitor automatic features of the (SF9 WGS) WASTE GAS DISPOSAL SYSTEM, including (CFR: 41.7 / 45.7): Automatic isolation

K/A Match: The K/A is matched because the candidate must know what channels of RM-A3 causes an automatic isolation of the waste gas release.

Selection criteria: Bank, Question 63 of the 2019 NRC exam. The question is not word for word the same.

Tier: 2 **Group:** 2

Importance Rating: **RO:** 3.0 **SRO:**

Technical Reference: AB-12, WASTE GAS SYSTEM

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-12 016, DESCRIBE the Waste Gas System Interlocks. Specify purpose and setpoints.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

62.

Given the following plant conditions:

- 100% power.
- RM-G19A, STMLN HI RNG GAMMA just failed high.

Which ONE of the choices below completes the following statements?

When RM-G19A failed, “A” MSIV ____ (1) ____ receive a signal to automatically close.

The US ____ (2) ____ required to enter an action statement in accordance with LCO 3.3.3.1, RADIATION MONITORING INSTRUMENTATION.

- A. 1) did
2) is
- B. 1) did **not**
2) is
- C. 1) did
2) is **not**
- D. 1) did **not**
2) is **not**

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that RM-G19A does not provide an input to “A” MSIV to automatically close and that RM-G19A is required to be operable IAW LCO 3.3.3.1.

- A. Incorrect. Part 1 is plausible because the MSIV have multiple Steamline Isolation signals. Incorrect because RM-G19A is not one of them. Part 2 is correct because RM-G19A is part of LCO 3.3.3.1.
- B. Correct. Part 1 is correct because RM-G19A does not input into any of the Steamline Isolation signals. Part 2 is correct because RM-G19A is part of LCO 3.3.3.1.
- C. Incorrect. Part 1 is plausible because the MSIV have multiple Steamline Isolation signals. Incorrect because RM-G19A is not one of them. Part 2 is plausible because there are more radiation monitors that are not required by tech specs than there are radiation monitors that are required by tech specs. RM-G19A happens to be one radiation monitor that is required by tech specs.
- D. Incorrect. Part 1 is correct because RM-G19A does not input into any of the Steamline Isolation signals. Part 2 is plausible because there are more radiation monitors that are not required by tech specs than there are radiation monitors that are required by tech specs. RM-G19A happens to be one radiation monitor that is required by tech specs.

Form 4.2-1 Written Examination Question Worksheet

K/A: (072A2.01) Ability to (a) predict the impacts of the following on the (SF7 ARM) AREA RADIATION MONITORING SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): ARM component failures

K/A Match: The K/A is matched because the candidate must predict if the MSIVs will automatically close from a radiation monitor and then determine that they are required to take actions based on Tech Spec requirements.

Selection criteria: New

Tier: 2 **Group:** 2

Importance Rating: **RO:** 3.3 **SRO:**

Technical Reference: Technical Specifications, LCO 3.3.3.1, RADIATION MONITORING INSTRUMENTATION

Proposed references to be provided to candidates during examination: None

Learning Objective: GS-09 024: IDENTIFY the ODCM/Technical Specification(s) associated with Radiation Monitoring System, including LCO, APPLICABILITY, and BASES, for all Technical Specification(s) with an ACTION of 1 hour or less.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.7

SRO Justification: N/A

Comments:

63.

C

Given the following plant conditions:

- 50% power.
- “A” Circulating Water pump is running.
- “C” Circulating Water pump is OOS.
- “B” Circulating Water pump trips.

Which ONE of the choices below completes the following statement?

After the “B” Circulating Water pump trips, Circulating water outlet temperature will _____.

CONSIDER NO OPERATOR ACTIONS

- A. increase initially and then return to its original value.
- B. decrease initially and then return to its original value.
- C. increase and stabilize at a new higher value.
- D. decrease and stabilize at a new lower value.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that we do not throttle Circulating water flow or cooling to it so when a pump trips, the mass flowrate goes down and the outlet temperature rises.

- A. Incorrect. Plausible because temperature will increase and they could think that similar to other systems such as RHR or CCW, that a controller throttles to maintain temperature.
- B. Incorrect. Plausible if they misapply $\dot{Q} = \dot{m}c_p\Delta T$ and think that similar to other systems such as RHR or CCW that a controller throttles to maintain temperature.
- C. Correct. Because Mass flowrate has decreased, $\dot{Q}$ stays the same, c_p stays the same, Temperature has to increase.
- D. Incorrect. Plausible if they misapply $\dot{Q} = \dot{m}c_p\Delta T$.

Form 4.2-1 Written Examination Question Worksheet

K/A: (075A1.06) Ability to predict and/or monitor changes in parameters associated with operation of the (SF8 CW) CIRCULATING WATER SYSTEM, including (CFR: 41.5 / 45.5): Circulating water temperature (inlet and outlet)

K/A Match: The K/A is matched because the candidate must predict what circulating water outlet temperature will do after a circulating water pump trips.

Selection criteria: New

Tier: 2 **Group:** 2

Importance Rating: **RO:** 2.6 **SRO:**

Technical Reference: GFES material, 191006 Heat Exchangers and Condensers.

Proposed references to be provided to candidates during examination: None

Learning Objective: GFES 191006 1.5: Given the necessary data, calculate flow rates, and temperatures for various types of heat exchangers.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.5

SRO Justification: N/A

Comments:

64.

Which ONE of the choices below is considered a CORE ALTERATION in accordance with OAP-100.6, CONTROL ROOM CONDUCT AND CONTROL OF SHIFT ACTIVITIES?

- A. Removal of reactor vessel head with fuel and upper internals in the reactor vessel.
- B. Moving the reactor vessel head from the reactor vessel head stand with fuel in the Reactor Vessel.
- C. Movement of the mast into the vessel for the purpose of indexing.
- D. Movement of fuel inside the Spent Fuel Pool.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know what activity is considered a core alteration.

- A. Correct. In accordance with OAP-100.6, this is considered a core alteration.
- B. Incorrect. Plausible because removal of the reactor vessel head with fuel and upper internals in the vessel is a core alteration. Incorrect because this is moving the head from the stand at which it sits on during fuel movement.
- C. Incorrect. Plausible because OAP-100.6 specifically calls this out as NOT being a core alteration. It does this because people may think that it is considered a core alteration.
- D. Incorrect. Plausible because this is movement of fuel and the core is offloaded into this pool. It's reasonable to think that this movement could be considered a core alteration. Incorrect because this is not listed as a core alteration.

Form 4.2-1 Written Examination Question Worksheet

K/A: (G2.1.36) CONDUCT OF OPERATIONS: Knowledge of procedures and limitations involved in core alterations (CFR: 41.10 / 43.6 / 45.7)

K/A Match: The K/A is matched because the candidate must know what OAP-100.6 considers a core alteration.

Selection criteria: New

Tier: 3 **Group:**

Importance Rating: **RO:** 3.0 **SRO:**

Technical Reference: OAP-100.6, CONTROL ROOM CONDUCT AND CONTROL OF SHIFT ACTIVITIES

Proposed references to be provided to candidates during examination: None

Learning Objective: OAP-100.6 07: Discuss reactivity management expectations as described in OAP-100.6.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

65.

Which ONE of the choices below is a required conservative action to manually trip the reactor in accordance with OAP-100.6, CONTROL ROOM CONDUCT AND CONTROL OF SHIFT ACTIVITIES?

- A. T_{AVG}/T_{REF} mismatch of 8°F.
- B. A single step change in Reactor Power of 5%.
- C. A Feedwater Isolation Valve fails closed and is verified by other indications.
- D. With 3 Feedwater pumps running, one Feedwater Pump trips while at 100% power.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know which condition requires a reactor trip IAW OAP-100.6.

- A. Incorrect. Plausible because T_{avg}/T_{ref} mismatch is a trip condition from GOP Appendix A. Incorrect because we used 8°F which is under the 10°F. 8 is a value used in several AOPs that if Pressurizer level is approaching 8%, a reactor trip and safety injection is required.
- B. Incorrect. Plausible because OAP-100.6 requires a reactor trip for reactor power oscillating for any reason except a single step change in reactor power. We used 5% because in GOP Appendix A, a power reduction that requires > 5%/minute power reduction requires a reactor trip.
- C. Correct. OAP-100.6 says a reactor trip is required for A Feedwater Isolation Valve fails closed and is verified by other indications.
- D. Incorrect. Plausible because this is a misapplication of OAP-100.6, Step 10.3.b. The actual case is 2 feedwater pumps running and one pump trips.

Form 4.2-1 Written Examination Question Worksheet

K/A: (G2.1.39) CONDUCT OF OPERATIONS: Knowledge of conservative decision-making practices (CFR: 41.10 / 43.5 / 45.12)

K/A Match: The K/A is matched because the candidate must know which condition requires a conservative action to trip the reactor IAW OAP-100.6.

Selection criteria: New

Tier: 3 **Group:**

Importance Rating: **RO:** 3.7 **SRO:**

Technical Reference: OAP-100.6, CONTROL ROOM CONDUCT AND CONTROL OF SHIFT ACTIVITIES

Proposed references to be provided to candidates during examination: None

Learning Objective: OAP-100.6 05: DISCUSS conservative plant operation as described in OAP-100.6.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

66.

Which ONE of the choices below completes the following statements?

In accordance with Technical Specifications, a surveillance with the notation “S” is required to be performed at least once per ____ (1) ____ hours.

In accordance with OAP-100.6, CONTROL ROOM CONDUCT AND CONTROL OF SHIFT ACTIVITIES, operators are required to complete Technical Specification Logs within a **maximum** of ____ (2) ____ hours of taking the shift.

- A. 1) 12
2) 1.5
- B. 1) 12
2) 3
- C. 1) 24
2) 1.5
- D. 1) 24
2) 3

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that “S” denotes a surveillance to be performed every 12 hours and tech spec logs are required to be performed within the first 3 hours.

- A. Incorrect. Part 1 is correct because Tech Specs says an “S” is the notation for a surveillance to be performed every 12 hours. Part 2 is plausible because OP-AA-100 requires logs to be commenced within 1.5 hours of scheduled start time.
- B. Correct. Part 1 is correct because Tech Specs says an “S” is the notation for a surveillance to be performed every 12 hours. Part 2 is correct because OAP-100.6 requires tech spec logs to be complete by the third hour of shift.
- C. Incorrect. Part 1 is plausible because a surveillance with a “D” is required every 24 hours. Incorrect because “S” is required every 12 hours. Part 2 is plausible because OP-AA-100 requires logs to be commenced within 1.5 hours of scheduled start time.
- D. Incorrect. Part 1 is plausible because a surveillance with a “D” is required every 24 hours. Incorrect because “S” is required every 12 hours. Part 2 is correct because OAP-100.6 requires tech spec logs to be complete by the third hour of shift.

Form 4.2-1 Written Examination Question Worksheet

K/A: (G2.2.12) EQUIPMENT CONTROL: Knowledge of surveillance procedures (CFR: 41.10 / 43.2 / 45.13)

K/A Match: The K/A is matched because the candidate must know that a surveillance marked with an "S" is required to be done every 12 hours.

Selection criteria: New

Tier: 3 **Group:**

Importance Rating: **RO:** 3.7 **SRO:**

Technical Reference: Technical Specifications, Table 1.2, FREQUENCY NOTATION.

Proposed references to be provided to candidates during examination: None

Learning Objective: SB-4 018: RELATE plant procedures to the surveillance requirements of the Technical Specifications.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

67.

Given the following plant conditions:

- 100% power.
- “C” Condensate pump is running.
- XVB-614C, C DISCH ISOL is closed.

NOTE: Refer to drawings B-208-018, Sheet 19 and B-208-002, Sheet 1.

Which ONE of the choices below completes the following statement?

In the conditions above, if XVB-614C control switch is taken to the OPEN position and released when the valve indicates intermediate, the valve will _____.

REFERENCE PROVIDED

- A go back closed because the 52 contact closed.
- B. go back closed because the SS-CO19 contact closed.
- C. fully open because only the 52 contact remains open.
- D. fully open because both the 52 and the 33BC contacts remain open.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must be able to interpret VC Summer's 208 drawings for opening of XVB-614C.

- A. Incorrect. Plausible if candidate believes the valve switch controls the 52 contact.
- B. Incorrect. Plausible because the switch contact does close, if the candidate miss applies the 33BC contact operation it would result in the valve going back closed.
- C. Incorrect. Plausible because the 52 would be open but also requires the 33BC. Candidate may believe the switch for the valve opens the 52 contact.
- D. Correct. Both the 52 and 33 BC contacts must be open to allow the valve to stroke open, 52 is open on Pump breaker closing and the 33BC contact opens when the valve is not full closed.

Form 4.2-1 Written Examination Question Worksheet

K/A: (G2.2.41) EQUIPMENT CONTROL: Ability to obtain and interpret station electrical and mechanical drawings (reference potential) (CFR: 41.10 / 45.12 / 45.13)

K/A Match: The K/A is matched because the candidate must interpret the stations 208 drawings to determine what the valve will do for a given scenario.

Selection criteria: Bank

Tier: 3 **Group:**

Importance Rating: **RO:** 3.5 **SRO:**

Technical Reference: B-208-018, Sheet 19 and B-208-002, Sheet 1.

Proposed references to be provided to candidates during examination: B-208-018, Sheet 19 and B-208-002, Sheet 1.

Learning Objective: SB-1A 04: Given a set of plant conditions, **DETERMINE** the appropriate plant response using 208 drawings

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

68.

Given the following plant conditions:

- 100% power.
- Operators are preparing to perform a Waste Gas Decay tank release.
- The Waste Gas Decay tank to be released has been sampled.
- All Meteorological Instrumentation is operable.
- RM-A3, MAIN PLANT VENT EXHAUST AIR MONITOR channel surveillances are up to date.
- RM-A10, WASTE GAS DISCHARGE AIR MONITOR is inoperable due to the detector failing low.
- The interlock switch position for RM-A10 is as shown:



Which ONE of the choices below completes the following statements?

In accordance with the ODCM, Section 1.2.1, Radioactive Gaseous Effluent Monitoring Instrumentation, operators ____ (1) ____ allowed to commence the release without additional sampling.

When RM-A10 is restored to OPERABLE status, SOP-124, PROCESS AND AREA RADIATION MONITORING SYSTEM, requires the interlock switch to be in the ____ (2) ____ position.

REFERENCE PROVIDED

- A. 1) are
2) OFF (NORMAL)
- B. 1) are
2) ON (BYPASS)
- C. 1) are **not**
2) OFF (NORMAL)
- D. 1) are **not**
2) ON (BYPASS)

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know what rad monitors are required for the release and which position the interlock switch should be in for RM-A10.

A. Correct. Part 1 is correct. With RM-A3 inoperable and the Interlock on RM-A10 in bypass there are NO operable channels to monitor the release and per the ODCM Table 1.2-1 Action 7 the release can only continue for the conditions given if samples are analyzed. Part 2 is correct. SOP-119 requires the Interlock switches to be in the OFF position.

B. Incorrect. Part 1 is correct. With RM-A3 inoperable and the Interlock on RM-A10 in bypass there are NO operable channels to monitor the release and per the ODCM Table 1.2-1 Action 7 the release can only continue for the conditions given if samples are analyzed. Part 2 is incorrect. Plausible because this switch position is a common error. This switch position indicates whether the interlocks for the particular rad monitor are bypassed which allow you to shutdown the rad monitor or do maintenance without the automatic actions occurring. Typically confused with whether or not the interlock is on or off in conjunction with the switch position.

Incorrect because placing the switch in ON bypasses the interlock and SOP-119 requires the switches to be in NORMAL (OFF).

C. Incorrect. Part 1 is incorrect. Plausible because RM-A10 is not described as inoperable and you need either rad monitor for the release unless you are performing the necessary samples IAW ODCM Table 1.2-1 Action 7. Part 2 is correct. SOP-119 requires the Interlock switches to be in the OFF position.

Incorrect because SOP-119 requires the Interlock Switch to be in the NORMAL position.

D. Incorrect. Part 1 is incorrect. Plausible because RM-A10 is not described as inoperable and you need either rad monitor for the release unless you are performing the necessary samples IAW ODCM Table 1.2-1 Action 7. Part 2 is incorrect. Plausible because this switch position is a common error. This switch position indicates whether the interlocks for the particular rad monitor are bypassed which allow you to shutdown the rad monitor or do maintenance without the automatic actions occurring. Typically confused with whether or not the interlock is on or off in conjunction with the switch position.

Incorrect because the switches should be in the OFF position.

Form 4.2-1 Written Examination Question Worksheet

K/A: (G2.3.11) RADIATION CONTROL: Ability to control radiation releases (CFR: 41.11 / 43.4 / 45.10)

K/A Match: The K/A is matched because the candidate must know if a release is allowed to commence given several conditions.

Selection criteria: Bank

Tier: 3 **Group:**

Importance Rating: **RO:** 3.8 **SRO:**

Technical Reference: ODCM, Section 1.2.1, Radioactive Gaseous Effluent Monitoring Instrumentation.

Proposed references to be provided to candidates during examination: None

Learning Objective: GS-09 024: IDENTIFY the ODCM/Technical Specification(s) associated with the Radiation Monitoring System.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.11

SRO Justification: N/A

Comments:

69.

Given the following plant conditions:

- 100% power.
- A lightning strike has occurred.
- The annunciator power loss alarm bell is ringing.
- Multiple Main Control Board and Rad Monitor Panel annunciators have been lost.

Which ONE of the choices below completes the following statements?

The crew is required to use ____ (1) ____ to manage the loss of annunciators.

To silence the power loss alarm bell, the crew is required to ____ (2) ____.

- A. 1) AOP-100.5, LOSS OF CONTROL ROOM ANNUNCIATORS.
2) remove a fuse.
- B. 1) AOP-100.5, LOSS OF CONTROL ROOM ANNUNCIATORS.
2) depress the SILENCE pushbutton.
- C. 1) OAP-100.5, GUIDELINES FOR CONFIGURATION CONTROL AND OPERATION OF PLANT EQUIPMENT.
2) remove a fuse.
- D. 1) OAP-100.5, GUIDELINES FOR CONFIGURATION CONTROL AND OPERATION OF PLANT EQUIPMENT.
2) depress the SILENCE pushbutton.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that entry conditions for AOP-100.5 have been met and that you must remove a fuse to silence the power loss alarm bell.

- A. Correct. Part 1 is correct because entry conditions for AOP-100.5 have been met and this procedure will take care of the loss of all these annunciators. Part 2 is correct because you must remove a fuse IAW AOP-100.5 to silence the power loss alarm bell.
- B. Incorrect. Part 1 is correct because entry conditions for AOP-100.5 have been met and this procedure will take care of the loss of all these annunciators. Part 2 is plausible because AOP-100.5 and OAP-100.5 both have you silence alarms by pushing the SILENCE pushbutton. Incorrect because to silence the power loss alarm bell, you must remove a fuse.
- C. Incorrect. Part 1 is plausible because OAP-100.5 contains guidance on how to respond to annunciators, more specifically, a section on how to respond to unexpected annunciators which is what is described in the stem. Part 2 is correct because you must remove a fuse IAW AOP-100.5 to silence the power loss alarm bell.
- D. Incorrect. Part 1 is plausible because OAP-100.5 contains guidance on how to respond to annunciators, more specifically, a section on how to respond to unexpected annunciators which is what is described in the stem. Part 2 is plausible because AOP-100.5 and OAP-100.5 both have you silence alarms by pushing the SILENCE pushbutton. Incorrect because to silence the power loss alarm bell, you must remove a fuse.

Form 4.2-1 Written Examination Question Worksheet

K/A: (G2.4.32) EMERGENCY PROCEDURES/PLAN: Knowledge of operator response to loss of annunciators (CFR: 41.10 / 43.5 / 45.13)

K/A Match: The K/A is matched because the candidate must know what procedure is required to address a loss of annunciators and specifically what actions to take to silence the power loss alarm bell.

Selection criteria: Modified question 49 of the 2021 NRC Exam. The question was modified by asking a different second part of the question. This created a new answer. Original question is on the following page.

Tier: 3 **Group:**

Importance Rating: **RO:** 3.6 **SRO:**

Technical Reference: AOP-100.5, LOSS OF CONTROL ROOM ANNUNCIATORS.

Proposed references to be provided to candidates during examination: None

Learning Objective: AOP-100.5 3: Given a set of plant conditions, DETERMINE the appropriate plant response and operator actions in accordance with AOP-100.5.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

Original question 49 from the 2021 NRC Exam:

Given the following plant conditions:

- 100% power.
- Internal short resulted in a power loss to 125 VDC circuit XPN6095.
- AOP-100.5, LOSS OF MAIN CONTROL BOARD ANNUNCIATORS is in progress.
- The crew is ensuring T_{AVG} is above the minimum temperature for criticality in accordance with GTP-702, Attachment IV.G, T-AVG/T-REF DEVIATION ALARM NOT RESET.

Which ONE of the choices below completes the following statements?

In accordance with AOP-100.5, to clear the MCB annunciator power loss bell, the crew will ____ (1) ____.

RCS T_{AVG} must be greater than a minimum value of ____ (2) ____ to be above the minimum temperature for criticality.

- A. 1) depress the silence push button.
2) 551°F
- B. 1) depress the silence push button.
2) 557°F
- C. 1) remove control power fuse in the MCB.
2) 551°F
- D. 1) remove control power fuse in the MCB.
2) 557°F

70.

Given the following plant conditions:

0700 on 9/01/23:

- 100% power.

0900 on 9/01/23:

- 25% power.

0900 on 9/02/23:

- 25% power.

Which ONE of the choices below describes the current status of the xenon-135 concentration at **0900 on 9/02/23?**

- A. At equilibrium.
- B. Decreasing toward an upturn.
- C. Decreasing toward equilibrium.
- D. Increasing toward a peak.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know how Xenon concentration reacts after a down power.

- A. Incorrect. Plausible because a candidate could think that it takes 24 hours to reach the new equilibrium. It's also plausible because at 24 hours, xenon has returned to its pre-power change concentration, which some validators have confused for its equilibrium value.
- B. Incorrect. Plausible because on an up power, xenon does decrease until it reaches its lowest value at which point it makes an upturn to rise to its new higher concentration. This point could be mistaken for 24 hours vice the thumb rule of the square root of the power change.
- C. Correct. Approximately 26 hours after the power change, xenon concentration is decreasing to its new equilibrium value.
- D. Incorrect. Plausible because on the down power, xenon increases towards a peak value at roughly 9 hours for this power change, these times are easily mistaken. Incorrect because at 26 hours, the xenon concentration is decreasing towards its equilibrium.

Form 4.2-1 Written Examination Question Worksheet

K/A: (192006K1.05) FISSION PRODUCT POISONS (CFR: 41.1): Describe the following processes and state their effect on reactor operations: -- equilibrium xenon

K/A Match: The K/A is matched because the candidate must know that the xenon concentration is heading towards equilibrium based on a given power change.

Selection criteria: Bank P1158

Tier: 4 **Group:**

Importance Rating: **RO:** 3.1 **SRO:**

Technical Reference: INPO GFES, 192006 FISSION PRODUCT POISONS

Proposed references to be provided to candidates during examination: None

Learning Objective: 192006 1.5: Explain how Xe-135 concentration reacts during the following nuclear reactor operations: xenon free initial reactor startup, reactor shutdown, decrease in reactor power, increase in reactor power, and reactor startup with xenon present in core.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.1

SRO Justification: N/A

Comments:

71.

Which ONE of the choices below completes the following statements?

A boron addition is made to a shutdown reactor with RCPs in operation and the same boron addition is made to a shutdown reactor while in natural circulation, **1 min** after the boron addition is completed to the reactor with reactor coolant pumps running, the reactor will see a ____ (1) ____ change in reactivity due to the boron addition alone.

4 hours after boron addition is completed, the total reactivity change due to the boron addition alone would be ____ (2) ____ for the reactor in natural circulation when compared to the shutdown reactor with RCPs in operation.

- A. 1) larger
2) smaller
- B. 1) larger
2) the same
- C. 1) smaller
2) smaller
- D. 1) smaller
2) the same

Mike, we had to make two small changes to this question. First we changed “more” and “the same” for the first statement to “larger” and “smaller”. This is because it didn’t read properly. In the second statement, we changed 1 hour to 4 hours. This is to ensure we have a homogenous mixture. It’s 5-7 loop transits to ensure a homogenous mixture with each transit time approximately 11 minutes.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that boron being added during natural circulation takes longer to achieve complete mixing in the RCS. They must also know that once completely mixed, the concentration is the same regardless of forced flow.

- A. Incorrect. Part 1 is correct because without the Reactor Coolant Pumps (RCPs) running the RCS flow rate will be much lower and the boron mixture distribution will take much longer to be evenly distributed throughout the core. Part 2 is plausible if the candidate does not take into account complete mixing. Incorrect because once completely mixed, the concentration is the same regardless of forced flow.
- B. Correct. Part 1 is correct because without the Reactor Coolant Pumps (RCPs) running the RCS flow rate will be much lower and the boron mixture distribution will take much longer to be evenly distributed throughout the core. Part 2 is correct because any boron changes in natural circulation will have the same reactivity effect as with forced circulation, once completely mixed.
- C. Incorrect. Part 1 is plausible because the candidate could confuse this with how the concentration piece works. Incorrect because during natural circulation, boron takes longer to be completely mixed in the RCS when compared to being added during forced circulation. Part 2 is plausible if the candidate does not take into account complete mixing. Incorrect because once completely mixed, the concentration is the same regardless of forced flow.
- D. Incorrect. Part 1 is plausible because the candidate could confuse this with how the concentration piece works. Incorrect because during natural circulation, boron takes longer to be completely mixed in the RCS when compared to being added during forced circulation. Part 2 is correct because any boron changes in natural circulation will have the same reactivity effect as with forced circulation, once completely mixed.

Form 4.2-1 Written Examination Question Worksheet

K/A: 192007K1.05: FUEL DEPLETION AND BURNABLE POISONS (CFR: 41.1):
Describe the effects of boration/dilution on reactivity during forced-flow and natural circulation conditions

K/A Match: The K/A is matched because the candidate must know how reactivity is effected by adding boron during forced flow vs natural circulation.

Selection criteria: Bank, P3364

Tier: 4 **Group:**

Importance Rating: **RO:** 3.2 **SRO:**

Technical Reference: 192007 Fuel Depletion and Burnable Poisons

Proposed references to be provided to candidates during examination: None

Learning Objective: 1.6: Describe the effect of changes in boron concentration on reactivity during forced and natural circulation conditions.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.1

SRO Justification: N/A

Comments:

72.

Given the following plant conditions:

- GOP-3, REACTOR STARTUP FROM HOT STANDBY TO STARTUP (MODE 3 TO MODE 2) is in progress after a trip at 12,000 MWD/MTU.
- The crew has recorded Critical Data.
- The crew is increasing Reactor Power to between 1% and 3%.

Which ONE of the choices below completes the following statement in accordance with GOP-3?

The crew is required to establish a maximum stable Startup Rate of less than ____ (1) ____ decades per minute on the ____ (2) ____ SUR instrument.

- A. 1) 0.3
2) Source Range
- B. 1) 0.3
2) Intermediate Range
- C. 1) 1.0
2) Source Range
- D. 1) 1.0
2) Intermediate Range

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the startup rate limits not to exceed and which SUR meter is being used to monitor this startup.

- A. Incorrect. Part 1 is plausible because during a startup with a positive MTC, a caution in GOP-3 states that SUR of 0.3 dpm should not be exceeded. Incorrect because in the stem, this is a startup of a plant towards its end of life which means the MTC is negative. Part 2 is plausible because there is a Source Range SUR instrument. Incorrect because the Source Range instruments go to 10^6 cps and therefore their associated SUR meter stops working at this point.
- B. Incorrect. Part 1 is plausible because during a startup with a positive MTC, a caution in GOP-3 states that SUR of 0.3 dpm should not be exceeded. Incorrect because in the stem, this is a startup of a plant towards its end of life which means the MTC is negative. Part 2 is correct because at 10^6 cps, the Source Range SUR meter no longer reads out because this is the top of the scale for the Source Range nuclear instruments.
- C. Incorrect. Part 1 is correct because GOP-3 has a note that states 1 dpm should not be exceeded. Part 2 is plausible because there is a Source Range SUR instrument. Incorrect because the Source Range instruments go to 10^6 cps and therefore their associated SUR meter stops working at this point.
- D. Correct. Part 1 is correct because GOP-3 has a note that states 1 dpm should not be exceeded. Part 2 is correct because at 10^6 cps, the Source Range SUR meter no longer reads out because this is the top of the scale for the Source Range nuclear instruments.

Form 4.2-1 Written Examination Question Worksheet

K/A: (192008K1.12) REACTOR OPERATIONAL PHYSICS (CFR: 41.1):
(INTERMEDIATE RANGE OPERATION) List parameters that should be monitored and controlled during the intermediate phase of startup (from criticality to the POAH)

K/A Match: The K/A is matched because the candidate must know that they should be monitoring the intermediate range SUR meter for the given conditions.

Selection criteria: New

Tier: 4 **Group:**

Importance Rating: **RO:** 3.6 **SRO:**

Technical Reference: GOP-3, REACTOR STARTUP FROM HOT STANDBY TO
STARTUP (MODE 3 TO MODE 2)

Proposed references to be provided to candidates during examination: None

Learning Objective: GOP-3 3: Explain the NOTES and CAUTIONS associated with
GOP-3.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.10

SRO Justification: N/A

Comments:

73.

Given a set of steam tables that lists the following parameters for saturated steam and water:

- Pressure
- Enthalpy
- Specific volume
- Entropy
- Temperature

Which ONE of the choices below completes the following statement?

One can determine the ____ (1) ____ of a saturated steam-water mixture given only the ____ (2) ____.

- A. 1) temperature
2) enthalpy.
- B. 1) temperature
2) pressure.
- C. 1) pressure
2) entropy.
- D. 1) pressure
2) specific volume.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that given only pressure, you can only determine its associated saturation temperature.

- A. Plausible because in the steam tables, you can go to the “temperature table” and pull up a value for enthalpy, this will give you a temperature. Incorrect because you cannot determine temperature given only the enthalpy without knowing at least one other parameter.
- B. Correct. Given only pressure, you can determine the saturation temperature using the steam tables.
- C. Plausible because in the steam tables, you can go to the “pressure table” and pull up a value for entropy, this will give you a pressure. Incorrect because you cannot determine temperature given only the enthalpy without knowing at least one other parameter.
- D. Plausible because in the steam tables, you can go to the “pressure table” and pull up a value for Specific Volume, this will give you a pressure. Incorrect because you cannot determine temperature given only the enthalpy without knowing at least one other parameter.

Form 4.2-1 Written Examination Question Worksheet

K/A: (193003K1.24) STEAM (CFR: 41.14): Explain the usefulness of steam tables to the control room operator

K/A Match: The K/A is matched because the candidate must know how to use steam tables to determine a specific value.

Selection criteria: Bank, GFES P6039

Tier: 4 **Group:**

Importance Rating: **RO:** 3.1 **SRO:**

Technical Reference: GFES 193003, STEAM

Proposed references to be provided to candidates during examination: None

Learning Objective: 193003 02: Use Mollier diagram and steam tables to determine properties of a fluid.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.14

SRO Justification: N/A

Comments:

74.

A pressurizer relief valve is leaking by with the leakage being collected in a pressurizer relief tank. The pressurizer pressure is 2,200 psia and the relief tank pressure is 5 psig.

With dry saturated steam in the pressurizer vapor space, which ONE of the choices below is the condition of the fluid **just downstream of the relief valve?**

A. Superheated steam.

B. Subcooled liquid.

C. Dry saturated steam.

D. Wet vapor.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that throttling process is a constant enthalpy process and be able to use the mollier diagram to determine that this is a wet vapor.

A. Plausible because if the temperature stayed the same and only pressured dropped, you'd end up with a superheated steam.

B. Plausible because once the vapor reaches the PRT, it becomes a subcooled liquid.

C. Plausible because this is how the steam starts off in the Pressurizer.

D. Correct. Throttling is a constant enthalpy process and when you draw the line straight across from the 2200 psia point on the saturation curve to the 20 psia line, you end up below the saturation curve and therefore you have a wet vapor.

Form 4.2-1 Written Examination Question Worksheet

K/A: (193004K1.15) THERMODYNAMIC PROCESS (CFR: 41.14): (THROTTLING AND THE THROTTLING PROCESS) Determine the exit conditions for a throttling process based on the use of steam and/or water

K/A Match: The K/A is matched because the candidate must determine the phase of the steam during the throttling process.

Selection criteria: Bank, GFES 193004 P148

Tier: 4 **Group:**

Importance Rating: **RO:** 2.8 **SRO:**

Technical Reference: GFES 193004, Thermodynamic Process

Proposed references to be provided to candidates during examination: None

Learning Objective: 193004 1.5: Determine exit conditions for a throttling process.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 41.14

SRO Justification: N/A

Comments:

75.

Which ONE of the choices below completes the following statement?

Reactor thermal limits are established to _____.

- A. ensure the integrity of the reactor fuel.
- B. prevent exceeding reactor vessel mechanical limitations.
- C. minimize the coolant temperature rise across the core.
- D. establish control rod insertion limits.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that reactor thermal limits are established to ensure integrity of the reactor fuel.

- A. Correct. Reactor thermal limits are established to ensure the integrity of the reactor fuel.
- B. Plausible if the candidate believes that thermal limits are designed to prevent the reactor vessel from thermal damage since this is one of the RCS barriers and is needed to contain the fuel.
- C. Plausible because we maintain Delta T to prevent boiling in the core. This could be confused with thermal limits.
- D. Plausible because Reactor Power Limits are used to establish control rod insertion limits, this can be confused with Reactor Thermal Limits.

Form 4.2-1 Written Examination Question Worksheet

K/A: (193009K1.05) CORE THERMAL LIMITS (CFR: 41.14): State why thermal limits are necessary.

K/A Match: The K/A is matched because the candidate must know why thermal limits are necessary.

Selection criteria: Bank GFES P1295

Tier: 4 **Group:**

Importance Rating: **RO:** 3.5 **SRO:**

Technical Reference: GFES 193009, Core Thermal Limits

Proposed references to be provided to candidates during examination: None

Learning Objective: 193009 1.2: Describe the reason thermal limits are necessary and the function of the core protection calculator.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 41.14

SRO Justification: N/A

Comments:

76.

Initial conditions:

- The reactor has tripped.
- “B” SG is depressurizing uncontrollably.
- PCV-445A, PWR RELIEF is open and can **not** be closed.
- MVG-8000A, RELIEF 445A ISOL is open and can **not** be closed.
- Immediate actions of EOP-1.0 were just completed.

Current conditions:

- EOP-2.1, ES-1.2 POST-LOCA COOLDOWN AND DEPRESSURIZATION is in progress.

Which ONE of the choices below completes the following statements?

In the **initial conditions**, the **first** transition was to ____ (1) ____.

In accordance with EOP-2.1, a CAUTION states that if SI has been terminated, the SI Accumulators are required to be isolated prior to depressurizing the RCS to LESS THAN ____ (2) ____ psig.

- A. 1) EOP-3.0, E-2 FAULTED STEAM GENERATOR ISOLATION.
2) 195
- B. 1) EOP-3.0, E-2 FAULTED STEAM GENERATOR ISOLATION.
2) 850
- C. 1) EOP-2.0, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.
2) 195
- D. 1) EOP-2.0, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.
2) 850

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must recognize that the open PORV must be addressed by going to EOP-2.0 prior to addressing the faulted SG. This is a unique condition in EOP-1.0 since normally a faulted steam generator takes precedence to address. The candidate must also know what pressure to depressurize the RCS to in EOP-2.1 after SI has been terminated.

- A. Incorrect. Part 1 is plausible because under normal circumstances, EOP-3.0 is addressed first in EOP-1.0. Incorrect because there is a unique transition out of EOP-1.0 when there is a vapor space accident occurring. Part 2 is plausible because In EOP-2.0 during the check if SI Accumulators should be isolated, if subcooling is not met, you verify RCS pressure is less than 195 psig and then isolate accumulators.
- B. Incorrect. Part 1 is plausible because under normal circumstances, EOP-3.0 is addressed first in EOP-1.0. Incorrect because there is a unique transition out of EOP-1.0 when there is a vapor space accident occurring. Part 2 is correct because EOP-2.1 has you depressurize the RCS to 850 psig then isolate accumulators when SI has been terminated.
- C. Incorrect. Part 1 is correct because there is an open PORV that can't be isolated. This requires a transition out of EOP-1.0 prior to the normal transition criteria is checked. Part 2 is plausible because In EOP-2.0 during the check if SI Accumulators should be isolated, if subcooling is not met, you verify RCS pressure is less than 195 psig and then isolate accumulators.
- D. Correct. Part 1 is correct because there is an open PORV that can't be isolated. This requires a transition out of EOP-1.0 prior to the normal transition criteria is checked. Part 2 is correct because EOP-2.1 has you depressurize the RCS to 850 psig then isolate accumulators when SI has been terminated.

Form 4.2-1 Written Examination Question Worksheet

K/A: 008 2.1.32: (000008) (APE 8) Pressurizer Vapor Space Accident (G2.1.32)
CONDUCT OF OPERATIONS: Ability to explain and apply system precautions, limitations, notes, or cautions (CFR: 41.10 / 43.2 / 45.12)

K/A Match: The K/A is matched because the candidate must be able to apply a caution in EOP-2.1 based on a Vapor Space accident occurring. The candidate must also determine the priority of events occurring to determine which procedure to transition to.

Selection criteria: New

Tier: 1 **Group:** 1

Importance Rating: **RO:** **SRO:** 4.0

Technical Reference: EOP-1.0, E-0 REACTOR TRIP OR SAFETY INJECTION

Proposed references to be provided to candidates during examination: None

Learning Objective: EOP-1.0, 09: Given plant conditions, select an appropriate transition out of EOP-1.0.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.5

SRO Justification: This question is at the SRO level because the candidate must analyze a set of conditions and select a procedure with which to proceed. This condition is a unique path out of EOP-1.0 if you have a PORV stuck open prior to getting to the normal transitions. Traditionally the flow path out of EOP-1.0 is, in order, EOP-3.0 (Faulted SG), EOP-4.0 (Ruptured SG), EOP-2.0(LOCA).

Comments:

77.

A

Given the following plant conditions:

- A Large Break LOCA occurred.
- XCP-610, 1-1, RHR PP A TRIP is in alarm.
- XCP-610, 2-1, RHR PP B TRIP is in alarm.
- EOP-2.0, E-1 LOSS OF REACTOR OR SECONDARY COOLANT in progress.
 - Operators are at step 16, "Verify equipment is available for Cold Leg Recirculation".
- RB pressure is 13 psig and decreasing.
- RWST level is 25% and decreasing.
- RHR Sump Level is 415 ft and increasing.

Which ONE of the choices below describes the **next** procedure transition and the **first** action that is required in that procedure?

- A. 1) EOP-2.4 LOSS OF EMERGENCY COOLANT RECIRCULATION.
2) Align RB Spray for recirculation.
- B. 1) EOP-2.4 LOSS OF EMERGENCY COOLANT RECIRCULATION.
2) Commence an RCS cooldown.
- C. 1) EOP-2.2, ES-1.3 TRANSFER TO COLD LEG RECIRCULATION.
2) Align Charging Pumps for Cold Leg Recirculation.
- D. 1) EOP-2.2, ES-1.3 TRANSFER TO COLD LEG RECIRCULATION.
2) Split High-Head SI trains.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that at least one RHR pump is required to go to cold leg recirculation and that RB Spray is the first action taken in EOP-2.4

- A. Correct. Part 1 is correct because both RHR pumps are tripped and therefore you requirements to enter EOP-2.2 are not met. Part 2 is correct because you align RB Spray for recirculation prior to commencing the RCS cooldown in EOP-2.4.
- B. Incorrect. Part 1 is correct because both RHR pumps are tripped and therefore you requirements to enter EOP-2.2 are not met. Part 2 is plausible because EOP-2.4 will have you perform a cooldown, Incorrect because you first align RB spray for recirculation.
- C. Incorrect. Part 1 is plausible because this is the normal procedure you would go to if all conditions were met at step 16 of EOP-2.0. Part 2 is plausible because if you did transition to EOP-2.2, you will align charging pumps prior to splitting high head SI trains.
- D. Incorrect. Part 1 is plausible because this is the normal procedure you would go to if all conditions were met at step 16 of EOP-2.0. Part 2 is plausible because EOP-2.2 will have you split high head SI trains. Incorrect because you first align charging pumps in EOP-2.2.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000011EA2.05) Ability to determine and/or interpret the following as they apply to (EPE 11) LARGE-Break LOCA (CFR: 41.10 / 43.5 / 45.13): Significance of ECCS pump operation

K/A Match: The K/A is matched because the candidate must determine a procedure transition based on several ECCS pumps tripping.

Selection criteria: New

Tier: 1 **Group:** 1

Importance Rating: **RO:** **SRO:** 4.1

Technical Reference: EOP-2.4, ECA-1.1 LOSS OF EMERGENCY COOLANT RECIRCULATION.

Proposed references to be provided to candidates during examination: None

Learning Objective: EOP-2.4 06: Given a set of plant conditions, predict a discrete path through EOP-2.4.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.5

SRO Justification: The question is at the SRO level because the candidate must assess a set of plant conditions and determine a procedure with which to proceed.

Comments:

78.

Given the following plant conditions:

- EOP-13.0, FR-S.1 RESPONSE TO ABNORMAL NUCLEAR POWER GENERATION is in progress.
- Core Exit Thermocouples are 1250°F and increasing.
- The NROATC has driven control rods in manually.
- Group step counters indicate 0 steps.
- DRPI indicates 0 steps on all control rods.

Which ONE of the choices below completes the following statements?

In accordance with EOP-13.0, the DRPI indications ____ (1) ____ used to determine whether the reactor is subcritical for the purpose of **exiting** EOP-13.0.

In the conditions above, a procedural transition to SAG-1, INITIAL RESPONSE ____ (2) ____ required.

- A. 1) are
2) is
- B. 1) are
2) is **not**
- C. 1) are **not**
2) is **not**
- D. 1) are **not**
2) is

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the instruments used to determine the reactor is subcritical in EOP-13.0 and know if the requirements to transition to SAG-1 are met.

- A. Incorrect. Part 1 is plausible because with DRPI at 0 steps, the Rod Bottom Lights will be lit and this is an indication used to determine the reactor is tripped. Incorrect because to exit EOP-13.0, it requires you to use power range <5% and Intermediate Range SUR indicates negative. Part 2 is correct because with Core Exit TC temperatures $\geq 1200^{\circ}\text{F}$, EOP-13.0 requires a transition to SAG-1.
- B. Incorrect. Part 1 is plausible because with DRPI at 0 steps, the Rod Bottom Lights will be lit and this is an indication used to determine the reactor is tripped. Incorrect because to exit EOP-13.0, it requires you to use power range <5% and Intermediate Range SUR indicates negative. Part 2 is plausible because OP-AP-104 states that a red path Functional Restoration procedure (EOP-13.0) should be performed to completion unless preempted by a higher priority path or a loss of all AC power. Incorrect at 1200°F , SAG-1 is required to be entered.
- C. Incorrect. Part 1 is correct because to verify the reactor is subcritical, you verify power range NIs indicate <5% and Intermediate Range SUR indicates a negative value. Part 2 is plausible because OP-AP-104 states that a red path Functional Restoration procedure (EOP-13.0) should be performed to completion unless preempted by a higher priority path or a loss of all AC power. Incorrect at 1200°F , SAG-1 is required to be entered.
- D. Correct. Part 1 is correct because to verify the reactor is subcritical, you verify power range NIs indicate <5% and Intermediate Range SUR indicates a negative value. Part 2 is correct because with Core Exit TC temperatures $\geq 1200^{\circ}\text{F}$, EOP-13.0 requires a transition to SAG-1.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000029) (EPE 29) Anticipated Transient Without Scram (G2.4.16) EMERGENCY PROCEDURES/PLAN: Knowledge of emergency and abnormal operating procedures implementation hierarchy and coordination with other support procedures or guidelines, such as operating procedures, abnormal operating procedures, or severe accident management guidelines (CFR: 41.10 / 43.5 / 45.13)

K/A Match: The K/A is matched because the candidate must determine if the ATWS procedure takes precedence over entry requirements to SAG-1.

Selection criteria: Modified, Question 79 of the 2019 NRC Exam. Question is modified by changing the Core Exit TC temperatures. This changed a previously incorrect answer to the correct answer. Original question is on the following page.

Tier: 1 **Group:** 1

Importance Rating: **RO:** **SRO:** 4.4

Technical Reference: EOP-13.0, FR-S.1 RESPONSE TO ABNORMAL NUCLEAR POWER GENERATION

Proposed references to be provided to candidates during examination: None

Learning Objective: EOP-13.0 07: Given a set of plant conditions predict a discrete path through EOP-13.0.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.5

SRO Justification: The question is at the SRO level because the candidate must assess plant conditions and determine if a procedure transition is required.

Comments:

Original question 79 from the 2019 NRC Exam.

Initial conditions:

- 100% power initially.
- All Main Feedwater pumps tripped.
- The reactor did not trip automatically or manually.
- No EFW pumps are running.
- DRPI indicates 228 steps on all rods.
- Group step counters indicate 228 steps.
- Pressurizer PORVs have opened to maintain RCS pressure.
- Operators entered EOP-13.0, FR-S.1 RESPONSE TO ABNORMAL NUCLEAR POWER GENERATION.
- An AO had been dispatched to trip the reactor locally.

Current conditions:

- The CRS crew is evaluating Core Exit TCs in accordance with the associated step in EOP-13.0.
- Core Exit Thermocouples are 800°F and increasing.
- The NROATC has driven control rods in manually.
- Group step counters indicate 0 steps.
- DRPI indicates 0 steps on all control rods.

Which ONE of the choices below completes the following statements?

In accordance with EOP-13.0, the DRPI indications in the current conditions ____ (1) ____ used to determine whether the reactor is subcritical for the purpose of exiting EOP-13.0.

Given the current conditions above, a procedural transition to SAG-1, INITIAL RESPONSE ____ (2) ____ required.

- A. 1) are
2) is
- B. 1) are
2) is **not**
- C. 1) are **not**
2) is **not**
- D. 1) are **not**
2) is

79.

Given the following plant conditions:

- A Steam Generator Tube Rupture on "A" SG occurred.
- EOP-4.0, E-3 STEAM GENERATOR TUBE RUPTURE is in progress.
- Ruptured SG pressure is 400 psig.
- RCS subcooling is 70°F.
- Pressurizer level is 45%.

Which ONE of the choices below completes the following statements?

EOP-4.0 requires a transition to ____ (1) ____.

When starting a RCP in the new procedure, RCS pressure must be greater than a minimum pressure of ____ (2) ____ psig in accordance with SOP-101, REACTOR COOLANT SYSTEM.

- A. 1) EOP-4.2, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.
2) 250.
- B. 1) EOP-4.2, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.
2) 325.
- C. 1) EOP-4.1A, ES-3.1 POST-SGTR COOLDOWN BY BACKFILLING THE REACTOR COOLANT SYSTEM.
2) 250.
- D. 1) EOP-4.1A, ES-3.1 POST-SGTR COOLDOWN BY BACKFILLING THE REACTOR COOLANT SYSTEM.
2) 325.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that with the ruptured SG pressure below 460 psig, EOP-4.2 is required to be transitioned to. They must also know that SOP-101 requires RCS pressure to be greater than 325 psig to start a RCP.

- A. Incorrect. Part 1 is correct because the ruptured SG pressure is less than 460 psig. Part 2 is plausible because RCP trip criteria for CBO flow has a limit of 250°F. This is where 250 comes from. Incorrect because SOP-101 requires RCS pressure >325 psig.
- B. Correct. Part 1 is correct because the ruptured SG pressure is less than 460 psig. Part 2 is correct because SOP-101 requires RCS pressure >325 psig.
- C. Incorrect. Part 1 is plausible because this is the preferred procedure to transition to after you complete the cooldown in EOP-4.0. Part 2 is plausible because RCP trip criteria for CBO flow has a limit of 250°F. This is where 250 comes from. Incorrect because SOP-101 requires RCS pressure >325 psig.
- D. Incorrect. Part 1 is plausible because this is the preferred procedure to transition to after you complete the cooldown in EOP-4.0. Part 2 is correct because SOP-101 requires RCS pressure >325 psig.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000038EA2.17) Ability to determine and/or interpret the following as they apply to (EPE 38) STEAM GENERATOR Tube Rupture (CFR: 41.10 / 43.5 / 45.13): RCP restart criteria

K/A Match: The K/A is matched because the candidate must know what RCS pressure is required to start a RCP in the procedure that is required to be transitioned to.

Selection criteria: New

Tier: 1 **Group:** 1

Importance Rating: **RO:** **SRO:** 3.1

Technical Reference: EOP-4.0, E-3 STEAM GENERATOR TUBE RUPTURE

Proposed references to be provided to candidates during examination: None

Learning Objective: EOP-4.0 07: Given a set of plant conditions, PREDICT a discrete path through EOP-4.0.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.5

SRO Justification: The question is at the SRO level because the candidate must assess plant conditions and determine a procedure with which to proceed.

Comments:

80.

Given the following plant conditions:

- 100% power.
- “A” Charging pump is running.
- “A” Service Water pump tripped.
- AOP-117.1, LOSS OF SERVICE WATER is in progress.
- “C” Service Water pump can **not** be started.
- FI-4468, FR LOOP A TO POND FLOW GPM reads 0 gpm.
- FI-4498, FR LOOP B TO POND FLOW GPM reads 0 gpm.

Which ONE of the choices below completes the following statements?

AOP-117.1 requires ____ (1) ____.

Flow indications from the RBCUs ____ (2) ____ reading normal.

- A. 1) tripping the reactor and going to EOP-1.0 while continuing on in AOP-117.1.
2) are
- B. 1) tripping the reactor and going to EOP-1.0 while continuing on in AOP-117.1.
2) are **not**
- C. 1) establishing “B” Train CCW as the active loop in accordance with AOP-117.1.
2) are
- D. 1) establishing “B” Train CCW as the active loop in accordance with AOP-117.1.
2) are **not**

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know how to proceed during a loss of service water and know flow requirements from the RBCUs.

- A. Incorrect. Part 1 is plausible because with a loss of both loops of SW, AOP-117.1 requires a reactor trip. Continuing on in AOP-117.1 is plausible because AOP-117.1 is a continuous use procedure. Incorrect because only one loop is lost in the stem so you establish the "B" train on CCW as the active loop. Part 2 is correct because Service Water is not running through the RBCUs in this condition.
- B. Incorrect. Part 1 is plausible because with a loss of both loops of SW, AOP-117.1 requires a reactor trip. Continuing on in AOP-117.1 is plausible because AOP-117.1 is a continuous use procedure. Incorrect because only one loop is lost in the stem so you establish the "B" train on CCW as the active loop. Part 2 is plausible because "B" SW pump is still running. Incorrect because normally, SW is not flowing through the RBCUs, it is only during a Phase A actuation does SW start cooling the RBCUs and you can see flow indications on the meters above.
- C. Correct. Part 2 is correct because the "B" Train of SW is still available so you will transfer the Active loop of CCW to the "B" Train. Part 2 is correct because Service Water is not running through the RBCUs in this condition.
- D. Incorrect. Part 2 is correct because the "B" Train of SW is still available so you will transfer the Active loop of CCW to the "B" Train. Part 2 is plausible because "B" SW pump is still running. Incorrect because normally, SW is not flowing through the RBCUs, it is only during a Phase A actuation does SW start cooling the RBCUs and you can see flow indications on the meters above.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000062AA2.05) Ability to determine and/or interpret the following as they apply to (APE 62) LOSS OF SERVICE WATER (CFR: 41.10 / 43.5 / 45.13): The normal values for the SWS-header flow rate and the flow rates to the components cooled by the SWS

K/A Match: The K/A is matched because the candidate must interpret the flow indications through the RBCUs (that are cooled by Service Water in emergency conditions) and determine if they are reading accurately for the conditions given.

Selection criteria: New

Tier: 1 **Group:** 1

Importance Rating: **RO:** **SRO:** 3.0

Technical Reference: AOP-117.1, LOSS OF SERVICE WATER

Proposed references to be provided to candidates during examination: None

Learning Objective: AOP-117.1 03: Given a set of plant conditions, determine the appropriate plant response and operator actions in accordance with AOP-117.1.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.5

SRO Justification: The question is at the SRO level because they must assess plant conditions and determine a section of a procedure to proceed with.

Comments:

81.

Initial conditions:

- A large-break LOCA occurred.
- All RBCUs failed to start automatically or manually.
- EOP-2.4, ECA-1.1 LOSS OF EMERGENCY COOLANT RECIRCULATION is in progress.
- Operators have secured both RB Spray pumps in accordance with EOP-2.4.

Current conditions:

- RWST level is 16%.
- RB Pressure is 57 psig and slowly increasing.

Which ONE of the choices below completes the following statements?

The ____ (1) ____ are more effective in the short term in limiting peak pressure and temperature conditions inside the RB.

In the **current conditions**, RB Spray pumps ____ (2) ____ be started in accordance with EOP-2.4.

- A. 1) RBCUs
2) will **not**
- B. 1) RBCUs
2) will
- C. 1) RB Spray pumps
2) will **not**
- D. 1) RB Spray pumps
2) will

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that Tech Spec basis states the RB Spray pumps are more effective in the short term in limiting peak pressure and temperature conditions inside the RB. They must also know the conditions which require the starting of RB spray pumps and they should be secured because of low level in the RWST in EOP-2.4.

- A. Incorrect. Part 1 is plausible because the RBCUs reduce pressure and temperature inside the RB. Incorrect because the RB Spray pumps are more effective in the short term in limiting peak pressure and temperature conditions inside the RB. Part 2 is plausible because EOP-2.4 has you secure all pumps taking a suction from the RWST when suction source is lost. Incorrect because there is a point at which RB Pressure is high enough that requires you to restart the pumps.
- B. Incorrect. Part 1 is plausible because the RBCUs reduce pressure and temperature inside the RB. Incorrect because the RB Spray pumps are more effective in the short term in limiting peak pressure and temperature conditions inside the RB. Part 2 is correct because RB Pressure is above 55%, this requires you to restart the RB Spray pumps.
- C. Incorrect. Part 1 is correct because RB Spray pumps are more effective in the short term in limiting peak pressure and temperature conditions inside the RB. Part 2 is plausible because EOP-2.4 has you secure all pumps taking a suction from the RWST when suction source is lost. Incorrect because there is a point at which RB Pressure is high enough that requires you to restart the pumps.
- D. Correct. Part 1 is correct because RB Spray pumps are more effective in the short term in limiting peak pressure and temperature conditions inside the RB. Part 2 is correct because RB Pressure is above 55%, this requires you to restart the RB Spray pumps.

Form 4.2-1 Written Examination Question Worksheet

K/A: E11 2.1.7: Loss of Emergency Coolant Recirculation (G2.1.42) CONDUCT OF OPERATIONS: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation (CFR: 41.5 / 43.5 / 45.12 / 45.13)

K/A Match: The K/A is matched because the candidate must evaluate plant conditions during a loss of emergency coolant recirculation and determine if RB Spray pumps should be re-started.

Selection criteria: New

Tier: 1 **Group:** 1

Importance Rating: **RO:** **SRO:** 4.7

Technical Reference: EOP-2.0, E-1 LOSS OF REACTOR OR SECONDARY COOLANT

Proposed references to be provided to candidates during examination: None

Learning Objective: EOP-2.4 C06: Given a set of plant conditions, predict a discrete path through EOP-2.4.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.5

SRO Justification: The question is at the SRO level because the candidate must have detailed knowledge of diagnostic steps and decision points in EOP-2.4 as well as Tech Spec basis knowledge for RB Spray pumps.

Comments:

82.

Given the following plant conditions:

- 100% power.
- RWST level was 87%.

Which ONE of the choices below completes the following statements?

The RWST level ____ (1) ____ meet the volume requirements of LCO 3.1.2.6, BORATED WATER SOURCES – OPERATING.

In accordance with LCO 3.1.2.2, BORATION SYSTEMS FLOW PATHS – OPERATING, the boration capability of either flow path is sufficient to provide the required SHUTDOWN MARGIN from expected operating conditions of 1.77% $\Delta K/K$ or as required by Figure 3.1-3 after xenon decay and cooldown to ____ (2) ____.

REFERENCE PROVIDED

- A. 1) does
2) 200°F.
- B. 1) does
2) 300°F.
- C. 1) does **not**
2) 200°F.
- D. 1) does **not**
2) 300°F.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the RWST Level requirement of LCO 3.1.2.6 and the basis for LCO 3.1.2.2.

- A. Incorrect. Part 1 is plausible if the candidate mis-interprets the graph and miscalculates the values. Part 2 is correct because the boration capability of either flow path is sufficient to provide the required SHUTDOWN MARGIN from expected operating conditions of 1.77% delta k/k or as required by Figure 3.1-3 after xenon decay and cooldown to 200°F.
- B. Incorrect. Part 1 is plausible if the candidate mis-interprets the graph and miscalculates the values. Part 2 is plausible because at 300°F TS 3.1.2.2 has a # modifying the requirements and the candidate may believe that the shutdown margin requirement only needs to be satisfied for a cooldown to 300°F. Incorrect because the basis of Tech Spec 3/4.1.2 also states that the shutdown margin requirement will be satisfied following a cooldown to 200°F.
- C. Correct. Part 1 is correct because RWST level is approximately 5% below the required Tech Spec level. Part 2 is correct because the boration capability of either flow path is sufficient to provide the required SHUTDOWN MARGIN from expected operating conditions of 1.77% delta k/k or as required by Figure 3.1-3 after xenon decay and cooldown to 200°F.
- D. Incorrect. Part 1 is correct because RWST level is approximately 5% below the required Tech Spec level. Part 2 is plausible because at 300°F TS 3.1.2.2 has a # modifying the requirements and the candidate may believe that the shutdown margin requirement only needs to be satisfied for a cooldown to 300°F. Incorrect because the basis of Tech Spec 3/4.1.2 also states that the shutdown margin requirement will be satisfied following a cooldown to 200°F.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000024AA2.09) Ability to determine and/or interpret the following as they apply to (APE 24) EMERGENCY Boration (CFR: 41.10 / 43.5 / 45.13): RWST level

K/A Match: The K/A is matched because the candidate must determine if RWST level meets the Tech Spec requirement.

Selection criteria: New

Tier: 1 **Group:** 2

Importance Rating: **RO:** **SRO:** 3.3

Technical Reference: LCO 3.1.2.6, BORATED WATER SOURCES – OPERATING
and LCO 3.1.2.2, BORATION SYSTEMS FLOW PATHS –
OPERATING

Proposed references to be provided to candidates during examination: Graph VI-25, Refueling Water Storage Tank.

Learning Objective: AB-05 024: IDENTIFY the Technical Specification(s) associated with the Reactor Makeup system, including LCO, APPLICABILITY, ACTION, and BASES.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.2

SRO Justification: The question is at the SRO level because they must have knowledge of TS bases.

Comments:

83.

Initial conditions:

- 100% power.
- LCV-459 fails low.
- Operators just started their immediate actions.
- Step 1 of AOP-401.6, PRESSURIZER LEVEL CONTROL AND PROTECTION CHANNEL FAILURE is in progress.

Current conditions:

- The crew is at the step to re-establish normal letdown in accordance with Attachment 4, ESTABLISHING NORMAL LETDOWN.

Which ONE of the choices below completes the following statements?

In the **initial conditions**, the CRS will verify that the OATC has ____ (1) ____.

In the **current conditions**, the CRS ____ (2) ____ allowed to assign a board operator to perform Attachment 4 in AOP-401.6 in accordance with OAP-103.4, EOP/FSP/AOP/ARP USER'S GUIDE.

- A. 1) placed the PZR LEVEL CNTRL switch to 460 + 461.
2) is
- B. 1) placed the PZR LEVEL CNTRL switch to 460 + 461.
2) is **not**
- C. 1) Placed LCV-122 to manual and is controlling Pressurizer level.
2) is
- D. 1) Placed LCV-122 to manual and is controlling Pressurizer level.
2) is **not**

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the immediate actions of AOP-401.6 and that they can assign a board operator an attachment of the procedure to perform.

- A. Correct. Part 1 is correct because AOP-401.6 immediate actions requires placing PZR LEVEL CNTRL switch to 460 + 461 since these are the only two operable channels. Part 2 is correct because OAP-103.4 says it is permissible for the Unit Supervisor to hand out attachments for board or local operators to perform.
- B. Incorrect. Part 1 is correct because AOP-401.6 immediate actions requires placing PZR LEVEL CNTRL switch to 460 + 461 since these are the only two operable channels. Part 2 is plausible because OAP-103.4 states "generally, the EOPs and AOPs are designed for a reader/doer concept". Incorrect because OAP-103.4 goes on to say it is permissible for the Unit Supervisor to hand out attachments for board or local operators to perform.
- C. Incorrect. Part 1 is plausible because AOP-401.6 has you take manual control and control pressurizer level if auto is not working. Incorrect because the immediate operator action has you swap to two operable channels, which is 460+461. Part 2 is correct because OAP-103.4 says it is permissible for the Unit Supervisor to hand out attachments for board or local operators to perform.
- D. Incorrect. Part 1 is plausible because AOP-401.6 has you take manual control and control pressurizer level if auto is not working. Incorrect because the immediate operator action has you swap to two operable channels, which is 460+461. Part 2 is plausible because OAP-103.4 states "generally, the EOPs and AOPs are designed for a reader/doer concept". Incorrect because OAP-103.4 goes on to say it is permissible for the Unit Supervisor to hand out attachments for board or local operators to perform.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000028) (APE 28) Pressurizer (PZR) Level Control Malfunction (G2.1.6)
CONDUCT OF OPERATIONS: Ability to manage the control room crew during
plant transients (SRO Only) (CFR: 43.5 / 45.12 / 45.13)

K/A Match: The K/A is matched because the candidate must have knowledge of
administrative procedures that says they can allow the OATC to perform an
attachment from the AOP for a loss of pressurizer level control.

Selection criteria: New

Tier: 1 **Group:** 2

Importance Rating: **RO:** **SRO:** 4.8

Technical Reference: OAP-103.4, EOP/FSP/AOP/ARP USER'S GUIDE.

Proposed references to be provided to candidates during examination: None

Learning Objective: OAP-103.4 03: Know the format rules for EOP's, FSP's, and
AOP's.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 43.5

SRO Justification: The question is at the SRO level because they must use knowledge
of administrative procedures to allow implementation of a portion of
an Abnormal Operating procedure.

Comments:

84.

037 2.1.8 C

Given the following plant conditions:

New

- 100% power. High cog
- AOP-112.2, ARG-3 STEAM GENERATOR TUBE LEAK NOT REQUIRING SI is in progress. New
- The crew is trying to identify the AFFECTED SG(s). High
- There are no indications in the Control Room that currently identify the AFFECTED SG. Rev 1, Major

Current conditions:

Post NRC
Exam
Review.
Wrote
question to
wrong KA

- The leak just increased to 43,200 gpd.
- The crew is at the step in AOP-112.2 to determine if a plant shutdown is required.

NOTE the following procedure titles:

GOP-4C, RAPID POWER REDUCTION

GOP-4B, POWER OPERATION (MODE 1 - DESCENDING).

Which ONE of the choices below completes the following statements in accordance with AOP-112.2?

In the **initial conditions**, the US will identify the AFFECTED SG by ____ (1) ____.

In the **current conditions**, the crew is required to ____ (2) ____.

- A. 1) enabling RM-A9 on IPCS.
2) Shutdown the plant using GOP-4C or GOP-4B.
- B. 1) enabling RM-A9 on IPCS.
2) Trip the reactor, perform immediate actions then actuate SI.
- C. 1) notifying Chemistry to sample all SG secondary sides, and screen samples for abnormal activity using a frisker.
2) Shutdown the plant using GOP-4C or GOP-4B.
- D. 1) notifying Chemistry to sample all SG secondary sides, and screen samples for abnormal activity using a frisker.
2) Trip the reactor, perform immediate actions then actuate SI.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know how AOP-112.2 will identify the leaking SG and based on the leak size, determine the correct actions AOP-112.2 will require to mitigate this event.

- A. Incorrect. Part 1 is plausible because you will enable RM-A9 using the ARP actions in order to determine the leakrate. Incorrect because this does not tell you what SG is leaking, only total leakrate. Part 2 is correct because this is a 30 gpm leak currently which is well within the capacity of the makeup system. AOP-112.2 has you shutdown using GOP-4C or GOP-4B.
- B. Incorrect. Part 1 is plausible because you will enable RM-A9 using the ARP actions in order to determine the leakrate. Incorrect because this does not tell you what SG is leaking, only total leakrate. Part 2 is plausible because the bullet says 43,200, which is a large number and if this was gpm, this would require a reactor trip and SI. Incorrect because this is 43,200 gallons per day which equates to 30 gallons per minute. This is well within the capacity of the makeup system and we can shutdown the reactor in a controlled manner using a GOP.
- C. Correct. Part 1 is correct because if they can't identify the leak form the control room or by sending health physics out to monitor blowdown lines, AOP-112.2 requires the US to notify Chemistry to sample all SG secondary sides, and screen samples for abnormal activity using a frisker. Part 2 is correct because this is 43,200 gallons per day which equates to 30 gallons per minute. This is well within the capacity of the makeup system and we can shutdown the reactor in a controlled manner using GOP-4B or GOP-4C.
- D. Incorrect. Part 1 is correct because if they can't identify the leak form the control room or by sending health physics out to monitor blowdown lines, AOP-112.2 requires the US to notify Chemistry to sample all SG secondary sides, and screen samples for abnormal activity using a frisker. Part 2 is plausible because the bullet says 43,200, which is a large number and if this was gpm, this would require a reactor trip and SI. Incorrect because this is 43,200 gallons per day which equates to 30 gallons per minute. This is well within the capacity of the makeup system and we can shutdown the reactor in a controlled manner using a GOP.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000037) (APE 37) Steam Generator Tube Leak (G2.1.8) CONDUCT OF OPERATIONS: Ability to coordinate personnel activities outside the control room (CFR: 41.10 / 43.1 / 45.5 / 45.12 / 45.13)

K/A Match: The K/A is matched because the candidate must know that AOP-112.2 requires coordinating with chemistry to sample the SGs for activity to determine which Steam Generator has a tube leak when there are no indications available in the control room.

Selection criteria: New

Tier: 1 **Group:** 2

Importance Rating: **RO:** **SRO:** 4.1

Technical Reference: AOP-112.2, ARG-3 STEAM GENERATOR TUBE LEAK NOT REQUIRING SI.

Proposed references to be provided to candidates during examination: None

Learning Objective: AOP-112.2 07: Given a set of plant conditions, determine the appropriate plant response and operator actions in accordance with AOP-112.2.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.5

SRO Justification: The question is at the SRO level because the candidate must assess the conditions in the stem and determine how to proceed.

Comments:

85.

Given the following plant conditions:

Time 1800:

- "A" Main Steam Line break occurred inside the RB.

Time 1810:

- OATC reports that Reactor Building pressure is now 13 psig and decreasing.

Time 1815:

- EOP-3.0, E-2 FAULTED STEAM GENERATOR ISOLATION is in progress.
- "B" Steam Generator level begins to increase at 5%/ minute.
- Chemist reports that "B" Steam Generator has increased activity.

Time 1816:

- STA reports that RM-G7 and RM-G18 are 105 R/hr and increasing.

Time 1825:

- Chemistry reports that Dose Equivalent I-131 coolant activity is 400 uci/gm.

Which ONE of the choices below describes the **earliest** times given above in which conditions for ALERT and SITE AREA EMERGENCY (SAE) were **first** met in accordance with VCS-EPP-0001, CLASSIFICATION OF EMERGENCIES?

Do **not** consider Emergency Director Judgment as a basis for emergency classification.

REFERENCE PROVIDED

	ALERT	SAE
A.	1810	1815
B.	1810	1825
C.	1815	1816
D.	1815	1825

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must determine they have a loss of the RCS barrier due to the SG Tube rupture and then a loss of the Fuel Clad Barrier due to I-131 levels.

- A. Incorrect. Alert at 1810 is plausible for a potential loss of the containment barrier because RB Pressure is >12 psig. Incorrect because there are two trains of depressurization equipment available. SAE at 1815 is plausible if the candidate believes they have a potential loss of containment at 1810 then a loss of the RCS because of the need for ECCS due to a SG Tube Rupture.
- B. Incorrect. Alert at 1810 is plausible for a potential loss of the containment barrier because RB Pressure is >12 psig. Incorrect because there are two trains of depressurization equipment available. SAE is plausible at 1825 because I-131 is >300 microcuries/gram which constitutes a loss of the fuel clad barrier.
- C. Incorrect. Alert at time 1815 is correct because this is the first time there is a loss of a fission product barrier, there is a loss of the RCS barrier because of the need for ECCS due to a SG Tube Rupture. SAE at time 1816 is plausible because RM-G7 and RM-G18 are reading >4 R/hr, this constitutes a loss of the RCS barrier. Incorrect because you do not count them twice.
- D. Correct. Alert at time 1815 is correct because this is the first time there is a loss of a fission product barrier, there is a loss of the RCS barrier because of the need for ECCS due to a SG Tube Rupture. At time 1825 there is a loss of the second fission product barrier due to the loss of the Fuel Clad because of I-131 being >300 microcuries/gram. Both of these constitutes a SAE at time 1825.

Form 4.2-1 Written Examination Question Worksheet

K/A: (000076AA2.09) Ability to determine and/or interpret the following as they apply to (APE 76) HIGH REACTOR COOLANT ACTIVITY (CFR: 41.10 / 43.5 / 45.13):
Implement emergency plan for failed fuel

K/A Match: The K/A is matched because the candidate must interpret from the given conditions that there is a Site Area Emergency due to failed fuel.

Selection criteria: Bank, EOPS 697

Tier: 1 **Group:** 2

Importance Rating: **RO:** **SRO:** 4.1

Technical Reference: VCS-EPP-0001, CLASSIFICATION OF EMERGENCIES

Proposed references to be provided to candidates during examination: EALs, Hot Conditions, All Conditions, and Cold Conditions boards.

Learning Objective: VCS-EPP-0001 01: For a given set of conditions, determine which Emergency Action Level applies.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.5

SRO Justification: This question is at the SRO level because it is unique to the SRO position. The candidate must assess plant conditions and implement an emergency plan procedure.

Comments:

86.

Given the following plant conditions:

- 100% power.
- XVT-8156, VOLUME CONTROL TK H2 PRESS CONTROL VLV failed causing VCT pressure to lower.
- XCP-617, 2-2, RCP A #1 SL INJ FLO LO.
- XCP-618, 2-2, RCP B #1 SL INJ FLO LO.
- XCP-619, 2-2, RCP C #1 SL INJ FLO LO.
- FI-122A, CHG FLOW GPM is 87 gpm.
- Operators are throttling to raise seal injection flow.

Which ONE of the choices below completes the following statements?

Operators are throttling to raise seal injection flow in accordance with ____ (1) ____.

While throttling seal injection flow, **Controlled Leakage** should be limited per the basis of Technical Specification 3.4.6.2, REACTOR COOLANT SYSTEM OPERATIONAL LEAKAGE because this ____ (2) ____.

- A. 1) XCP-617(618)(619), 2-2.
2) ensures safety injection flow will not be less than assumed in the accident analysis for a LOCA.
- B. 1) XCP-617(618)(619), 2-2.
2) is from a known source that does not interfere with detection of UNIDENTIFIED LEAKAGE.
- C. 1) AOP-102.2, LOSS OF CHARGING.
2) ensures safety injection flow will not be less than assumed in the accident analysis for a LOCA.
- D. 1) AOP-102.2, LOSS OF CHARGING.
2) is from a known source that does not interfere with detection of UNIDENTIFIED LEAKAGE.

Mike, we added "is" to B2 and D2 so that it reads properly.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know which procedure is used to adjust seal injection flows based on VCT Pressure changes. The candidate must also know the bases for Technical Specification 3.4.6.2, REACTOR COOLANT SYSTEM OPERATIONAL LEAKAGE.

- A. Correct. Part 1 is correct because seal injection flows are throttled IAW XCP-617(618)(619), 2-2. Part 2 is correct because the basis of 3.4.6.2 states that Controlled Leakage is limited to ensure safety injection flow will not be less than assumed in the accident analysis for a LOCA.
- B. Incorrect. Part 1 is correct because seal injection flows are throttled IAW XCP-617(618)(619), 2-2. Part 2 is plausible because this is the reason that unidentified leakage is minimized.
- C. Incorrect. Part 1 is plausible because there are indications that meet entry conditions for AOP-102.2. Incorrect because AOP-102.2 will not address throttling seal injection flows. Part 2 is correct because the basis of 3.4.6.2 states that Controlled Leakage is limited to ensure safety injection flow will not be less than assumed in the accident analysis for a LOCA.
- D. Incorrect. Part 1 is plausible because there are indications that meet entry conditions for AOP-102.2. Incorrect because AOP-102.2 will not address throttling seal injection flows. Part 2 is plausible because this is the reason that unidentified leakage is minimized.

Form 4.2-1 Written Examination Question Worksheet

K/A: 038 A2.04: Ability to (a) predict the impacts of the following on the (SF4P RCP) REACTOR COOLANT PUMP SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6):
Effects of fluctuation of VCT pressure on RCP seal injection flow

K/A Match: The K/A is matched because the candidate must determine which procedure is used to throttle seal injection flows based on a failure of the VCT pressure control device as well as the basis for why seal injection flows are limited when throttling them in accordance with the Technical Specification basis document.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** **SRO:** 3.2

Technical Reference: Technical Specification 3.4.6.2, REACTOR COOLANT SYSTEM OPERATIONAL LEAKAGE basis document.

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-04 033: Identify the Technical Specifications associated with the Reactor Coolant Pump system, including LCO, Applicability, Action, and Bases.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.2

SRO Justification: The question is at the SRO level because the candidate must have knowledge of Technical Specification bases.

Comments:

87.

Initial conditions:

- MODE 6.
- A core off-load is in progress.
- FCV-603A, A RHR HX DISCH VLV is throttled 20% open.
- FCV-605A, RHR HX BYP is in automatic and 50% open.
- "A" RHR flowrate is 3100 gpm.

Current conditions:

- FT-605A, FLOW GPM is failing high.

Given the conditions above, which ONE of the choices below completes the following statements?

In the **current conditions**, **actual** RHR flow will be ____ (1) ____.

The bases of T.S. 3.9.7, RESIDUAL HEAT REMOVAL AND COOLANT CIRCULATION HIGH WATER LEVEL states that sufficient ____ (2) ____.

- A. 1) increasing
2) circulation must be maintained to prevent boron stratification and minimize the effects of a dilution event.
- B. 1) increasing
2) cooling must be maintained to keep RCS temperature less than a maximum refueling limit of 170°F.
- C. 1) decreasing
2) circulation must be maintained to prevent boron stratification and minimize the effects of a dilution event.
- D. 1) decreasing
2) cooling must be maintained to keep RCS temperature less than a maximum refueling limit of 170°F.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know how FCV-605 will react to its flow transmitter failing high and the basis for T.S. 3.9.7.

- A. Incorrect. Part 1 is plausible because we have several reverse acting controllers, e.g. PCV-145, where if its transmitter fails high, its controller will increase its output. A candidate could believe this is how this transmitter works. Incorrect because FCV-605 is set to control a specific amount of flow so when its controller fails high, it will throttle closed to “reduce” flow. Part 2 is correct because 3.9.7 states that sufficient coolant circulation is maintained through the reactor core to minimize the effects of a boron dilution incident and prevent boron stratification.
- B. Incorrect. Part 1 is plausible because we have several reverse acting controllers, e.g. PCV-145, where if its transmitter fails high, its controller will increase its output. A candidate could believe this is how this transmitter works. Incorrect because FCV-605 is set to control a specific amount of flow so when its controller fails high, it will throttle closed to “reduce” flow. Part 2 is plausible because another reason in 3.9.7 that one RHR loop must be in operation is to ensure sufficient cooling capacity is available to remove decay heat and maintain the water in the reactor pressure vessel below 140°F. Incorrect because we changed the 140°F to 170° which comes from the basis for T.S. 3.9.3 for spent fuel pool temperature limit.
- C. Correct. Part 1 is correct because with FT-605 failing high, RHR Flow will decrease due to FCV-605 throttling closed to maintain a set flow. Part 2 is correct because 3.9.7 states that sufficient coolant circulation is maintained through the reactor core to minimize the effects of a boron dilution incident and prevent boron stratification.
- D. Incorrect. Part 1 is correct because with FT-605 failing high, RHR Flow will decrease due to FCV-605 throttling closed to maintain a set flow. Part 2 is plausible because another reason in 3.9.7 that one RHR loop must be in operation is to ensure sufficient cooling capacity is available to remove decay heat and maintain the water in the reactor pressure vessel below 140°F. Incorrect because we changed the 140°F to 170° which comes from the basis for T.S. 3.9.3 for spent fuel pool temperature limit.

Form 4.2-1 Written Examination Question Worksheet

K/A: (005A2.01) Ability to (a) predict the impacts of the following on the (SF4P RHR) RESIDUAL HEAT REMOVAL SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): RHR instrumentation failure

K/A Match: The K/A is matched because the candidate must predict the impact of RHR flow on FT-605 failing high and the basis for LCO 3.9.7.

Selection criteria: Modified TECH SPECS 570 from the 2015 NRC. The question was modified by changing the stem and asking a different second part of the question. This created a new correct answer.

Tier: 2 **Group:** 1

Importance Rating: **RO:** **SRO:** 3.6

Technical Reference: Technical Specifications 3.9.7, RESIDUAL HEAT REMOVAL AND COOLANT CIRCULATION HIGH WATER LEVEL

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-7 035: Identify the Technical Specifications associated with the RHR system, including LCOs, Applicability, and Bases.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.2

SRO Justification: This question is at the SRO level because the candidate must apply the correct Technical specification bases.

Comments:

Initial conditions:

Mode 6.

- A core off-load is in progress.
- Water level in the refueling cavity is at 461.5 ft.
- "A" RHR flowrate is 3100 gpm.
- "B" RHR Loop is tagged out for maintenance.

Current conditions:

- A fuel bundle has just been removed from the Reactor Vessel and is approximately half-way between the Reactor Vessel and the Upender.
- "A" RHR flowrate is 2700 gpm.

Given the conditions above, which ONE of the choices below completes the following statements?

T.S. 3.9.7, RESIDUAL HEAT REMOVAL AND COOLANT CIRCULATION HIGH WATER LEVEL allows operators to move the suspended fuel assembly to the ____ (1) ____ .

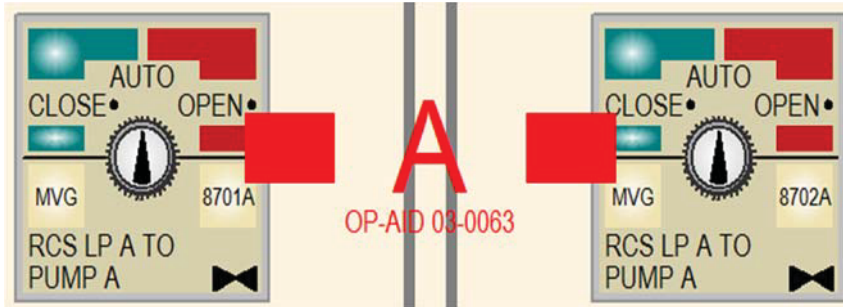
The bases of TS 3.9.7 states that sufficient ____ (2) ____ .

- A. 1) Reactor Vessel
2) circulation must be maintained to prevent boron stratification and minimize the effects of a dilution event.
- B. 1) Reactor Vessel
2) cooling must be maintained to keep RCS temperature less than a maximum refueling limit of 170°F.
- C. 1) Upender
2) circulation must be maintained to prevent boron stratification and minimize the effects of a dilution event.
- D. 1) Upender
2) cooling must be maintained to keep RCS temperature less than a maximum refueling limit of 170°F.

88.

Given the following plant conditions:

- 100% power.
- MVG-8701A, RCS LP A TO PUMP A is as indicated:



Which ONE of the choices below completes the following statements in accordance with T.S. 3.5.2, ECCS SUBSYSTEMS – $T_{avg} \geq 350^{\circ}\text{F}$ and its basis document?

T.S. 3.5.2 is **not** met because the valve is ____ (1) ____.

The OPERABILITY of two independent ECCS subsystems ensures that sufficient emergency core cooling capability will be available in the event of a ____ (2) ____.

- 1) closed.
2) LOCA.
- 1) energized.
2) LOCA.
- 1) closed.
2) SGTR.
- 1) energized.
2) SGTR.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that 8701A and 8702A are required to be de-energized in these conditions and that the basis for 3.5.2 requires core cooling capability be available in the event of a LOCA.

- A. Incorrect. Part 1 is plausible because there are several valves for ECCS that IAW LCO 3.5.2 are required to be open, e.g. 8888A/B. Incorrect because 8701A and 8702A are required to be closed. Part 2 is correct because the bases for 3.5.2 states "The OPERABILITY of two independent ECCS subsystems ensures that sufficient emergency core cooling capability will be available in the event of a LOCA".
- B. Correct. Part 1 is correct because 8701A and 8702A are required to be de-energized in the current conditions IAW 3.5.2. Part 2 is correct because the bases for 3.5.2 states "The OPERABILITY of two independent ECCS subsystems ensures that sufficient emergency core cooling capability will be available in the event of a LOCA".
- C. Incorrect. Part 1 is plausible because there are several valves for ECCS that IAW LCO 3.5.2 are required to be open, e.g. 8888A/B. Incorrect because 8701A and 8702A are required to be closed. Part 2 is plausible because with a SGTR, you get a loss of RCS to the SG which requires an ECCS actuation. Incorrect because the bases states that ECCS will be available for a LOCA.
- D. Incorrect. Part 1 is correct because 8701A and 8702A are required to be de-energized in the current conditions IAW 3.5.2. Part 2 is plausible because with a SGTR, you get a loss of RCS to the SG which requires an ECCS actuation. Incorrect because the bases states that ECCS will be available for a LOCA.

Form 4.2-1 Written Examination Question Worksheet

K/A: (006) (SF2; SF3 ECCS) EMERGENCY CORE COOLING SYSTEM (G2.1.31)
CONDUCT OF OPERATIONS: Ability to locate control room switches, controls,
and indications and to determine whether they correctly reflect the desired plant
lineup (CFR: 41.10 / 45.12)

K/A Match: The K/A is matched because the candidate must determine if the
indications of 8701A and 8702A correctly reflect the desired plant lineup for
the conditions given.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** **SRO:** 4.3

Technical Reference: T.S. 3.5.2, ECCS SUBSYSTEMS – $T_{avg} \geq 350^{\circ}\text{F}$

Proposed references to be provided to candidates during examination: None

Learning Objective: AB-10 029: IDENTIFY the Technical Specification(s) associated
with the Emergency Core Cooling system, including
LCO, APPLICABILITY, ACTION, and BASES.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.2

SRO Justification: The question is at the SRO level because the candidate must
determine why LCO 3.5.2 is not met and apply its associated
bases.

Comments:

89.

Given the following plant conditions:

Time 1800:

- 100% power.
- Diesel Generator B is tagged out for maintenance.
- Battery charger XBC1A-1B is being aligned to battery XBA1A.

Time 2130:

- The following alarms come in on XCP-636:
 - DG A LOSS OF DC.
 - TRAIN A BATT CHGR TRBL XBC 1A/1A-1B.
 - DC SYS TRAIN A GND TRBL.
 - DC SYS OVRVOLT/UNDRVOLT.
 - 7KV ESF CHAN A LOSS OF DC.
 - 480V ESF CHAN A LOSS OF DC.

Time 2200:

- 115 KV PARR ESF LINE has been de-energized.

Based on the conditions at **2200**, which ONE of the following Tech Spec conditions is applicable and requires the **earliest** entry into Cold Shutdown?

REFERENCE PROVIDED

- A. TS 3.0.3
- B. TS 3.8.1.1, condition b
- C. TS 3.8.1.1, condition c
- D. TS 3.8.1.1, condition e

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know how to appropriately apply T.S. 3.8.1 and more specifically because there is no action statement for the condition given, apply T.S. 3.0.3.

- A. Correct. With both DGs inoperable and the normal power source lost to 1DA, 3.0.3 is in effect since TS 3.8.1 Action e cannot be satisfied.
- B. Incorrect. Plausible since 230 KV bus 3 and Parr Hydro is still available. Incorrect because Parr Hydro is not credited for ESF busses. Plausible if the candidate thinks that the loss of DC to the "A" DG does not make the diesel inoperable since 3.8.1.1 lists items B.1, b.2, and b.3 as things that the DG is required to have to make it operable. The mistake being that DC power is not listed and therefore a candidate does not believe it is required.
- C. Incorrect. Plausible because there is one offsite circuit and one EDG that is inoperable in the stem. Also plausible if the candidate believes that the loss of DC does not make the EDG inoperable and they are in a separate Tech Spec for the loss of DC. Incorrect because the EDG cannot flash its field with the loss of DC therefore we have two EDGs that are inoperable and a loss of one offsite circuit.
- D. Incorrect. Plausible because there is a loss of both EDGs and action e is specifically for two EDGs that are inoperable. Incorrect because there is also a loss of offsite power source.

Form 4.2-1 Written Examination Question Worksheet

K/A: (013A2.08) Ability to (a) predict the impacts of the following on the (SF2 ESFAS) ENGINEERED SAFETY FEATURES ACTUATION SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): Loss of EDG

K/A Match: The K/A is matched because the candidate must correctly apply technical specification action statements based on the loss of EDGs.

Selection criteria: Bank, Question 78 from the 2021 NRC Exam. The question was labeled as a bank question because most of the stem carried forward and it has the same correct answer. Only the distractors were changed out. Original question on the next page.

Tier: 2 **Group:** 1

Importance Rating: **RO:** **SRO:** 4.1

Technical Reference: Technical Specifications, 3.8.1 AC SOURCES OPERATING

Proposed references to be provided to candidates during examination: Tech Spec 3.8.1 pages 3/4 8-1, 3/4 8-2, 3/4 8-2a.

Learning Objective: IB-5 039: IDENTIFY the Technical Specifications associated with the Diesel Generator System, including LCO, APPLICABILITY, ACTION, and BASES.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.2

SRO Justification: The question is at the SRO level because the candidate must apply generic LCO requirements to the conditions in the stem to determine the correct set of actions to be taken.

Comments:

Original question 78 from 2021 NRC Exam

Given the following plant conditions:

Time 1800:

- 100% power.
- Diesel Generator B is tagged out for maintenance.
- Battery charger XBC1A-1B is being aligned to battery XBA1A.

Time 2130:

- The following alarms come in on XCP-636:
 - DG A LOSS OF DC.
 - TRAIN A BATT CHGR TRBL XBC 1A/1A-1B.
 - DC SYS TRAIN A GND TRBL.
 - DC SYS OVRVOLT/UNDRVOLT.
 - 7KV ESF CHAN A LOSS OF DC.
 - 480V ESF CHAN A LOSS OF DC.

Time 2200:

- AOP-600.1, CONTROL ROOM EVACUATION is in progress due to a bomb threat in the Control Room.
- A lockout occurs on Bus 1DX.

Time 2230:

- DC power was restored to “A” DG.
- “A” DG failed to autostart.

Which ONE of the choices below answers the following questions?

- 1) Based on the conditions **at 2200**, which Tech Spec LCO is applicable and requires the **earliest** entry into Cold Shutdown?
- 2) At **time 2230**, what method will the BOP **first** use to locally start the “A” Diesel Generator in accordance with AOP-600.1?

REFERENCE PROVIDED

- A. 1) TS 3.0.3.
2) EMERG START Pushbutton.
- B. 1) TS 3.0.3.
2) The Main Air Start Valve.
- C. 1) TS 3.8.1.1.
2) EMERG START Pushbutton.
- D. 1) TS 3.8.1.1.
2) The Main Air Start Valve.

90.

Given the following plant conditions:

- “A” SG is ruptured.
- EOP-4.0, E-3 STEAM GENERATOR TUBE RUPTURE is in progress.
- PWR RELIEF A SETPT Controller has been adjusted to 8.85.
- The cooldown has **not** been commenced.
- “A” SG PORV is cycling at its setpoint.

Which ONE of the choices below completes the following statements?

“A” SG PORV setpoint is adjusted to ____ (1) ____.

A loss of Containment Barrier ____ (2) ____ occurring in accordance with VCS-EPP-0108, EMERGENCY ACTION LEVEL TECHNICAL BASIS DOCUMENT.

- A. 1) maintain ruptured SG at no load SG pressure.
2) is
- B. 1) maintain ruptured SG at no load SG pressure.
2) is **not**
- C. 1) ensure the “A” SG PORV opens prior to opening a safety valve.
2) is
- D. 1) ensure the “A” SG PORV opens prior to opening a safety valve.
2) is **not**

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know why the PORV lift setpoint is adjusted in EOP-4.0. They must also know what constitutes a loss of the Containment Barrier.

- A. Incorrect. Part 1 is plausible because PORVs will maintain SGs at no load SG pressure. Incorrect because it is adjusted to ensure the “A” SG PORV opens prior to opening a safety valve. Part 2 is plausible because there is a SG tube ruptured on the “A” SG and its PORV is open creating a path to the environment that’s releasing radioactive steam. Incorrect because VCS-EPP-0108 says “Steam releases associated with the expected operation of a SG power operated relief valve or safety relief valve do not meet the intent of this threshold. Such releases may occur intermittently for a short period of time following a reactor trip as operators process through emergency operating procedures to bring the plant to a stable condition and prepare to initiate a plant cooldown”.
- B. Incorrect. Part 1 is plausible because PORVs will maintain SGs at no load SG pressure. Incorrect because it is adjusted to ensure the “A” SG PORV opens prior to opening a safety valve. Part 2 is correct because VCS-EPP-0108 says “Steam releases associated with the expected operation of a SG power operated relief valve or safety relief valve do not meet the intent of this threshold. Such releases may occur intermittently for a short period of time following a reactor trip as operators process through emergency operating procedures to bring the plant to a stable condition and prepare to initiate a plant cooldown”. This is what the “A” PORV is doing.
- C. Incorrect. Part 1 is correct because after the PWR RELIEF A SETPT Controller has been adjusted to 8.85, the setpoint for the PORV lifting is now 1150 psig which is prior to opening a safety valve. Part 2 is plausible because there is a SG tube ruptured on the “A” SG and its PORV is open creating a path to the environment that’s releasing radioactive steam. Incorrect because VCS-EPP-0108 says “Steam releases associated with the expected operation of a SG power operated relief valve or safety relief valve do not meet the intent of this threshold. Such releases may occur intermittently for a short period of time following a reactor trip as operators process through emergency operating procedures to bring the plant to a stable condition and prepare to initiate a plant cooldown”.
- D. Correct. Part 1 is correct because after the PWR RELIEF A SETPT Controller has been adjusted to 8.85, the setpoint for the PORV lifting is now 1150 psig which is prior to opening a safety valve. Part 2 is correct because VCS-EPP-0108 says “Steam releases associated with the expected operation of a SG power operated relief valve or safety relief valve do not meet the intent of this threshold. Such releases may occur intermittently for a short period of time following a reactor trip as operators process through emergency operating procedures to bring the plant to a stable condition and prepare to initiate a plant cooldown”. This is what the “A” PORV is doing.

Form 4.2-1 Written Examination Question Worksheet

K/A: 039 2.3.14: MAIN AND REHEAT STEAM SYSTEM (G2.3.14) Radiation Control: Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities, such as analysis and interpretation of radiation and activity readings as they pertain to administrative, normal, abnormal, and emergency procedures or to analysis and interpretation of coolant activity, including comparison to emergency plan or regulatory limits (SRO Only) (CFR: 43.4 / 45.10)

K/A Match: The K/A is matched because the candidate must have knowledge of contamination hazards by knowing why the SG PORV has been adjusted on a SG that is ruptured. Furthermore, the candidate must know what does and does not constitute a loss of containment barrier during a radioactive release from a SG.

Selection criteria: New

Tier: 2 **Group:** 1

Importance Rating: **RO:** **SRO:** 3.8

Technical Reference: VCS-EPP-0108, EMERGENCY ACTION LEVEL TECHNICAL BASIS DOCUMENT.

Proposed references to be provided to candidates during examination: None

Learning Objective: EPP-001-01, For a given set of conditions, Determine which Emergency Action Level Applies.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.4

SRO Justification: This question is at the SRO level because the candidate must assess plant conditions and have knowledge of administrative procedures that specify the implementation of emergency procedures.

Comments:

91.

Initial conditions:

- 85% power initially.
- Control Bank "A" Rod K-2 dropped.
- AOP-403.6, DROPPED CONTROL ROD is in progress.

Current conditions:

- QPTR on IPCS indicates 1.01, stable.
- Shutdown Margin has been verified.
- Actions to recover the rod were **not** successful.
- The plant will remain at power.

Which ONE of the choices below completes the following statements?

In the **initial conditions**, control rods ____ (1) ____ be used to maintain T_{AVG} within the required band of T_{REF} while reducing power in accordance with AOP-403.6.

In accordance with the **bases** for T.S. 3.1.3, MOVABLE CONTROL ASSEMBLIES confirmation that safety analyses will remain valid while the plant remains at power will be provided by ____ (2) ____.

- A. 1) will
2) reevaluating those Safety analyses that are affected by rod misalignment.
- B. 1) will **not**
2) reevaluating those Safety analyses that are affected by rod misalignment.
- C. 1) will
2) verifying remaining rods are above Rod Insertion Limits.
- D. 1) will **not**
2) verifying remaining rods are above Rod Insertion Limits.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know how to maintain Tav_g and T_{ref} IAW AOP-403.6 and the basis for T.S. 3.1.3, MOVABLE CONTROL ASSEMBLIES.

- A. Incorrect. Part 1 is plausible because typically you do use control rods to maintain Tav_g within the required temperature band and at the end of this procedure, you will use rods to maintain Tav_g within 1.0°F of T_{ref}. Incorrect because with a dropped rod, you use the turbine to maintain Tav_g within 5°F of T_{ref}. Part 2 is correct because the safety analyses affected by rod misalignment must be re-analyzed as identified in the T.S. 3.1.3.1 basis.
- B. Correct. Part 1 is correct because the AOP has you use the turbine to maintain Tav_g within 5°F of T_{ref}. Part 2 is correct because the safety analyses affected by rod misalignment must be re-analyzed as identified in the T.S. 3.1.3.1 basis.
- C. Incorrect. Part 1 is plausible because typically you do use control rods to maintain Tav_g within the required temperature band and at the end of this procedure, you will use rods to maintain Tav_g within 1.0°F of T_{ref}. Incorrect because with a dropped rod, you use the turbine to maintain Tav_g within 5°F of T_{ref}. Part 2 is plausible because verifying rods are above the rod insertion limits are a method of ensuring that hot channel factor limits are maintained between surveillances. PDF page 403 of Tech Specs.
- D. Incorrect. Part 1 is correct because the AOP has you use the turbine to maintain Tav_g within 5°F of T_{ref}. Part 2 is plausible because verifying rods are above the rod insertion limits are a method of ensuring that hot channel factor limits are maintained between surveillances. PDF page 403 of Tech Specs.

Form 4.2-1 Written Examination Question Worksheet

K/A: (001A2.24) Ability to (a) predict the impacts of the following on the (SF1 CRDS) CONTROL ROD DRIVE SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): Dropped rod

K/A Match: The K/A is matched because the candidate must determine how they are going to maintain Tav_g and Tref IAW the AOP for a dropped rod and the basis for T.S. 3.1.3, MOVABLE CONTROL ASSEMBLIES

Selection criteria: Modified Question 82 of the 2019 NRC Exam. Question was modified by asking a different part 1 of the question. This created a new correct answer. Original question on the following page.

Tier: 2 **Group:** 2

Importance Rating: **RO:** **SRO:** 4.1

Technical Reference: T.S. 3.1.3, MOVABLE CONTROL ASSEMBLIES

Proposed references to be provided to candidates during examination: None

Learning Objective: IC-5 029: IDENTIFY the Technical Specifications associated with the Rod Control system, including LCOs, Applicability, and Bases.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 43.2

SRO Justification: The question is at the SRO level because the candidate must have knowledge of the bases for T.S. 3.1.3.

Comments:

Original Question 82 of the 2019 NRC Exam:

Given the following plant conditions:

Initial conditions:

- The plant was at 70% power initially.
- Control Bank "A" Rod K-2 dropped to 36 steps withdrawn.
- AOP-403.6, DROPPED CONTROL ROD was entered.

Current conditions:

- QPTR on IPCS indicates 1.01, stable.
- Shutdown Margin has been verified.
- Actions to recover the rod were **not** successful.
- The rod has been verified **trippable**.
- The plant will remain at power.

Which ONE of the choices below completes the following statements?

In the **initial conditions**, reactor power ____ (1) ____ required to be lowered in accordance with AOP-403.6 prior to attempting recovery of the misaligned rod.

In accordance with the **bases** for T.S. 3.1.3, MOVABLE CONTROL ASSEMBLIES confirmation that safety analyses will remain valid while the plant remains at power will be provided by ____ (2) ____.

- A. 1) was
2) reevaluating those Safety analyses that are affected by rod misalignment.
- B. 1) was **not**
2) reevaluating those Safety analyses that are affected by rod misalignment.
- C. 1) was
2) verifying remaining rods are above Rod Insertion Limits.
- D. 1) was **not**
2) verifying remaining rods are above Rod Insertion Limits.

92.

B

Given the following plant conditions:

- Plant is shutdown for Refueling Outage.

Which ONE of the choices below answers the following questions in accordance with the T.S. 3.9.3, DECAY TIME and its basis?

- 1) When does the 72 hour clock start to begin moving fuel?
 - 2) Why is 72 hours the minimum time limit to start moving fuel?
- A. 1) When MODE 6 was reached.
2) To allow short lived radioactive isotopes to decay prior to moving fuel assemblies.
- B. 1) When the reactor tripped.
2) To allow short lived radioactive isotopes to decay prior to moving fuel assemblies.
- C. 1) When MODE 6 was reached.
2) To ensure Spent Fuel Pool heat load is reduced sufficiently to allow the SFP Cooling System to maintain bulk pool temperature below 105°F.
- D. 1) When the reactor tripped.
2) To ensure Spent Fuel Pool heat load is reduced sufficiently to allow the SFP Cooling System to maintain bulk pool temperature below 105°F.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know when the 72 hour wait time starts IAW T.S. 3.9.3, DECAY TIME and its basis.

- A. Incorrect. Part 1 is plausible because MODE 6 is titled "REFUELING" and this is a common misconception. Incorrect because 3.9.3 says from subcriticality. Part 2 is correct because 3.9.3 basis says "The minimum time of 72 hours for reactor subcriticality prior to movement of irradiated fuel assemblies in the reactor pressure vessel ensures that sufficient time has elapsed to allow the radioactive decay of the short-lived fission products".
- B. Correct. Part 1 is correct because 3.9.3 says from subcriticality. Part 2 is correct because 3.9.3 basis says "The minimum time of 72 hours for reactor subcriticality prior to movement of irradiated fuel assemblies in the reactor pressure vessel ensures that sufficient time has elapsed to allow the radioactive decay of the short-lived fission products".
- C. Incorrect. Part 1 is plausible because MODE 6 is titled "REFUELING" and this is a common misconception. Incorrect because 3.9.3 says from subcriticality. Part 2 is plausible because within 3.9.3 there is a CCW temperature that must be below a value and this is to ensure that the spent fuel heat load is reduced sufficiently to allow the spent fuel pool cooling system to maintain the bulk pool temperature below 170°F. 170°F was replaced with 105°F to remove any potential for 170°F to be correct. 105°F comes from the precautions of SOP-123 for spent fuel cooling and this is the max temperature CCW supply temperature can be to prevent the spent fuel temperature from reaching 170°F.
- D. Incorrect. Part 1 is correct because 3.9.3 says from subcriticality. Part 2 is plausible because within 3.9.3 there is a CCW temperature that must be below a value and this is to ensure that the spent fuel heat load is reduced sufficiently to allow the spent fuel pool cooling system to maintain the bulk pool temperature below 170°F. 170°F was replaced with 105°F to remove any potential for 170°F to be correct. 105°F comes from the precautions of SOP-123 for spent fuel cooling and this is the max temperature CCW supply temperature can be to prevent the spent fuel temperature from reaching 170°F.

Form 4.2-1 Written Examination Question Worksheet

K/A: (033) (SF8 SFPCS) SPENT FUEL POOL COOLING SYSTEM (G2.1.20)
CONDUCT OF OPERATIONS: Ability to interpret and execute procedure steps
(CFR: 41.10 / 43.5 / 45.12)

K/A Match: The K/A is matched because the candidate must know when the time starts counting down until they can first move fuel and the basis for this time IAW T.S. 3.9.3, DECAY TIME.

Selection criteria: New

Tier: 2 **Group:** 2

Importance Rating: **RO:** **SRO:** 4.6

Technical Reference: T.S. 3.9.3, DECAY TIME

Proposed references to be provided to candidates during examination: None

Learning Objective: GS-5 023: Identify the Technical Specification(s) associated with the Spent Fuel Cooling System, including LCO, APPLICABILITY, ACTION, and BASES.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 43.2

SRO Justification: The question is at the SRO level because the candidate must apply knowledge of the T.S. 3.9.3, DECAY TIME and its basis.

Comments:

93.

Given the following plant conditions:

- 25% power.
- XVM01708-GS, SEAL STEAM PRESSURE CONTROL VALVE has failed closed in automatic.
- AOP-206.1, DECREASING MAIN CONDENSER VACUUM is in progress.

Which ONE of the choices below completes the following statements?

Proper operation of the Condenser seal systems will be verified by locally adjusting XVT00124-AR, MN COND VAC BREAKER SEAL WATER SUP VLV (TB-436), for ____ (1) ____ overflow.

Main Turbine Seal Steam System operation will be restored using ____ (2) ____.

- A. 1) a slight
2) AOP-206.1.
- B. 1) no
2) AOP-206.1.
- C. 1) a slight
2) SOP-205, TURBINE SEALING STEAM SYSTEM.
- D. 1) no
2) SOP-205, TURBINE SEALING STEAM SYSTEM.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know that XVT00124 is adjusted for a slight overflow and that AOP-206.1 has you refer to SOP-205 to restore normal main turbine seal steam operation.

- A. Incorrect. Part 1 is correct because AOP-206.1 has you verify proper operation of the condenser seal systems by adjusting XVT00124 for a slight overflow. Part 2 is plausible because AOP-206.1 is in progress. Incorrect because AOP-206.1 has you refer to SOP-205 to restore normal main turbine seal steam operation.
- B. Incorrect. Part 1 is plausible because in SOP-205 when monitoring feedwater pump turbine steam seal drain for proper operation, you verify there is no condensate overflow. Part 2 is plausible because AOP-206.1 is in progress. Incorrect because AOP-206.1 has you refer to SOP-205 to restore normal main turbine seal steam operation.
- C. Correct. Part 1 is correct because AOP-206.1 has you verify proper operation of the condenser seal systems by adjusting XVT00124 for a slight overflow. Part 2 is correct because AOP-206.1 has you refer to SOP-205 to restore normal main turbine seal steam operation.
- D. Incorrect. Part 1 is plausible because in SOP-205 when monitoring feedwater pump turbine steam seal drain for proper operation, you verify there is no condensate overflow. Part 2 is correct because AOP-206.1 has you refer to SOP-205 to restore normal main turbine seal steam operation.

Form 4.2-1 Written Examination Question Worksheet

K/A: (055A2.02) Ability to (a) predict the impacts of the following on the (SF4S CARS) CONDENSER AIR REMOVAL SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations (CFR: 41.5 / 45.6): Loss of gland seal/gland exhaust

K/A Match: The K/A is matched because the candidate must know that AOP-206.1 has you refer to SOP-205 to restore normal main turbine seal steam operation.

Selection criteria: New

Tier: 2 **Group:** 2

Importance Rating: **RO:** **SRO:** 3.0

Technical Reference: AOP-206.1, DECREASING MAIN CONDENSER VACUUM

Proposed references to be provided to candidates during examination: None

Learning Objective: AOP-206.1 04: Given a set of plant conditions, determine the appropriate plant response and operator actions in accordance with AOP-206.1.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 43.5

SRO Justification: The question is at the SRO level because the candidate must assess plant conditions and determine a section of a procedure with which to proceed.

Comments:

94.

Given the following plant conditions:

- STP-131.001 MANIPULATOR CRANE TEST is in progress
- The Manipulator Crane Overload Cutout limit was surveilled and found at a setting of 2875 pounds.

Which ONE of the choices below completes the following statements in accordance with T.S. 3.9.6, REFUELING OPERATIONS - MANIPULATOR CRANE?

The surveillance result for the overload limit above ____ (1) ____ satisfy the requirement contained in T.S. 3.9.6 for that setting.

The manipulator crane must be demonstrated operable within ____ (2) ____ hours of fuel movement in the reactor.

- A. 1) does **not**
2) 100
- B. 1) does **not**
2) 146
- C. 1) does
2) 100
- D. 1) does
2) 146

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the overload limit for the manipulator crane and within how much time the crane must be demonstrated operable prior to fuel movement.

- A. Correct. Part 1 is correct because the manipulator cranes minimum capacity is 3250 pounds. Part 2 is correct because the manipulator crane must be demonstrated operable within 100 hours prior to starting fuel movement.
- B. Incorrect. Part 1 is correct because the manipulator cranes minimum capacity is 3250 pounds. Part 2 is plausible because 146 hours is the maximum wait time before fuel movement can begin based on CCW temperature from T.S. 3.9.3.
- C. Incorrect. Part 1 is plausible because T.S. 3.9.6 has an overload cut off limit less than or equal to 2700 pounds. A candidate could use this value vice the 3250 pounds. Part 2 is correct because the manipulator crane must be demonstrated operable within 100 hours prior to starting fuel movement.
- D. Incorrect. Part 1 is plausible because T.S. 3.9.6 has an overload cut off limit less than or equal to 2700 pounds. A candidate could use this value vice the 3250 pounds. Part 2 is plausible because 146 hours is the maximum wait time before fuel movement can begin based on CCW temperature from T.S. 3.9.3.

Form 4.2-1 Written Examination Question Worksheet

K/A: (G2.1.40) CONDUCT OF OPERATIONS: Knowledge of refueling administrative requirements (CFR: 41.10 / 43.5 / 43.6 / 45.13)

K/A Match: The K/A is matched because the candidate must have knowledge of the Technical Specification requirements for the refueling manipulator crane.

Selection criteria: Modified Question 94 of 2021 NRC Exam. Question was modified by changing out the first part of the question. This created a new correct answer. Original question is on the following page.

Tier: 2 **Group:** 2

Importance Rating: **RO:** **SRO:** 3.9

Technical Reference: T.S. 3.9.6, REFUELING OPERATIONS - MANIPULATOR CRANE

Proposed references to be provided to candidates during examination: None

Learning Objective: GS-04 022: IDENTIFY the Technical Specifications associated with the Fuel Handling System, including LCO, APPLICABILITY, ACTION, and BASES.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 43.2

SRO Justification: The question is at the SRO level because the candidate must apply Surveillance requirements of T.S. 3.9.6.

Comments:

Original Question 94 of 2021 NRC Exam:

Given the following plant conditions:

- STP-131.001 MANIPULATOR CRANE TEST is complete.
- MODE 6 with fuel movement in progress.
- An interlock is required to be bypassed on the Upender in the Fuel Handling Building.

Which ONE of the choices below completes the following statements?

The Manipulator Crane must be demonstrated OPERABLE within ____ (1) ____ hours of fuel movement in the reactor.

Bypassing a Fuel Handling Building Upender interlock ____ (2) ____ require Refueling SRO concurrence.

- A. 1) 146
2) does
- B. 1) 146
2) does **not**
- C. 1) 100
2) does
- D. 1) 100
2) does **not**

95.

Initial conditions:

- 100% power.
- “A” Main Feedwater Booster pump has tripped.
- The crew is reducing power to 95% in accordance with GOP-4C, RAPID POWER REDUCTION.

Current conditions:

- The load reduction is complete.

Which ONE of the choices below completes the following statements?

In the **initial conditions**, GOP-4C requires RCS T_{AVG} to be maintained within a **maximum** of ____ (1) ____ and trending to T_{REF} using boron and rod motion during the downpower.

In the **current conditions**, the Shift Manager ____ (2) ____ required to notify the Operations Manager on Call (OMOC) of the load reduction in accordance with OP-AA-100, CONDUCT OF OPERATIONS.

- A. 1) 3°F
2) is
- B. 1) 3°F
2) is **not**
- C. 1) 10°F
2) is
- D. 1) 10°F
2) is **not**

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know who is required to be notified during an emergent down power and the maximum temperature at which RCS Tavg can be maintained.

- A. Incorrect. Part 1 is plausible because 3°F is the temperature at which rods start to step in at an increasing rate. Part 2 is correct because during an unplanned load reduction, the OMOC is required to be notified.
- B. Incorrect. Part 1 is plausible because 3°F is the temperature at which rods start to step in at an increasing rate. Part 2 is plausible because OP-AA-100 requires the OMOC to be notified for AOP entries. The candidate may think that because this condition does not require entry into an AOP, they don't need to notify the OMOC. Incorrect because there is an unplanned down power which requires the OMOC to be notified.
- C. Correct. Part 1 is correct because GOP-4C requires you to maintain RCS TAVG less than 10°F. Part 2 is correct because during an unplanned load reduction, the OMOC is required to be notified.
- D. Incorrect. Part 1 is correct because GOP-4C requires you to maintain RCS TAVG less than 10°F. Part 2 is plausible because OP-AA-100 requires the OMOC to be notified for AOP entries. The candidate may think that because this condition does not require entry into an AOP, they don't need to notify the OMOC. Incorrect because there is an unplanned down power which requires the OMOC to be notified.

Form 4.2-1 Written Examination Question Worksheet

K/A: 2.1.43: CONDUCT OF OPERATIONS: Ability to use an online power distribution monitoring system and/or procedures to determine the effects on reactivity of plant changes, such as RCS temperature, secondary plant, or fuel depletion

K/A Match: The K/A is matched because the candidate must know the maximum RCS temperature allowed during a GOP-4C downpower.

Selection criteria: New

Tier: 3 **Group:**

Importance Rating: **RO:** **SRO:** 4.3

Technical Reference: OP-AA-100, CONDUCT OF OPERATIONS

Proposed references to be provided to candidates during examination: None

Learning Objective: OP-AA-100, 03: In accordance with OP-AA-100, describe the responsibilities of the following shift positions: 3. Shift Managers.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 43.5

SRO Justification: This question is at the SRO level because the topic is unique to the SRO position. The question requires the candidate to know who the Shift Manager is required to notify given a unique scenario.

Comments:

96.

C

Initial conditions:

- An outage is in progress.
- A High Risk Evolution (HRE) is being reviewed in accordance with OU-AA-200, SHUTDOWN RISK MANAGEMENT.

Current conditions:

- The Nuclear Plant Manager has assigned a manager, senior to the Shift Manager, for oversight of this evolution.
- A valve needs to be operated outside of its normal procedure.
- The Work Control Center SRO is reviewing SAP-123, PROCEDURE USE AND ADHERENCE, Attachment I, REQUEST TO OPERATE A COMPONENT OUTSIDE OF ITS NORMAL PROCEDURE.

Which ONE of the choices below completes the following statements?

In the **initial conditions**, the HRE ____ (1) ____ proceed if a RED condition entry is determined in accordance with OU-AA-200, SHUTDOWN RISK MANAGEMENT.

In the **current conditions**, the ____ (2) ____ will need to approve Attachment I for the valve operation in accordance with SAP-123.

- A. 1) can
2) Shift Manager **only**
- B. 1) can
2) Shift Manager **and** the manager for oversight
- C. 1) can **not**
2) Shift Manager **only**
- D. 1) can **not**
2) Shift Manager **and** the manager for oversight

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know if planned entries into a red condition are allowed during an HRE and who has to approve the valve to be operated outside of its normal procedure.

- A. Incorrect. Part 1 is plausible because during Infrequently Conducted or Complex Evolutions (ICCE), there is nothing that prohibits a RED condition during these evolutions (OP-AA-106). Incorrect because OU-AA-200 specifically prohibits RED conditions during HREs. Part 2 is correct because Attachment I of SAP-123 requires the SM signature, not the Manager of oversight.
- B. Incorrect. Part 1 is plausible because during Infrequently Conducted or Complex Evolutions (ICCE), there is nothing that prohibits a RED condition during these evolutions (OP-AA-106). Incorrect because OU-AA-200 specifically prohibits RED conditions during HREs. Part 2 is plausible because the manager of oversight is senior to the SM and in charge of this evolution so a candidate may think this individual needs to approve this valve operation as well. Incorrect because of these two individuals, only the SM is required for approval.
- C. Correct. Part 1 is correct because OU-AA-200 specifically says planned entries into a RED condition are prohibited during HREs. Part 2 is correct because Attachment I of SAP-123 requires the SM signature, not the Manager of oversight.
- D. Incorrect. Part 1 is correct because OU-AA-200 specifically says planned entries into a RED condition are prohibited during HREs. Part 2 is plausible because the manager of oversight is senior to the SM and in charge of this evolution so a candidate may think this individual needs to approve this valve operation as well. Incorrect because of these two individuals, only the SM is required for approval.

Form 4.2-1 Written Examination Question Worksheet

K/A: (G2.2.18) EQUIPMENT CONTROL: Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments and work prioritization (CFR: 41.10 / 43.5 / 45.13)

K/A Match: The K/A is matched because the candidate must know what is not allowed during maintenance activities during the outage.

Selection criteria: New

Tier: 3 **Group:**

Importance Rating: **RO:** **SRO:** 3.9

Technical Reference: SAP-123, PROCEDURE USE AND ADHERENCE, Attachment I, REQUEST TO OPERATE A COMPONENT OUTSIDE OF ITS NORMAL PROCEDURE

Proposed references to be provided to candidates during examination: None

Learning Objective: SAP-123 05: DESCRIBE the specific requirements for Infrequently Performed Tests and Evolutions and Critical Infrequently Performed Tests and Evolutions per SAP-123.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 43.5

SRO Justification: N/A

Comments:

97.

Given the following plant conditions:

- A weekly surveillance has been missed.
- The crew noticed it 2 days after it was due.

Which ONE of the choices below completes the following statements in accordance with Technical Specification 4.0.3, SURVEILLANCE REQUIREMENTS?

Technical Specification 4.0.3 requires the _____.

- A. completion of this surveillance within 24 hours of discovery.
- B. completion of this surveillance within 7 days of discovery.
- C. completion of this surveillance within the next 5 days.
- D. LCO to be immediately declared not met.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know how to correctly apply the delay period for a missed surveillance IAW LCO 4.0.4.

- A. Incorrect. Plausible because LCO 4.0.4 says you have up to 24 hours OR up to the limit of the specified frequency, whichever is greater. The candidate could mix this up and think they only have 24 hours from time of discovery.
- B. Correct. LCO 4.0.4 says you have 24 hours or up to the limit of the specified frequency, whichever is greater. In this case, the 7 days is the frequency so that is how long they have to complete the surveillance.
- C. Incorrect. Plausible if the candidate does not understand that the Delay period starts once you have discovered the issue, not from the time the surveillance was last completed. Because the stem says it was noticed 2 days after it was due, a candidate could think they have only 5 days left.
- D. Incorrect. Plausible because if the surveillance is not performed within the delay period, the LCO must immediately be declared not more. A candidate could believe that the delay period was 24 hours and since that was missed, the LCO must be declared not met immediately.

Form 4.2-1 Written Examination Question Worksheet

K/A: (G2.2.22) EQUIPMENT CONTROL: Knowledge of limiting conditions for operation and safety limits (CFR: 41.5 / 43.2 / 45.2)

K/A Match: The K/A is matched because the candidate must correctly apply the LCO 4.0.4 to a missed surveillance.

Selection criteria: New

Tier: 3 **Group:**

Importance Rating: **RO:** **SRO:** 4.7

Technical Reference: Technical Specifications.

Proposed references to be provided to candidates during examination: None

Learning Objective: SB-04 23: Determine applicable time limits for the performance of surveillance requirements in accordance with Section 4 of the Technical Specifications.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.2

SRO Justification: The question is at the SRO level because the candidate must be able to apply Technical Specification Section 4 in accordance with the rules of application.

Comments:

98.

Given the following plant conditions:

- 100% power.
- A Reactor Building entry by Operations is required.
- HP has sampled the Reactor Building atmosphere and reports that Particulate, Gas and Iodine are at 0.1 DAC.
- The crew is utilizing OAP-108.1, CONTROL OF REACTOR BUILDING ENTRY.

Which ONE of the choices below answers both of the following questions?

- 1) Who is the **lowest** level of approval required for at power entries?
 - 2) What is a condition that is **required** to be satisfied before this RB entry in accordance with OAP-108.1?
- A. 1) Nuclear Plant Manager.
2) Incore detectors must be tagged out.
- B. 1) Shift Manager.
2) RB Charcoal Cleanup Units must be in service.
- C. 1) Shift Manager.
2) Incore detectors must be tagged out.
- D. 1) Nuclear Plant Manager.
2) RB Charcoal Cleanup Units must be in service.

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know who authorizes at power entries into containment and one of the conditions required before RB entry can be performed.

- A. Correct. Part 1 is correct because the Nuclear Plant Manager must authorize at power entries into containment. Part 2 is correct because OAP-108.1 requires the Incore detectors to be tagged out prior to containment entry.
- B. Incorrect. Part 1 is plausible because the Shift Manager is the highest level of OPS management in the Control Room and in the majority of situations, has approval authority. Incorrect because the procedure specifically says that the Nuclear Plant manager is required to approve this entry. Part 2 is plausible because when normally going into containment, we will startup reactor building purge supply and exhaust and if RB atmosphere samples dictate, in the stem it says there is particulate, RB Charcoal Cleanup system will be put in service.
- C. Incorrect. Part 1 is plausible because the Shift Manager is the highest level of OPS management in the Control Room and in the majority of situations, has approval authority. Incorrect because the procedure specifically says that the Nuclear Plant manager is required to approve this entry. Part 2 is correct because OAP-108.1 requires the Incore detectors to be tagged out prior to containment entry.
- D. Incorrect. Part 1 is correct because the Nuclear Plant Manager must authorize at power entries into containment. Part 2 is plausible because when normally going into containment, we will startup reactor building purge supply and exhaust and if RB atmosphere samples dictate, in the stem it says there is particulate, RB Charcoal Cleanup system will be put in service.

Form 4.2-1 Written Examination Question Worksheet

K/A: (G2.3.12) RADIATION CONTROL: Knowledge of radiological safety principles and procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, or alignment of filters (CFR: 41.12 / 43.4 / 45.9 / 45.10)

K/A Match: The K/A is matched because the candidate must know conditions that are required to be established for Containment entry at power and who can authorize this entry.

Selection criteria: Bank

Tier: 3 **Group:**

Importance Rating: **RO:** **SRO:** 3.7

Technical Reference: OAP-108.1, CONTROL OF REACTOR BUILDING ENTRY.

Proposed references to be provided to candidates during examination: None

Learning Objective: OAP-108.1 04: Discuss the procedure details of OAP-108.1.

Question Cognitive Level: **Memory or Fundamental Knowledge:** X

Comprehension or Analysis:

10 CFR Part 55 Content: 43.4

SRO Justification: SRO because the question requires knowledge “unique to the SRO position” as documented within SAT process as ties the knowledge/ability to the licensee’s SRO job position duties (Task # O-341-031-03-02).

Comments:

99.

Given the following plant conditions:

- A LOCA occurs and the station has escalated to a Site Area Emergency (SAE).
- The OSC, TSC and EOF are activated.

Which ONE the choices below completes the following statements?

The station is required to escalate to a SAE within a **maximum** of ____ (1) ____ minutes of indications being available in accordance with VCS-EPP-0001, CLASSIFICATION OF EMERGENCIES.

All non-essential personnel (not assigned an emergency response duty) shall evacuate the site to the location designated by the ____ (2) ____ in accordance with VCS-EPP-0001.3, SITE AREA EMERGENCY.

- A. 1) 15
2) Shift Manager
- B. 1) 15
2) Emergency Director
- C. 1) 30
2) Shift Manager
- D. 1) 30
2) Emergency Director

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know the time requirements for escalating EALs and who designates the evaluation site location.

- A. Incorrect. Part 1 is correct because the SAE must be declared within 15 minutes of indications being available. Part 2 is plausible because if the TSC and EOF were not activated, the Shift Manager would evacuate the site personnel. Incorrect because the TSC and EOF are activated and therefore the Emergency Director is responsible for this.
- B. Correct. Part 1 is correct because the SAE must be declared within 15 minutes of indications being available. Part 2 is correct because the TSC and EOF are activated and therefore the Emergency Director is responsible for this.
- C. Incorrect. Part 2 is plausible because this is the time limit for determining site accountability of personnel IAW VCS-EPP-0001.3. Part 2 is plausible because if the TSC and EOF were not activated, the Shift Manager would evacuate the site personnel. Incorrect because the TSC and EOF are activated and therefore the Emergency Director is responsible for this.
- D. Incorrect. Part 2 is plausible because this is the time limit for determining site accountability of personnel IAW VCS-EPP-0001.3. Part 2 is correct because the TSC and EOF are activated and therefore the Emergency Director is responsible for this.

Form 4.2-1 Written Examination Question Worksheet

K/A: (G2.4.29) EMERGENCY PROCEDURES/PLAN: Knowledge of the emergency plan implementing procedures (CFR: 41.10 / 43.5 / 45.11)

K/A Match: The K/A is matched because the candidate must have knowledge of how long they have to declare an EAL and who can designate the location for site personnel to evacuate to.

Selection criteria: New

Tier: 3 **Group:**

Importance Rating: **RO:** **SRO:** 4.4

Technical Reference: VCS-EPP-0001.3, SITE AREA EMERGENCY.

Proposed references to be provided to candidates during examination: None

Learning Objective: EPP-ELO 20: List the responsibilities for the following positions in the onsite emergency response center: 1.
Emergency Director.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.5

SRO Justification: The question is at the SRO level because it is unique to this position and requires knowledge of the Shift Manager position when acting as Interim Emergency Director.

Comments:

100.

Given the following plant conditions:

Time 0700:

- The internet is not available.
- An ALERT was declared.

Time 0745:

- A SITE AREA EMERGENCY (SAE) was declared.

Which ONE of the choices below completes the following statements in accordance with VCS-EPP-0002, COMMUNICATION AND NOTIFICATION?

When filling out the Emergency Notification Form, lines 7-11 ____ (1) ____ required to be filled out for the SAE.

A Protective Action Recommendation ____ (2) ____ required for the SAE.

REFERENCE PROVIDED

- A. 1) are
2) is
- B. 1) are
2) is **not**
- C. 1) are **not**
2) is
- D. 1) are **not**
2) is **not**

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must know what defines “initial notification” and that PARs are not required for an SAE.

- A. Incorrect. Part 1 is plausible because this is the second EAL that’s been declared and the procedure says “not required for initial notifications”. A candidate may not understand what “initial” means and believe you are required to fill out lines 7-11. Incorrect because “initial” is the first time each EAL is being declared. Since this is the first time an SAE is being declared, this is considered an initial notification. Part 2 is plausible because this is the second high level of EALs and conditions are pretty bad. This may make a candidate believe PARs are required during an SAE. Incorrect because they are not required until a GE.
- B. Incorrect. Part 1 is plausible because this is the second EAL that’s been declared and the procedure says “not required for initial notifications”. A candidate may not understand what “initial” means and believe you are required to fill out lines 7-11. Incorrect because “initial” is the first time each EAL is being declared. Since this is the first time an SAE is being declared, this is considered an initial notification. Part 2 is correct, PARs are not required until a GE is declared.
- C. Incorrect. Part 1 is correct because this is the first time an SAE is being declared, this is considered an initial notification. Part 2 is plausible because this is the second high level of EALs and conditions are pretty bad. This may make a candidate believe PARs are required during an SAE. Incorrect because they are not required until a GE.
- D. Correct. Part 1 is correct because this is the first time an SAE is being declared, this is considered an initial notification. Part 2 is correct, PARs are not required until a GE is declared

Form 4.2-1 Written Examination Question Worksheet

K/A: (G2.4.47) EMERGENCY PROCEDURES/PLAN: Ability to diagnose and recognize trends in an accurate and timely manner using the appropriate control room reference material (reference potential) (CFR: 41.10 / 43.5 / 45.12)

K/A Match: The K/A is matched because the candidate must have the ability to recognize that while the SAE is the second EAL declared, this is considered an initial notification.

Selection criteria: New

Tier: 3 **Group:**

Importance Rating: **RO:** **SRO:** 4.2

Technical Reference: VCS-EPP-0002, COMMUNICATION AND NOTIFICATION

Proposed references to be provided to candidates during examination: Attachment 12 of VCS-EPP-0002, Page 1 of 6.

Learning Objective: EPP-ILO 02: DIRECT appropriate notifications for changes to the emergency action level.

Question Cognitive Level: **Memory or Fundamental Knowledge:**

Comprehension or Analysis: X

10 CFR Part 55 Content: 43.5

SRO Justification: This question is at the SRO level because the candidate must have knowledge of administrative procedures that specify implementation of specific actions during an emergency procedure.

Comments:

Form 3.3-1 Scenario Outline

Facility:	VC SUMMER	Scenario #:	#1
Scenario Source:	New	Op. Test #:	ILO 22-01 NRC-2023
Examiners:	Applicants/ Operators:		
_____	_____		
_____	_____		
_____	_____		
Initial Conditions:	- Reactor power is 100%. "B" train work week. - XFN-0065B RBCU is OOS.		
Turnover:	Perform stroke test of PZR Block valves.		
Critical Tasks:	- Start at least one RHR pump in injection mode prior to RVLIS Narrow Range Level decreasing to less than 34%. - Realign any running ECCS pump to the RHR Sump prior to RWST level lowering below 10%.		

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N-BOP, US	STP-127.001, PZR PORV Block valve stroke test.
2#	MAL-FWM006B	C-BOP, US R-RO	FW Booster pump "B" trip requiring power reduction. (2019 NRC Scenario #2)
3	MAL-CCW007A PMP-CC003F	C/MC-RO, US TS-US	"A" CCW pump trip, "C" CCW pump fails to Auto start.
4	VLV-RC004L VLV-RC011W OVR-PR035B	C-RO, US TS-US	Pressurizer Power Operated Relief valve develops seat leakage
5	MAL-MSS001E	I/MC-BOP, US TS-US	Controlling Steam Generator Pressure Channel (PT-485) fails low on "B" Steam Generator, Feed flow lowers.

Form 3.3-1 Scenario Outline

6	MAL- RCS019C	M-ALL	Large Break LOCA with failures.
	PMP-SW006F		XPP-45B, Service Water Booster Pump “B” fails to start.
	PMP-RH001F PMP-RH002F		Both RHR pumps will fail to autostart.
	VLV-SI010F VLV-SI011F VLV-SI012F VLV-SI013F		Reactor Building sump suction isolation valves to RHR fail to auto open at 18% RWST level.
TERMINATE: The scenario may be terminated when the crew has aligned Charging Pumps for Cold Leg Recirculation in EOP-2.2 or at the discretion of the Lead Examiner.			
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control			

Used on previous two NRC Exams.

The following notation is used in the Form 3.3-2 "Time" column:

IOA designates Immediate Operator Action steps.

***** designates Continuous Action steps.

Form 3.3-1 Scenario Outline

TURNOVER:

The crew will assume the watch having been pre-briefed on the Initial Conditions, the plan for this shift and any related operating procedures.

Train "B" RBCU, XFN-0065B is tagged out for breaker maintenance and is to be returned to service next shift.

The Unit is at 100% power MOL.

The crew will be instructed to perform STP-127.001, Pressurizer Block Valve Operability Test as soon as they take the shift.

Phoenix display monitor is out of service. The Shift Engineer is tracking all necessary actions in Work Control.

Current RCS Boron concentration by chemistry is 1032 ppm.

Pre-loaded Items

- OVR-AH022A
CS-AH280 RBCU FAN 65B FAST SPEED GREEN L
FINAL: OFF
- OVR-AH023A
CS-AH279 RBCU FAN 65B SLOW SPEED GREEN L
FINAL: OFF

EVENT 1: STP-127.001, Pressurizer Block Valve Operability Test

The crew will perform STP-127.001, Pressurizer Block Valve Operability Test as soon as they take the shift. They will perform the test and record the appropriate data for all three Pressurizer Block valves. Once this is complete, the next event may be inserted.

EVENT 2: FW Booster pump "B" trip requiring power reduction

- **TRIGGER 2**
 - o MAL-FWM006B
FW BOOSTER PUMP B TRIP

On cue from the examiner, the "B" Feedwater Booster Pump will trip and the BOP will refer to XCP-625, 1-2 FWBP A/B/C/D TRIP which will require the crew to reduce Reactor power to 95% per GOP-4C, RAPID POWER REDUCTION. Once the crew has stabilized the plant after the power reduction, the next event may be inserted.

EVENT 3: “A” CCW pump trips, “C” fails to autostart

- **TRIGGER 3**
 - o VLV- MAL-CCW007A
CCW PUMP 1 TRIP
 - o PMP-CC003F
XPP0001CAL CCW PMP C TRAIN A FAIL TO START
- **TRIGGER 16**
 - o LOA-CCW042
CELL SWITCH OF CCW PUMP A
FINAL: RACK OUT

On cue from the Examiner, the “A” CCW pump will trip. The “C” CCW pump will fail to automatically start. The OATC will manually start the “C” CCW pump. The US will use ARP-601 1-3, CCP A/C TRIP FAIL for corrective actions. Once the “C” CCW pump has been started and Tech Specs reviewed, can move on to the next event.

The US will review Tech Specs and enter into 3.7.3. With only one component cooling water loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

EVENT 4: Pressurizer Power Operated Relief valve develops seat leakage

- **TRIGGER 4**
 - o VLV-RC004L
PCV00445A-RC PZR PWR REL VLV LEAKAGE
FINAL: 1.5%
RAMP: 30 sec
 - o OVR-PR035B
SS-RC51 PRZR POWER RELIEF (PCV-445A) RED LAMP
FINAL: OFF
- **TRIGGER 15**
 - o VLV-RC011W
XVG08000A-RC PZR REL ISO VLV LOSS OF POWER

On cue from the Chief Examiner, Pressurizer Power Operated Relief valve PCV-445A will commence leaking past its seat. The PCV-445A position indication will show red light off and green light on. Charging flow will begin increasing. PRT Pressure and Level will begin increasing and the Pressurizer relief line temperature will begin increasing. The RO will take action as directed by the US in accordance with annunciators XCP-616, 4-2 PZR RLF LINE TEMP HI, XCP-616, 4-4 PRT LVL LO/ TEMP/LVL/ PRESS HI and XCP-616, 3-6 PZR PCS LO BU HTRS ON. The US may refer to SOP-101, Reactor Coolant System. The RO will close MVG-8000B, RELIEF 445A ISOL to isolate the leakage.

The US will apply Tech Spec 3.4.4, Reactor Coolant System – Relief Valves action b, which requires with one PORV inoperable and not capable of being manually cycled, within 1 hour: 1) restore the PORV(s) to OPERABLE status or to a condition where it may be manually cycled or 2) close its associated block valve and remove power from the block valve.

EVENT 5: PT-485, Control SG pressure transmitter fails low.

- **TRIGGER 5**
 - o MAL-MSS001E
STEAM GENERATOR PRESSURE TRANSMITTER 485 FAILURE
FINAL: 0 psig
RAMP: 5 sec

On cue from the Examiner, the controlling Steam Generator Pressure channel on Steam Generator "B" will fail low. Controlling Steam Flow channel will lower and the Steam Generator Water level control system will respond by lowering feed water flow and Steam Generator level. The BOP responds to annunciator XCP- 624, 4-1 SG A STMLN Δ P HI and XCP- 624, 6-1 SG C STMLN Δ P HI and determines the cause of the event is an instrument failure. The BOP takes corrective action by swapping the controlling channels in accordance with immediate actions of AOP-401.3, Steam Flow - Feedwater Flow Protection Channel Failure. The US will implement AOP-401.3.

The US applies Tech Spec 3.3.1 Reactor Trip System Instrumentation Table 3.3-1, Function 14; Steam/Feedwater Flow Mismatch and Low Steam Generator Water Level - Action 6. The inoperable channel must be placed in the tripped condition within 72 hours.

The US also applies Tech Spec 3.3.2 Engineered Safety Feature Actuation System Instrumentation Table 3.3-3, Function 1.e; Differential Pressure between Steam Lines - High - Action 24. This Tech Spec also requires the inoperable channel must be placed in the tripped condition within 72 hours.

Once the crew has stabilized SG level and Tech Specs have been addressed, the next event may be inserted.

EVENT 6: Large Break LOCA with failures.

- **PRELOAD**
 - o PMP-SW006F
XPP0045B SW BOOSTER PMP B FAIL TO START
 - o PMP-RH001F
XPP0031A RHR PMP A FAIL TO START
 - o PMP-RH002F
XPP0031B RHR PMP B FAIL TO START
 - o VLV-SI010F
XVG08811A-SI RECIRC SUMP TO RHR PMP A FAIL AS IS
 - o VLV-SI011F
XVG08811B-SI RECIRC SUMP TO RHR PMP B FAIL AS IS
 - o VLV-SI012F
XVG08812A-SI RECIRC SUMP TO RHR PMP A FAIL AS IS
 - o VLV-SI013F
XVG08812B-SI RECIRC SUMP TO RHR PMP B FAIL AS IS
- **TRIGGER 6**
 - o MAL-RCS019A
DBA LOCA (HOT LEG) LOOP 1
- **AUTO-TRIGGER 17** x03i060o (MVG-8811A SWITCH TO OPEN)
 - o VLV-SI010F (NEW)
XVG08811A-SI RECIRC SUMP TO RHR PMP A FAIL AS IS
DELETE IN: 1 sec
- **AUTO-TRIGGER 18** x03i061o (MVG-8811B SWITCH TO OPEN)
 - o VLV-SI011F (NEW)
XVG08811B-SI RECIRC SUMP TO RHR PMP B FAIL AS IS
DELETE IN: 1 sec
- **AUTO-TRIGGER 19** x03i360o (MVG-8812A SWITCH TO OPEN)
 - o VLV-SI012F (NEW)
XVG08812A-SI RECIRC SUMP TO RHR PMP A FAIL AS IS
DELETE IN: 1 sec

Form 3.3-1 Scenario Outline

- **AUTO-TRIGGER 20** x03i361o (MVG-8812B SWITCH TO OPEN)
 - o VLV-SI013F (NEW)
XVG08812B-SI RECIRC SUMP TO RHR PMP B FAIL AS IS
DELETE IN: 1 sec

On cue from the Examiner, a Large Break LOCA will be initiated. The reactor will trip and operators will take immediate actions of EOP-1.0. Both RHR pumps will fail to auto start. "B" Service Water Booster pump will fail to auto start. The crew will then transition to EOP-2.0. Once RWST level reaches 18%, the automatic swap of RHR pump suction to the Recirc sump will not occur. The crew will transition to EOP-2.2, ES-1.3 Transfer to Cold Leg Recirc. When the operator attempts to manually open the RHR sump suctions, the valves will open.

CRITICAL TASKS:

- Start at least one RHR pump in injection mode prior to RVLIS Narrow Range Level decreasing to less than 34%.
- Realign any running ECCS pump to the RHR Sump prior to RWST level lowering below 10%.

TERMINATION:

The scenario may be terminated when the crew has aligned Charging Pumps for Cold Leg Recirculation in EOP-2.2 or at the discretion of the Lead Examiner.

Form 3.3-1 Scenario Outline

2023 NRC #1

Scenario Attributes		Events
Events after EOP entry (1-2)	2	• Sump Recirc Auto Swap Fail • Both RHR Pumps Fail to auto start
Abnormal Events (2-4)	4	• FW Booster pump "B" trip (2019 NRC #2) • "A" CCW pump trip, "C" CCW pump fails to Auto start. TS • Pressurizer PORV develops seat leakage. TS • Controlling Steam Generator Pressure Channel (PT-485) fails low on "B" Steam Generator.
Major Transients (1-2)	1	• Large Break LOCA
EOPs Entered (1-2)	2	• EOP-2.0, E-1 LOSS OF REACTOR OR SECONDARY COOLANT • EOP-2.2, ES-1.3 TRANSFER TO COLD LEG RECIRCULATION
EOP Contingencies (0-2)	0	• N/A
Preidentified CTs (≥ 2)	2	• Start at least one RHR pump in injection mode prior to RVLIS Narrow Range Level decreasing to less than 34%. • Open the RHR suction isolations from the RB sump prior to RWST level reaching 10%.

Form 3.3-1 Scenario Outline

SIMULATOR SCENARIO SETUP

INITIAL CONDITIONS:

- IC Set 256
- 100% Power, MOL
- Burnup = 10,000 MWD/MTU
- Current Core Cycle = 27
- RCS Boron Concentration = 1032 ppm
- FCV-113 Pot Setting = 4.47
- Rod Position: Group D = 226 steps
- Tavg = 587.4°F

PRE-EXERCISE:

- Ensure simulator has been checked for hardware problems (DORT, burnt out light bulbs, switch malfunctions, chart recorders, etc.).
- Complete VCS-TQP-0807 Attachment I-A, Unit 1 Booth Instructor Checklist.
- Verify plant aligned for "B1" work week IAW PTP-101.004, Safety Related Train Swap Checklist.
- Verify red Placard on "A" CCW Pump and "B" Charging Pump.
- Verify the Hard Card for Turbine operation is in its proper storage location and cleaned.
- Verify the Hard Card for borating via MVT-8104 is in its proper storage location and cleaned.
- Ensure no NI's are removed from service, on SIPCS type in "add/omit" to verify.
- Verify Rod Bank Update set correctly: 226 steps on all Banks.
- Place HOLD Tag on RBCU 65B NORM and SLOW Speed Switches.
- Ensure Phoenix computer screen is turned off.
- Ensure you have the following pre-marked up procedures:
 - STP-127.001, PRESSURIZER BLOCK VALVE OPERABILITY TEST.
- Ensure you have a turnover sheet for each position.
- Conduct two-minute drill.

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC	Scenario # 1	Event # 1	Page: 11 of 51
Event Description: STP-127.001 PRESSURIZER BLOCK VALVE OPERABILITY TEST			
Time/ Position	Applicant's Actions or Behavior		

EVALUATOR NOTE:	Crew will pre-brief and perform PZR Block Valve Test in accordance with STP-127.001.		
BOOTH OPERATOR:	NO TRIGGER		
US	NOTE 5.0 through 8.0 An asterisk (*) preceding a step indicates that data or a signoff is required on the attachment identified within the step. 5.0 INITIAL CONDITIONS 5.1 All Pressurizer Power Operated Relief Valves are CLOSED.		STP-127.001
	<u>6.0 PROCEDURE</u> 6.1 Record all calibration data on Attachment I as required.		STP-127.001
RO	*6.2 Perform an AS FOUND equipment lineup per Attachment II.		STP-127.001
	<u>NOTE 6.3, 6.4, 6.5</u> To prevent preconditioning, the Block Valves open and closed exercises may be performed out of sequence.		STP-127.001
RO	6.3 Stroke test XVG08000A-RC, PRZ PWR OPER RELIEF INLET ISOL VLV, as follows: a. Verify PCV-445A, PWR RELIEF, is closed. (PEER ✓) b. Close MVG-8000A, RELIEF 445A ISOL, and measure the stroke time to the nearest 0.1 second, from switch actuation until the closed light is lit and the open light goes out. *c. Record the stroke time for XVG08000A-RC, PRZ PWR OPER RELIEF INLET ISOL VLV, on Attachment I. d. Open MVG-8000A, RELIEF 445A ISOL, and measure the stroke time to the nearest 0.1 second, from switch actuation until the open light is lit and the closed light goes out. *e. Record the stroke time for XVG08000A-RC, PRZ PWR OPER RELIEF INLET ISOL VLV, on Attachment I.		STP-127.001
	<u>NOTE 6.3, 6.4, 6.5</u> To prevent preconditioning, the Block Valves open and closed exercises may be performed out of sequence.		STP-127.001

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC	Scenario # 1	Event # 1	Page: 12 of 51
Event Description: STP-127.001 PRESSURIZER BLOCK VALVE OPERABILITY TEST			
Time/ Position	Applicant's Actions or Behavior		

RO	6.4 Stroke test XVG08000B-RC, PRZ PWR OPER RELIEF INLET ISOL VLV, as follows: a. Verify PCV-444B, PWR RELIEF, is closed. (PEER ✓) b. Close MVG-8000B, RELIEF 444B ISOL, and measure the stroke time to the nearest 0.1 second, from switch actuation until the closed light is lit and the open light goes out. *c. Record the stroke time for XVG08000B-RC, PRZ PWR OPER RELIEF INLET ISOL VLV, on Attachment I. d. Open MVG-8000B, RELIEF 444B ISOL, and measure the stroke time to the nearest 0.1 second, from switch actuation until the open light is lit and the closed light goes out. *e. Record the stroke time for XVG08000B-RC, PRZ PWR OPER RELIEF INLET ISOL VLV, on Attachment I.	STP-127.001
	<u>NOTE 6.3, 6.4, 6.5</u> To prevent preconditioning, the Block Valves open and closed exercises may be performed out of sequence.	STP-127.001
RO	6.5 Stroke test XVG08000C-RC, PRZ PWR OPER RELIEF INLET ISOL VLV, as follows: a. Verify PCV-445B, PWR RELIEF, is closed. (PEER ✓) b. Close MVG-8000C, RELIEF 445B ISOL, and measure the stroke time to the nearest 0.1 second, from switch actuation until the closed light is lit and the open light goes out. *c. Record the stroke time for XVG08000C-RC, PRZ PWR OPER RELIEF INLET ISOL VLV, on Attachment I. d. Open MVG-8000C, RELIEF 445B ISOL, and measure the stroke time to the nearest 0.1 second, from switch actuation until the open light is lit and the closed light goes out. *e. Record the stroke time for XVG08000C-RC, PRZ PWR OPER RELIEF INLET ISOL VLV, on Attachment I.	STP-127.001
EVALUATOR NOTE:	The next event may be inserted at the discretion of the Lead Evaluator.	

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 2 Page: 13 of 51
 Event Description: FW Booster pump "B" trips requiring power reduction

Time/ Position	Applicant's Actions or Behavior
EVALUATOR NOTE:	On cue from the Examiner, the "B" Feedwater Booster pump will trip. This failure results in 3 Main Feedwater Pumps and 3 Feedwater Booster pumps in service at 100% power. The crew will refer to XCP-625 1-2 FWBP A/B/C/D TRIP, which will require a reduction of Reactor Power to 95%. The US will implement GOP-4C, Rapid Power Reduction to direct actions needed to accomplish the power reduction. The RO and BOP will perform actions necessary to reduce power from 100% to 95%.
BOOTH OPERATOR:	When directed – initiate Event 2 (TRIGGER 2).
Symptoms/ Cues:	XCP-625 1-2, FWBP A/B/C/D TRIP
US/BOP	Enters XCP-625 1-2, FWBP A/B/C/D TRIP
US	<u>NOTE</u> This alarm has reflash capabilities.
BOP	CORRECTIVE ACTIONS: 1. If the number of Feedwater Booster Pumps in operation is less than the number of Feedwater Pumps in operation, immediately trip the Reactor and enter EOP-1.0, REACTOR TRIP SAFETY INJECTION ACTUATION. (3 FW PUMPS AND 3 BOOSTER PUMPS ARE IN SERVICE NO TRIP REQUIRED) (NO) 2. If three Feedwater Booster Pumps and three Feedwater Pumps are in operation, reduce Reactor power to 95% per GOP-4C, RAPID POWER REDUCTION. 3. If available, start a standby Feedwater Booster Pump per SOP-210, FEEDWATER SYSTEM. (NO STANDBY BOOSTER PUMP AVAILABLE) (NO) 4. If only two Feedwater Booster Pumps are in operation, reduce Reactor power to less than 48% per GOP-4C, RAPID POWER REDUCTION. (3 BOOSTER PUMPS ARE IN SERVICE) (NO) 5. Ensure Deaerator wide range level is maintained greater than 4' as indicated on LI-3135, DEAER STOR TK WR LVL FEET..
BOOTH OPERATOR:	If requested to check status of the "B" Feedwater Booster Pump and breaker, wait 1 minute and report no obvious problem with pump and that the breaker is tripped.

XCP 625, 1-2

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 2 Page: 14 of 51
 Event Description: FW Booster pump "B" trips requiring power reduction

Time/ Position	Applicant's Actions or Behavior

US	Directs a plant down power to 95% in accordance with GOP-4C, RAPID POWER REDUCTION.

GOP-4C REFERENCE PAGE

GOP-4C

GENERAL NOTES

A.	Procedure steps should normally be performed in sequence. However, it is acceptable to perform steps in advance after thorough evaluation of plant conditions and impact by the Shift Manager or Unit Supervisor.	F
B.	After any Thermal Power change of greater than 15% within any one hour, Attachment III.H. of GTP-702 must be completed.	A
C.	If Reactor Power is stabilized during this procedure for the purpose of raising power per GOP-4A, a Power Range Heat Balance shall be performed.	
D.	Once a Rapid Power Reduction has begun, every effort should be made to prevent the Turbine from reaching "AT SET LOAD" unless it is desired to stabilize the plant.	

REACTOR CONTROL

A.	During operation with a positive Moderator Temperature Coefficient, power and temperature changes will require constant operator attention.	
B.	Rod Control should be maintained in Automatic if any Pressurizer PORV is isolated.	
C.	If at any time, power decreases unexpectedly below 0.1% on any Power Range NI (computer indication available) OR below 1.0% on any Power Range NI control board indication (computer not available):	E
1)	No positive reactivity will be added by rods or dilution.	
2)	A complete reactor shutdown shall be performed per GOP-5.	
3)	A controlled reactor startup may be commenced per GOP-3 once the event has been reviewed by Reactor Engineering.	

REACTOR TRIP CRITERIA DURING RAPID LOAD REDUCTION

A.	If any of the following conditions occur, trip the Reactor and implement EOP-1.0:	
1)	RCS T_{avg} is less than 551°F for greater than 15 minutes.	
2)	T_{avg}/T_{ref} mismatch exceeds 10°F.	
3)	Pressurizer pressure approaches 1870 psig.	
4)	Power reduction at 5% per minute is not sufficient to mitigate the event.	

NOTE 3.0

If time allows, load reductions should be discussed with the Load Dispatcher.

GOP-4C

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 1	Event # 2	Page: 15 of 51	
Event Description: FW Booster pump "B" trips requiring power reduction					
Time/ Position	Applicant's Actions or Behavior				
	<u>CAUTION 3.1 through 3.12</u> a. Thermal Power changes of greater than 15% in any one- our period requires completion of GTP-702 Attachment III.H. b. The following IPCS points, should be monitored periodically to determine if a thermal power change of greater than 15% in any one hour period has been exceeded: U0485-MAX-1HR – Max power in the past hour U0485-MIN-1HR – Min power in the past hour U0485-DIFF-1HR – Difference between Max and Min U1169-1M-MAX-1HR – Max power in the past hour U1169-1M-MIN-1HR – Min power in the past hour U1169-1M-DIFF-1HR – Difference between Max and Min				GOP-4C
BOOTH OPERATOR:	If contacted as Shift Engineer regarding GTP-702 Attachment, report back "I will complete the GTP-702 Attachment III.H".				
RO	3.1 Commence rapid Plant Shutdown as follows: a. Energize all Pressurizer Heaters.				GOP-4C
	NOTE 3.1.b Setting FCV-113 A&B, BA FLOW SET PT to 8.3 will yield 33 gpm Boration flow rate.				GOP-4C
CREW	b. Maintain the following with rod motion or boron concentration changes: 1) Tavg within 10°F and trending to Tref. 2) ΔI within limits. 3) Control Rods above the rod insertion limit.				GOP-4C
BOP	c. Using the EHC HMI, Control/Load screen, reduce load per SOP-214, Main Turbine And Controls, Section III.D, Turbine Load Reduction/Shutdown, at a rate of 5% per minute or less.				GOP-4C
EVALUATOR NOTE	The BOP will now obtain the hard card of SOP-214, Section III.D to reduce load. The steps to reduce load are as follows below.				
BOP	2.1. Ensure the Control/Load screen is selected.				SOP-214

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 2 Page: 16 of 51
 Event Description: FW Booster pump "B" trips requiring power reduction

Time/ Position	Applicant's Actions or Behavior	
	<u>NOTE 2.2</u> The turbine will come off the limiter and turbine load will lower once Load Set Reference is less than Load Limit Reference. Acknowledging dialog boxes is "skill of the Craft".	SOP-214
BOP	2.2 To lower Turbine Load using Load Set, perform the following: - To lower Turbine Load using Load Set, perform the following: - Select (or enter) the desired Rate %/min on Load Set. - Select Load on Load Set (a dialog box will open). - Enter the desired load. (PEER✓) - Confirm desired load. (PEER✓) - Verify proper system response. - If during a load reduction, it is desired to stop the load reduction, perform the following: - Select Hold on Load Set. - Select the desired Rate %/min to resume load reduction. - If desired, place LOAD LIMIT in service per Section III.	SOP-214
EVAULATOR NOTE	The RO will setup to borate the RCS using SOP-106, Section III.F. The steps for borating are as follows below.	
	<u>NOTE 2.0</u> - Energizing additional Pressurizer Heaters will enhance mixing. - LCV-115A, LTDN DIVERT TO HU-TK, will begin to modulate to the HU-TK position at 70% level on LI-115, VCT LEVEL %.	SOP-106
RO	2.0 INSTRUCTIONS 2.1 Ensure at least one Reactor Coolant Pump is running.	SOP-106
RO	2.2 Place RX COOL SYS MU switch to STOP.	SOP-106
RO	2.3 Place RX COOL SYS MU MODE SELECT switch to BOR. (Peer ✓)	SOP-106
RO	2.4 Adjust FCV-113 A&B, BA FLOW SET PT, for desired flow rate. (Peer ✓)	SOP-106

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 2 Page: 17 of 51
Event Description: FW Booster pump "B" trips requiring power reduction

Time/ Position	Applicant's Actions or Behavior		
RO	2.5	Set FIS-113, BA TO BLNDR FLOW, batch integrator to the desired volume. (Peer ✓)	SOP-106
RO	2.6	Place RX COOL SYS MU switch to START.	SOP-106
RO	NOTE 2.7 Step 2.7 may be omitted when borating less than 10 gallons. 2.7 Place FCV-113 A&B, BA FLOW, controller in AUTO.		SOP-106
RO	NOTE 2.8 The AUTO setpoint dial for FCV-113A&B, BA FLOW, controller may be adjusted slowly to obtain the desired flow rate. 2.8 Verify the desired Boric Acid flow rate on FR-113, BA TO BLNDR GPM (F-113).		SOP-106
RO	2.9	When the preset volume of boric acid has been reached, perform the following: a. Place FCV-113A&B, BA flow controller in MAN. b. Verify boration stops.	SOP-106
RO	2.10	Place RX COOL SYS MU switch to STOP.	SOP-106

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 2 Page: 18 of 51
 Event Description: FW Booster pump "B" trips requiring power reduction

Time/ Position	Applicant's Actions or Behavior	
RO	NOTE 2.11 a. If plant conditions require repeated borations, Step 2.11 may be omitted. b. The volume in the piping between the blender and the VCT outlet is approximately 3.8 gallons. 2.11 Alternate Dilute 4 to 6 gallons of Reactor Makeup Water to flush the line down stream of the blender by performing the following: a. Place RX COOL SYS MU MODE SELECT switch to ALT DIL. (Peer ✓) b. Adjust FCV-168, TOTAL MU FLOW SET PT, to desired flow rate. (Peer ✓) c. Set FIS-168, TOTAL MU FLOW, batch integrator to desired volume. (Peer ✓) d. Place RX COOL SYS MU switch to START. e. Verify desired flow rate on FR-113, TOTAL MU GPM (F-168). f. Verify alternate dilution stops when preset volume is reached on FIS-168, TOTAL MU FLOW, batch integrator. g. Place RX COOL SYS MU switch to STOP.	SOP-106
RO	2.12 Place RX COOL SYS MU MODE SELECT switch to AUTO. (Peer ✓)	SOP-106
RO	2.13 Adjust FCV-168, TOTAL MU FLOW SET PT, to 7.5 (120 gpm). (Peer ✓)	SOP-106
RO	2.14 In MAN, adjust FCV-113 A&B, BA FLOW OUTPUT, to the required position which will ensure proper Boric Acid addition for subsequent Automatic Makeup operations.	SOP-106
RO	2.15 Adjust FCV-113 A & B, BA FLOW, SET PT per one of the following: a. OAP-100.6, Attachment IA, Reactivity Control Parameters. b. Desired position to ensure proper boric acid addition based on current RCS conditions.	SOP-106
RO	2.16 Place RX COOL SYS MU switch to START. (Peer ✓)	SOP-106

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 2 Page: 19 of 51
Event Description: FW Booster pump "B" trips requiring power reduction

Time/ Position	Applicant's Actions or Behavior

RO	2.17 Perform the following: a. Start XPP-13A(B), BA XFER PP A(B), for the in-service Boric Acid Tank. b. If necessary, start XPP-13A(B), BA XFER PP A(B), for the Boric Acid Tank on recirculation.

EVALUATOR NOTE:	The next event will be initiated at the discretion of the Lead Examiner.

SOP-106

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 1	Event # 3	Page: 20 of 51
Event Description: "A" CCW Pump Trip, "C" CCW Pump fails to auto start				
Time/ Position	Applicant's Actions or Behavior			
EVALUATOR NOTE:	On cue from the Examiner, the "A" CCW Pump will trip and the "C" CCW Pump will fail to auto start. The crew will refer to XCP-601, 1-3, CCP A/C TRIP FAIL and start the "C" CCW Pump per the Corrective Actions.			
BOOTH OPERATOR:	When directed – initiate Event 3 (TRIGGER 3).			
Symptoms/ Cues:	• XCP-601 1-2, CCP A/C AUTOSTART FAIL • XCP-601 1-3, CCP A/C TRIP FAIL			
BOP	Corrective Actions: 1. Ensure the standby pump starts.			
US	Enters T.S. 3.7.3. With only one component cooling water loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.			
EVALUATOR NOTE	SOP-118, COMPONENT COOLING WATER, Precaution 5 states, "Any Component Cooling Water Pump which is inoperable must have its breaker racked down to maintain two loop operability."			
BOOTH OPERATOR:	When called to investigate the cause of the "A" CCW Pump Trip, wait 5 minutes and report back that there is nothing obviously wrong with the pump and you will continue to investigate.			
BOOTH OPERATOR	If asked to rack down the "A" CCW PP Breaker, wait 2 minutes and insert TRIGGER 16.			
EVALUATOR NOTE	The crew may respond IAW AOP-118.1, LOSS OF COMPONENT COOLING WATER. The steps for AOP-118.1 are found on Page 44 of 50.			
EVALUATOR NOTE	The crew should refer to XCP-603 1-3/2-2/3-2, RCP A/B/C THERM BAR FLOW HI and realign Component Cooling Booster Pump alignment per SOP-118, Section III.D. The alarms are in because of two CCBPs running.			
RO	<u>INITIAL CONDITIONS</u> 1.1 Component Cooling System is in operation.			

XCP-601 1-3

T.S. 3.7.3

SOP-118

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 3 Page: 21 of 51
Event Description: "A" CCW Pump Trip, "C" CCW Pump fails to auto start

Time/ Position	Applicant's Actions or Behavior
RO	2.1 Shift operating Component Cooling Booster Pumps: a. Place the desired Component Cooling Booster Pump, XPP-58A(B)(C), in START. b. Stop one of the running Component Cooling Booster Pumps. 1) Place XPP-58A(B)(C), in OFF. 2) Place XPP-58A(B)(C), in AUTO. c. Ensure MVT-9593A(B)(C), FROM RCP A(B)(C) THERM BARR is not closed due to high flow.
EVALUATOR NOTE:	Step 2.1 is Not Applicable for the given situation.
RO	2.2 Re-alignment of Component Cooling Booster Pumps following automatic start of a Component Cooling Booster Pump. a. Stop one of the running Component Cooling Booster Pumps. 1) Place XPP-58A(B)(C), in OFF. 2) Place XPP-58A(B)(C), in AUTO. b. Ensure MVT-9593A(B)(C), FROM RCP A(B)(C) THERM BARR is not closed due to high flow.
EVALUATOR NOTE:	The next event will be initiated at the discretion of the Lead Examiner.

SOP-118

SOP-118

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 1 Event # 4		Page: 22 of 51
Event Description: Pressurizer PORV develops seat leakage.				
Time/ Position		Applicant's Actions or Behavior		
EVALUATOR NOTE:		The Pressurizer Power Operated Relief valve PCV-445A will commence leaking past its seat. Position indication for PCV-445A will show both red and green lights on. Charging flow will begin increasing. PRT Pressure and Level will begin increasing and the Pressurizer relief line temperature will begin increasing.		
BOOTH OPERATOR:		When directed – initiate Event 4 (TRIGGER 4)		
Symptoms/ Cues:		Indications Available: XCP-616 4-2, PZR RLF LINE TEMP HI. XCP-616 4-4, PRT LVL LO/ TEMP/LVL/ PRESS HI. XCP-616 3-6, PZR PCS LO BU HTRS ON. PCV-445A, PWR RELIEF, Red and Green position indication BOTH lit. Increasing indication on the following instruments: • TI-471, PRT TEMP F. • PI-472, PRT PRESS PSIG. • FI-122C, CHARGING FLOW GPM. • TI-463, PZR RELIEF TEMP F. Decreasing indication on the following instruments: • PI-444, PZR PRESS PSIG. • PI-445, PZR PRESS PSIG. • PI-455, PZR PRESS PSIG. • PI-456, PZR PRESS PSIG. • PI-457, PZR PRESS PSIG.		
US/RO		Enters ARP-001- XCP 616, 4-2 PZR RLF LINE TEMP HI.		

XCP 616, 4-2

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 4 Page: 23 of 51
 Event Description: Pressurizer PORV develops seat leakage.

Time/ Position	Applicant's Actions or Behavior	
RO	CORRECTIVE ACTIONS: - Determine if a PORV has lifted or is leaking by monitoring the Pressurizer pressure on PI-444(445), CNTL CHAN PRESS PSIG. - Monitor the following computer points for individual PORV tailpipes: - T10753 (PCV-444B). - T10754 (PCV-445A). - T10755 (PCV-445B).	XCP 616, 4-2
RO	3. Refer to SOP-101, Section V, A. PRESSURE PORV TAILPIPE HIGH TEMPERATURE.	XCP 616, 4-2
EVALUATOR NOTE:	If at any time Pressurizer pressure becomes less than 2206 psig TS 3.2.5 will be entered for DNB.	
US	TS 3.2.5, DNB PARAMETERS Action: With any of the above parameters exceeding its limit, restore the parameter to within its limit within 2 hours or reduce THERMAL POWER to less than 5% of RATED THERMAL POWER within the next 4 hours.	TS 3.2.5
EVALUATOR NOTE:	The following procedure steps are from SOP-101, Reactor Coolant System Section V, Pressurizer PORV Tailpipe High Temperature. The US may direct closure of MVG-8000A based on panel indications that show the PORV PCV-445A with Red and Green lights lit and not enter SOP-101.	
RO	2.1 Observe the following computer points for any indication of valve seat leakage: - Pressurizer PORV Tailpipe Temperature (T1074). - PZR PORV PCV444B DISCH TEMP (T10753). - PZR PORV PCV445A DISCH TEMP (T10754). - PZR PORV PCV445B DISCH TEMP (T10755). "C" Pressurizer Safety Tailpipe Temperature (T1075). "B" Pressurizer Safety Tailpipe Temperature (T1076). "A" Pressurizer Safety Tailpipe Temperature (T1077).	SOP-101
RO	2.2 If the alarm is due to an increasing Pressurizer Safety Valve Tailpipe Temperature, go to the appropriate Annunciator Response Procedure. (NO)	SOP-101

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 4 Page: 24 of 51
Event Description: Pressurizer PORV develops seat leakage.

Time/ Position	Applicant's Actions or Behavior	
RO	2.3 If the cause of the high Pressurizer PORV Tailpipe Temperature cannot be determined using IPCS indication, perform the following to determine which PORV is leaking: a. Close MVG-8000A, RELIEF 445A ISOL. b. Close MVG-8000C, RELIEF 445B ISOL. c. Observe Pressurizer PORV Tailpipe Temperatures.	SOP-101
	NOTE 2.3.d If a PORV is leaking, the PORV Tailpipe Temperature should first decrease as the loop seal passes through and then begin to increase to the alarm set point.	SOP-101
RO	d. If Pressurizer PORV Tailpipe Temperatures decrease, then open MVG-8000C, RELIEF 445B ISOL otherwise proceed to Step 2.3.e. 2) If PORV Tailpipe Temperatures do not increase, then MVG-8000A, RELIEF 445A ISOL is the leaking PORV. Perform the following: a) Ensure that MVG-8000A, RELIEF 445A ISOL, remains closed. b) Proceed to step 2.4.	SOP-101
BOOTH OPERATOR:	If called, acknowledge request to evaluate PCV-445A, PZR PORV as Plant Support Engineering.	
US/RO	2.4 After determination and isolation of leaking the Pressurizer PORV, have Plant Support Engineering evaluate the leaking PORV.	SOP-101
BOOTH OPERATOR:	If called to remove power from MVG-8000A, acknowledge request. Wait 2 minutes and then insert TRIGGER 15 to remove power from MVG-8000A. TRIGGER 15 opens breaker 1DB2Y 03IM.	

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 4 Page: 25 of 51
Event Description: Pressurizer PORV develops seat leakage.

Time/ Position	Applicant's Actions or Behavior
US	Enters T.S. 3.4.4, REACTOR COOLANT SYSTEM – RELIEF VALVES. Action b: With one PORV inoperable and not capable of being manually cycled, within 1 hour: 1) restore the PORV(s) to OPERABLE status or to a condition where it may be manually cycled or 2) close its associated block valve and remove power from the block valve; otherwise, be in at least HOT STANDBY within the next 6hours and in HOTSHUTDOWN within the following 6 hours.
EVALUATOR NOTE:	The next event will be initiated at the discretion of the Lead Examiner.

TS 3.4.4

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 5 Page: 26 of 51

Event Description: PT-485, controlling SG pressure transmitter, fails low.

Time/ Position	Applicant's Actions or Behavior
EVALUATOR NOTE:	On cue from the Examiner the controlling Steam Generator Pressure channel on Steam Generator "B" will fail low. Controlling Steam Flow channel will lower and the Steam Generator Water level control system will respond by lowering feed water flow and Steam Generator level. The BOP responds to annunciator XCP- 624, 4-1 SG A STMLN Δ P HI and XCP- 624, 6-1 SG C STMLN Δ P HI and determines the cause of the event is an instrument failure. The BOP takes corrective action by swapping the controlling channels in accordance with immediate actions of AOP-401.3, Steam Flow - Feedwater Flow Protection Channel Failure.
BOOTH OPERATOR:	When directed – initiate Event 5 (TRIGGER 5)
Symptoms/Cues:	• XCP-624 4-1, SG A STMLN ΔP HI • XCP- 624, 6-1 SG C STMLN ΔP HI • XCP-624 6-4, SG B FWF>STF MISMATCH • "B" SG NR Level lowering.
US	Enters AOP-401.3, STEAM FLOW – FEEDWATER FLOW PROTECTION CHANNEL FAILURE.

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 5 Page: 27 of 51
 Event Description: PT-485, controlling SG pressure transmitter, fails low.

Time/ Position	Applicant's Actions or Behavior
	REFERENCE PAGE FOR Rev 5 AOP-401.3 1 <u>LOSS OF MAIN FEEDWATER FLOW</u> <u>IF</u> Feedwater flow is lost while Reactor Power is GREATER THAN 10%, and cannot be quickly restored from the MCB, <u>THEN</u> Trip the reactor and GO TO EOP-1.0, E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1. 2 <u>STEAM GENERATOR LEVEL CONTROL</u> a. <u>IF</u> Narrow Range Steam Generator Level decreases to LESS THAN 40% in <u>any</u> SG, <u>THEN</u> Trip the reactor and GO TO EOP-1.0, E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1. b. <u>IF</u> Reactor Power is GREATER THAN 15% and Narrow Range Steam Generator Level exceeds 75% in <u>any</u> SG, <u>THEN</u> Trip the reactor and GO TO EOP-1.0, E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1.
	<u>NOTE</u> Throughout this procedure, "AFFECTED" refers to any SG experiencing level control problems.
BOP (IOA)	1. Verify the failed channel is the controlling channel.
	<u>NOTE – Step 2</u> FW and STEAM CONTROL CHANNEL SEL Switches for a SG should be selected to the same direction (<u>both</u> to the left or <u>both</u> to the right).

AOP-401.3

AOP-401.3

AOP-401.3

AOP-401.3

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 1	Event # 5	Page: 28 of 51
Event Description: PT-485, controlling SG pressure transmitter, fails low.				
Time/ Position	Applicant's Actions or Behavior			
BOP (IOA)	2. Select the operable flow channel: - Place FW CONTROL CHANNEL SEL Switch to the operable channel. - Place STEAM CONTROL CHANNEL SEL Switch to the operable channel.			AOP-401.3
	<u>NOTE – Step 3</u> CTRL+ALT+S on <u>either</u> EHC HMI is equivalent to 50 MWe, and is the preferred method to accomplish a rapid load reduction.			AOP-401.3
BOP (IOA)	3. Verify Turbine Load is LESS THAN 950 MWe.			AOP-401.3
EVALUATOR NOTE:	Turbine Load will be < 950 MWe due to the previous load reduction.			
BOP	4. Verify only <u>one</u> SG is AFFECTED.			AOP-401.3
BOP	5. Adjust the Feedwater Flow Control Valve as necessary to restore feed flow to the AFFECTED SG.			AOP-401.3
BOP	6. Check if Feedwater Pump speed control is controlling properly: - Feedwater Header pressure is GREATER THAN Main Steam Header pressure. - Feed flow is normal for steam flow and power level. <u>All</u> operating Feedwater Pump speeds and flows are balanced.			AOP-401.3
BOP	7. Verify Narrow Range levels in <u>all</u> SGs are between 60% and 65%.			AOP-401.3
BOP	8. Restore the AFFECTED SG control systems to normal: - Place the Feedwater Flow Control Valve in AUTO. - Place the Feedwater Pump Speed Control System in AUTO. REFER TO SOP-210, FEEDWATER SYSTEM.			AOP-401.3
	<u>NOTE – Step 9</u> Steam flow transmitters FT-474, FT-484, FT-494, FT-475, FT-485, and FT-495 are density compensated by steam pressure transmitters PT-475, PT-485, PT-495, PT-476, PT-486, and PT-496.			AOP-401.3

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 5 Page: 29 of 51
 Event Description: PT-485, controlling SG pressure transmitter, fails low.

Time/ Position	Applicant's Actions or Behavior	
BOP	9. Perform the following: • Determine the failed instrument channel. • Record the time of the channel failure.	AOP-401.3
	<u>NOTE – Step 10</u> Compliance with T.S. requires tripping failed instrument channel bistables within 72 hours of the channel failure. Time should be allowed for troubleshooting of the failed channel prior to tripping the bistables.	AOP-401.3
US	*10. Place the failed channel protection bistables in a tripped condition within 72 hours of the channel failure: a) Write an R&R for the failed channel. b) Select the attachment for the failed channel from the back of the procedure. c) Record the R&R number on the attachment. d) Determine the cause of the channel failure. e) Notify the I&C Department to place the identified bistables in trip using the attachment.	AOP-401.3
Crew	11. Correct the cause of the channel failure	AOP-401.3
US	Enters Tech Spec 3.3.1 Reactor Trip System Instrumentation Table 3.3-1, Function 14; Steam/Feedwater Flow Mismatch and Low Steam Generator Water Level - Action 6. The inoperable channel must be placed in the tripped condition within 72 hours.	T.S. 3.3.1
US	Enters Tech Spec 3.3.2 Engineered Safety Feature Actuation System Instrumentation Table 3.3-3, Function 1.e; Differential Pressure between Steam Lines - High - Action 24. This Tech Spec also requires the inoperable channel must be placed in the tripped condition within 72 hours.	T.S. 3.3.2
EVALUATOR NOTE:	The next event will be initiated at the discretion of the Lead Examiner.	

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 30 of 51
 Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior
EVALUATOR NOTE:	On cue from the Examiner, a Large Break LOCA will be initiated. The reactor will trip and operators will take immediate actions of EOP-1.0. Both RHR pumps will fail to auto start. "B" Service Water Booster pump will fail to auto start. The crew will then transition to EOP-2.0. Once RWST level reaches 18%, the automatic swap of RHR pump suction to the Recirc sump will not occur. The crew will transition to EOP-2.2, ES-1.3 Transfer to Cold Leg Recirc. When the operator attempts to manually open the RHR sump suctions, the valves will open.
BOOTH OPERATOR:	When directed – initiate Event 6 (TRIGGER 6)
Symptoms/ Cues:	A reactor trip occurs due to the DBA LOCA.
US	Enters EOP-1.0, E-0 REACTOR TRIP OR SAFETY INJECTION. EOP-1.0
RO (IOA)	1. Verify Reactor Trip: • Trip the Reactor using either Reactor Trip Switch. • Verify all Reactor Trip and Bypass Breakers are open. • Verify all Rod Bottom Lights are lit. • Verify Reactor Power level is decreasing. EOP-1.0
RO (IOA)	2. Verify Turbine/Generator Trip: a. Verify all Turbine STM STOP VLVs are closed. b. Ensure Generator Trip (after 30 second delay): 1. Ensure the GEN BKR is open. 2. Ensure the GEN FIELD BKR is open. 3. Ensure the EXC FIELD CNTRL is tripped. EOP-1.0
RO (IOA)	3. Verify both ESF buses are energized. EOP-1.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 31 of 51
Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior

RO
(IOA)

4. Check if SI is actuated:

a. Check if either:

- SI ACT status light is bright on XCP-6107 1-1.

OR

- Any red first-out SI annunciator is lit on XCP-626 top row.

b. Actuate SI using either SI ACTUATION Switch.

c. GO TO Step 6.

EOP-1.0

REFERENCE PAGE FOR EOP-1.0

EOP-1.0

1 RCP TRIP CRITERIA

a. IF Phase B Containment Isolation has actuated (XCP-612 4-2), THEN trip all RCPs.

b. IF both of the following conditions occur, THEN trip all RCPs:

- SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM.

AND

- RCS Wide Range pressure is LESS THAN 1418 psig.

2 REDUCING CONTROL ROOM EMERGENCY VENTILATION

Reduce Control Room Emergency Ventilation to one train in operation within 30 minutes of actuation. REFER TO SOP-505, CONTROL BUILDING VENTILATION SYSTEM.

3 MONITOR SPENT FUEL COOLING

Periodically check status of Spent Fuel Cooling by monitoring the following throughout event recovery:

- Spent Fuel Pool level.
- Spent Fuel Pool temperature.

4 RUPTURED STEAM GENERATOR

IF a RUPTURED Steam Generator has been positively identified, THEN throttle EFW to the RUPTURED Steam Generator WHEN its Narrow Range Level is GREATER THAN 26%[41%].

5 FAULTED STEAM GENERATOR

• IF a FAULTED Steam Generator has been positively identified, THEN isolate EFW to the faulted Steam Generator as soon as possible UNLESS all three Steam Generators are FAULTED.

• IF all three Steam Generators are FAULTED, THEN throttle EFW flow to all three Steam Generators to 50 gpm.

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 32 of 51
Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior

EVALUATOR NOTE:	Attachment 3, SI Equipment Verification, is included for reference on Page 47 of 50.	EOP-1.0
EVALUATOR NOTE:	On the reactor trip and safety injection, both RHR Pumps will fail to auto start. Both RHR pumps can be started from the MCB. Critical Task is to start at least one RHR pump in injection mode prior to RVLIS Narrow Range Level decreasing to less than 34%.	EOP-1.0
EVALUATOR NOTE:	On the safety injection, the "B" Service Water Booster pump will fail to auto start. It can be started from the MCB.	EOP-1.0
BOP	6. Initiate ATTACHMENT 3, SI EQUIPMENT VERIFICATION.	EOP-1.0
CREW	7. Announce plant conditions over the page system.	EOP-1.0
RO	*8. Verify RB pressure has remained LESS THAN 12 psig on PR951, RB PSIG (P-951), red pen.	EOP-1.0
RO	*8. ALTERNATIVE ACTION Perform the following: a) Verify <u>both</u> the following annunciators are lit: • XCP-612 3-2 (RB SPR ACT). • XCP-612 4-2 (PHASE B ISOL). b) Verify RB SPRAY/PHASE B ISOL monitor lights are bright on XCP-6105. c) Ensure the following are open: • MVG-3001A(B), RWST TO SPRAY PUMP A(B) SUCT. • MVG-3002A(B), NAOH TO SPRAY PUMP A(B) SUCT. • MVG-3003A(B), SPRAY HDR ISOL LOOP A(B). d) Ensure <u>both</u> RB Spray Pumps are running. e) Verify RB Spray flow is GREATER THAN 2500 gpm for <u>each</u> operating train on: • FI-7368, SPR PP A DISCH FLOW GPM. • FI-7378, SPR PP B DISCH FLOW GPM. f) Stop <u>all</u> RCPs.	EOP-1.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 33 of 51
Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior

RO

***9. Check RCS temperature:**

- With any RCP running, RCS Tavg is stable at OR trending to 557°F.

OR

- With no RCP running, RCS Tcold is stable at OR trending to 557°F. **(NO)**

EOP-1.0

RO

***9. ALTERNATIVE ACTION**

IF RCS temperature is LESS THAN 557°F AND decreasing, THEN stabilize temperature by performing the following as required:

a) Close IPV-2231, MS/PEGGING STM TO DEAERATOR.

b) Perform one of the following:

- IF Narrow Range SG level is LESS THAN 26% [41%] in all SGs, THEN reduce EFW flow as necessary to stop cooldown, while maintaining total EFW flow GREATER THAN 450 gpm.

OR

- WHEN Narrow Range SG level is GREATER THAN 26% [41%] in at least one SG, THEN control EFW flow as necessary to stabilize RCS temperature at 557°F.

c) Initiate ATTACHMENT 6, STEAM VALVE ISOLATION, while continuing with this procedure.

d) IF RCS cooldown continues, THEN close:

- MS Isolation Valves, PVM-2801A(B)(C).
- MS Isolation Bypass Valves, PVM-2869A(B)(C).

EOP-1.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 34 of 51
 Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior
RO	10. Check PZR PORVs and Spray Valves: a. PZR PORVs are closed. b. PZR Spray Valves are closed. c. Verify power is available to at least one PZR PORV Block Valve: • MVG-8000A, RELIEF 445 A ISOL. • MVG-8000B, RELIEF 444 B ISOL. • MVG-8000C, RELIEF 445 B ISOL. d. Ensure one of the following Block Valves is open unless it was closed to isolate an open PZR PORV: • MVG-8000A, RELIEF 445 A ISOL. • MVG-8000B, RELIEF 444 B ISOL.
RO	<u>NOTE – Step 11</u> Seal Injection flow should be maintained to all RCPs. 11. Check if RCPs should be stopped: a. Check if either of the following criteria is met: • Annunciator XCP-612 4-2 is lit (PHASE B ISOL). OR • RCS pressure is LESS THAN 1418 psig AND SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. b. Stop all RCPs
RO/ BOP	12. Verify no SG is FAULTED: • No SG pressure is decreasing in an uncontrolled manner. • No SG is completely depressurized.
CREW	13. Verify Secondary radiation levels indicate SG tubes are NOT RUPTURED: • RM-G19A(B)(C), STMLN HI RNG GAMMA. • RM-A9, CNDSR EXHAUST GAS ATMOS MONITOR. • RM-L3, STEAM GENERATOR BLOWDOWN LIQUID MONITOR. • RM-L10, SG BLOWDOWN CW DISCHARGE LIQUID MONITOR.

EOP-1.0

EOP-1.0

EOP-1.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 35 of 51
Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior

RO/ BOP	14. Check if the RCS is INTACT: a. RB radiation levels are normal: • RM-G7, CNTMT HI RNG GAMMA. • RM-G18, CNTMT HI RNG GAMMA. b. RB Sump level are normal c. RB pressure is LESS THAN 1.5 psig. d. XCP-607 2-2 (RBCU DRN FLO HI) is <u>NOT</u> lit.	EOP-1.0

EVALUATOR NOTE:	The crew should transition to EOP-2.0, E-1, LOSS OF REACTOR OR SECONDARY COOLANT.	

US	Enters EOP-2.0, E-1, LOSS OF REACTOR OR SECONDARY COOLANT.	EOP-2.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 36 of 51
Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior

REFERENCE PAGE FOR EOP-2.0

EOP-2.0

1 SI REINITIATION CRITERIA

IF either of the following conditions occurs, THEN start Charging Pumps and operate valves as necessary:

- RCS subcooling on TI-499A(B), A(B) TEMP °F, is LESS THAN 52.5°F [67.5°F].
- PZR level can NOT be maintained GREATER THAN 10% [28%].

2 RCP TRIP CRITERIA

IF either of the following criteria is met, THEN trip all RCPs:

- Annunciator XCP-612 4-2 is lit (PHASE B ISOL).
- RCS pressure is LESS THAN 1418 psig AND SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM.

3 SECONDARY INTEGRITY TRANSITION CRITERIA

IF any unisolated SG pressure is decreasing in an uncontrolled manner OR is completely depressurized, THEN GO TO EOP-3.0, E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1.

4 TUBE RUPTURE TRANSITION CRITERIA

IF any SG level increases in an uncontrolled manner OR if any SG has abnormal radiation, THEN start Charging Pumps and operate valves as necessary, and GO TO EOP-4.0, E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.

5 COLD LEG RECIRCULATION TRANSITION CRITERION

IF RWST level decreases to LESS THAN 18%, THEN GO TO EOP-2.2, ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, Step 1.

6 LOSS OF EMERGENCY COOLANT RECIRCULATION TRANSITION CRITERION

IF Emergency Coolant Recirculation is established and subsequently lost, THEN GO TO EOP-2.4, ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION, Step 1.

7 REDUCING CONTROL ROOM EMERGENCY VENTILATION

Reduce Control Room Emergency Ventilation to one train in operation within 30 minutes of actuation. REFER TO SOP-505, CONTROL BUILDING VENTILATION SYSTEM.

NOTE

Seal Injection flow should be maintained to all RCPs.

EOP-2.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 37 of 51
 Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior	
RO	1. Check if RCPs should be stopped: a. Check if <u>either</u> of the following criteria are met: - Annunciator XCP-612 4-2 is lit (PHASE B ISOL). <u>OR</u> - RCS pressure is LESS THAN 1418 psig <u>AND</u> SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. b. Stop <u>all</u> RCPs.	EOP-2.0
BOP	2. Verify <u>no</u> SG is FAULTED: <u>No</u> SG pressure is decreasing in an uncontrolled manner. <u>No</u> SG is completely depressurized.	EOP-2.0
BOP	*3. Check INTACT SG levels: - Verify Narrow Range level in INTACT SGs is GREATER THAN 26% [41%]. - Control EFW flow to maintain Narrow Range level in <u>each</u> INTACT SG between 26% [41%] and 60%.	EOP-2.0
RO	4. Reset <u>both</u> SI RESET TRAIN A(B) Switches.	EOP-2.0
RO	5. Reset Containment Isolation: - RESET PHASE A – TRAIN A(B) CNTMT ISOL. - RESET PHASE B – TRAIN A(B) CNTMT ISOL.	EOP-2.0
BOP	6. Check if Secondary radiation levels are normal: - Check radiation levels normal on: - RM-G19A(B)(C), STMLN HI RNG GAMMA. - RM-A9, CNDSR EXHAUST GAS ATMOS MONITOR. - RM-L3, STEAM GENERATOR BLOWDOWN LIQUID MONITOR. - RM-L10, SG BLOWDOWN CW DISCHARGE LIQUID MONITOR. - Place SVX-9398A(B)(C), SG A(B)(C) SMPL ISOL, in AUTO. - Notify Chemistry to sample <u>all</u> SG secondary sides, and screen samples for abnormal activity using a frisker.	EOP-2.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 1	Event # 6	Page: 38 of 51
Event Description: LBLOCA.				
Time/ Position		Applicant's Actions or Behavior		
RO	*7. Check PZR PORVs and Block Valves: a. Verify power is available to the PZR PORV Block Valves: 1) MVG-8000A, RELIEF 445 A ISOL. 2) MVG-8000B, RELIEF 444 B ISOL. 3) MVG-8000C, RELIEF 445 B ISOL.			
	<u>CAUTION – Step 7.b</u> If <u>any</u> PZR PORV opens because of high PZR pressure, Step 7.b should be repeated after pressure decreases to LESS THAN 2330 psig, to ensure the PORV recloses.			
RO	b. Verify <u>all</u> PZR PORVs are closed. c. Verify at least <u>one</u> PZR PORV Block Valve is open.			
BOP	8. Place <u>both</u> ESF LOADING SEQ A(B) RESETS to: a. NON-ESF LCKOUTS. b. AUTO-START BLOCKS.			
RO	9. Establish Instrument Air to the RB: a. Start <u>one</u> Instrument Air Compressor and place the other in Standby. b. Verify PI-8342, INSTR AIR HDR PRESS PSIG, indicates GREATER THAN 60 psig. c. Open PVA-2659, INST AIR TO RB AIR SERV. d. Open PVT-2660. AIR SPLY TO RB.			
RO	*10. Check if SI flow should be reduced: a. RCS subcooling on TI-499A(B), A(B) TEMP °F, is GREATER THAN 52.5°F [67.5°F].			
RO	*10. ALTERNATIVE ACTION a. GO TO Step 11.			

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 39 of 51
 Event Description: LBLOCA.

Time/ Position Applicant's Actions or Behavior

- RO *11. Check if RB Spray should be stopped:
- a. Check if any RB Spray Pumps are running.
 - b. Determine the number of RB Spray Pumps required from the table below:

REACTOR BUILDING PRESSURE	RBCUs RUNNING IN EMERGENCY MODE	SPRAY PUMPS REQUIRED
GREATER THAN 55 psig	0, 1 or 2	2
BETWEEN 11 psig and 55 psig AND increasing	0, 1 or 2	2
BETWEEN 11 psig and 55 psig AND decreasing.	0 or 1	2
	2	1
LESS THAN 11 psig	0, 1 or 2	0

- RO
- c. Check if the number of RB Spray Pumps is GREATER THAN the number required.
 - d. Check if at least two RB Spray Pumps are running.
 - e. Depress both RESET TRAIN A(B) RB SPRAY.
 - f. Reduce the number of running RB Spray Pumps:
 - 1) Stop one RB Spray Pump and place in Standby.
 - 2) Close the discharge valve for the RB Spray Pump that was just secured.
 - MVG-3003A, SPRAY HDR ISOL LOOP A.
 - MVG-3003B, SPRAY HDR ISOL LOOP B.
 - g. Check if the last RB Spray Pump can be secured:
 - 1) Verify that RB pressure is LESS THAN 11 psig.

- RO 11. **ALTERNATIVE ACTION**
- g. CONTINUE with Step 12. Observe the CAUTION prior to Step 12.
- WHEN RB Spray termination criteria are met, THEN COMPLETE Step 11.h.

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 40 of 51
 Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior	
	<u>CAUTION – Step 12</u> RCS pressure should be monitored. If RCS pressure decreases in an uncontrolled manner to LESS THAN 325 psig, the RHR Pumps must be manually restarted to supply water to the RCS.	EOP-2.0
RO	12. Check if RHR Pumps should be stopped: a. Check RCS pressure: 1) RCS pressure is GREATER THAN 325 psig.	EOP-2.0
RO	12. ALTERNATIVE ACTION 1) GO TO Step 15. Observe the CAUTION prior to Step 15.	EOP-2.0
	<u>CAUTION – Step 15</u> The DGs should NOT be run at a minimum load or unloaded for extended periods of time, to prevent carbon fouling.	EOP-2.0
BOP	15. Check if DGs should be stopped: a. Verify <u>both</u> ESF buses are energized by offsite power. b. Stop <u>any</u> unloaded DG. REFER TO SOP-306, EMERGENCY DIESEL GENERATION.	EOP-2.0
RO	16. Verify equipment is available for Cold Leg Recirculation: a. Verify A Train equipment available: 1) XPP0031A-RH, RESIDUAL HEAT REMOVAL PUMP A. 2) XVG08809A-SI, REFUEL WTR STG TK RH PUMP A SUCT VLV. 3) XVG08811A-SI, CNTMT SUMP RH PUMP A SUCT ISOL VALVE. 4) XVG08812A-SI, RH PUMP A SUCTION HEADER VALVE. 5) <u>One</u> Train A Charging Pump: • XPP0043A CHARGING/SI PUMP A. <u>OR</u> • XPP0043C CHARGING/SI PUMP C (TRAIN A). 6) LCV00115B-CS, CHG PUMP A SUCTION HDR RWST HDR ISOL VALVE. 7) XVG08706A-RH, CHG/SI PUMP SUCT HDR RH HDR A(B) INLET VLV.	EOP-2.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 41 of 51
 Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior

RO	b. Verify B Train equipment available: 1) XPP0031B-RH, RESIDUAL HEAT REMOVAL PUMP B. 2) XVG08809B-SI, REFUEL WTR STG TK RH PUMP B SUCT VLV. 3) XVG08811B-SI, CNTMT SUMP RH PUMP B SUCT ISOL VALVE. 4) XVG08812B-SI, RH PUMP B SUCTION HEADER VALVE. 5) <u>One</u> Train B Charging Pump: - XPP0043B CHARGING/SI PUMP B. <u>OR</u> - XPP0043C CHARGING/SI PUMP C (TRAIN B). 6) LCV00115D-CS, CHG PUMP A SUCTION HDR RWST HDR ISOL VALVE. 7) XVG08706B-RH, CHG/SI PUMP SUCT HDR RH HDR A(B) INLET VLV.	EOP-2.0
RO	c. Open <u>both</u> MVG-9503A(B), CC TO RHR HX A(B).	EOP-2.0
	<u>CAUTION – Step 16.d</u> - If the swing CCW Pump is NOT available, the running pump should NOT be secured to shift it to fast speed, to prevent damage to the Charging Pump on that train. - If CCW can NOT be shifted to fast speed, this procedure should be continued. CCW alignment will be addressed in EOP-2.2, ES-1.3, TRANSFER TO COLD LEG RECIRCULATION.	EOP-2.0
RO	d. Shift the CCW Train to fast speed in the Active Loop. REFER TO SOP-118, COMPONENT COOLING WATER. e. Consult with the TSC personnel to determine if equipment required for Cold Leg Recirculation is available.	EOP-2.0
BOOTH INSTRUCTOR:	When called as TSC, acknowledge request.	
	<u>NOTE – Step 17</u> Presence of abnormally high levels of radioactivity in the AB indicates that a Containment breach may be in progress. Conditions for upgrading the Emergency status should be evaluated using EPP-001, ACTIVATION AND IMPLEMENTATION OF EMERGENCY PLAN.	EOP-2.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 42 of 51
 Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior	
BOP	17. Check the AB for evidence of ECCS leakage: a. Verify AB radiation levels are normal on: • RM-A3, MAIN PLANT VENT EXH ATMOS MONITOR: PARTICULATE, IODINE, GAS. • RM-A13, PLANT VENT HI RANGE. • RM-A11, AB VENT GAS ATMOS MONITOR. • Local area monitors. b. Verify annunciator XCP-631 6-1 is <u>NOT</u> lit (AB SMP LVL HI). c. Verify annunciators XCP-606 3-4 and XCP-607 3-4 are <u>NOT</u> lit (LD TRBL AB SMP/FLDRN LVL HI). d. Verify annunciators XCP-606 3-1 and XCP-607 3-1 are <u>NOT</u> lit (LTDN LD TEMP HI).	EOP-2.0
RO	18. Obtain necessary Chemistry samples: a. Ensure <u>all</u> RCS sample valves are in AUTO: • SVX-9364B and SVX-9365B, RCS LP B SMPL ISOL. • SVX-9364C and SVX-9365C, RCS LP C SMPL ISOL. b. Notify Chemistry to sample the following: • RCS. • <u>All</u> SGs for isotopic activity.	EOP-2.0
BOP	19. Shut down and stabilize the Secondary Plant. REFER TO AOP-214.1, TURBINE TRIP.	EOP-2.0
RO	20. Check if RCS cooldown and depressurization is required: a. RCS pressure is GREATER THAN 325 psig.	EOP-2.0
RO	20. ALTERNATIVE ACTION a. <u>IF</u> RHR Pump flow is GREATER THAN 1100 gpm, <u>THEN</u> GO TO Step 21. Observe the CAUTION prior to Step 21.	EOP-2.0
	<u>CAUTION – Step 21</u> Switchover to recirculation may cause high radiation in the AB.	EOP-2.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 43 of 51
Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior

RO	21. Check if transfer to Cold Leg Recirculation is required: a. RWST level is LESS THAN 18%. b. GO TO EOP-2.2, ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, Step 1.	EOP-2.0
EVALUATOR NOTE:	The crew should transition to EOP-2.2, ES-1.3, TRANSFER TO COLD LEG RECIRCULATION. If RWST level < 18% prior to Step 21, the crew should transition to EOP-2.2 based upon the Reference Page.	
RO	<u>CAUTION</u> If the suction source is lost to <u>any</u> SI <u>OR</u> RB Spray Pump, the AFFECTED pump should be stopped to prevent pump damage.	EOP-2.2
RO	<u>NOTE</u> Procedures referenced from the Critical Safety Function status trees should <u>NOT</u> be implemented prior to completion of Step 14.	EOP-2.2
RO	*1. <u>IF</u> it is known that <u>any</u> pump suction can <u>NOT</u> be transferred from the RWST, <u>THEN</u> place that pump in PULL TO LK NON-A, to delay RWST depletion.	EOP-2.2
RO	*2. Verify that RWST level is GREATER THAN 10%.	EOP-2.2
RO	3. Verify RHR Sump level is GREATER THAN 414 ft. • LI-1969, RHR SUMP A LEVEL FEET. • LI-1970, RHR SUMP B LEVEL FEET.	EOP-2.2

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 44 of 51
Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior

RO Critical Task	4. Align RHR to the Sumps: • For Train A: a. Ensure <u>both</u> MVG-8811A and MVG-8812A, RHR SUMP A TO RHR PP A, are open. b. Ensure MVG-8809A, RWST TO RHR PP A, is closed. • For Train B: a. Ensure <u>both</u> MVG-8811B and MVG-8812B, RHR SUMP B TO RHR PP B, are open. b. Ensure MVG-8809B, RWST TO RHR PP B, is closed.
EVALUATOR NOTE:	When RWST level < 18%, the RHR suction valves from the RHR Sump on Train A and B will fail to open, but can be opened from the MCB. Critical Task is to realign any running ECCS pump to the RHR Sump prior to RWST level lowering below 10%.
EVALUATOR NOTE:	The scenario may be terminated when the crew has aligned Charging Pumps for Cold Leg Recirculation in EOP-2.2 or at the discretion of the Lead Examiner.

EOP-2.2

Form 3.3-2 Required Operator Actions

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Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior

EVALUTOR NOTE	THESE ARE THE STEPS OF AOP-118.1.
US	Enters AOP-118.1, LOSS OF COMPONENT COOLING WATER.
	REFERENCE PAGE FOR AOP-118.1 1 <u>Reactor Trip:</u> <u>IF</u> a Reactor Trip occurs, this procedure should be continued concurrently with the recovery actions of EOP-1.0, E-0, REACTOR TRIP OR SAFETY INJECTION. 2 <u>Charging Pump Operation:</u> <u>Any</u> Charging Pump can be started or continue to be operated on a loss of Component Cooling Water to its oil coolers within <u>one</u> of the following limitations: • 20 minutes without local Charging Pump temperature monitoring. <u>OR</u> • <u>No</u> time limit as long as <u>any</u> maximum temperature of ATTACHMENT 5, CHARGING PUMP TEMPERATURE MONITORING, is <u>NOT</u> exceeded <u>AND</u> local Charging Pump temperature monitoring remains in place. 3 <u>Reactor Coolant Pump Operation With Degraded Component Cooling Water System Operation:</u> <u>Any</u> running Reactor Coolant Pump should be stopped if <u>any</u> of the following conditions exist: a. Component Cooling Water flow to the motor bearing coolers can <u>NOT</u> be restored within <u>ten</u> minutes. b. Motor Bearing temperature exceeds 195°F. c. Lower Seal Water Bearing Temperature exceeds 225°F. d. CBO temperature exceeds 250°F. 4 <u>WHEN a CCW pump is restored to service, THEN GO TO procedure Step 26.</u>

AOP-118.1

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 46 of 51
 Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior	
RO	1. Determine the cause for the loss of CCW: a. Check for annunciators on XCP-601, 602, and 603. b. REFER TO the appropriate ARPs. c. Attempt to correct the cause for loss of CCW.	AOP-118.1
EVALUATOR NOTE	Per XCP-601 1-2, CCP A/C AUTOSTART FAIL, the crew starts "C" CCW Pump.	
RO	2. Verify CCW Surge Tank level is stable <u>AND</u> <u>no</u> makeup is in progress.	AOP-118.1
RO	3. Establish <u>either</u> train of CCW as the Active Loop. REFER TO SOP-118, COMPONENT COOLING WATER.	AOP-118.1
RO	4. Check if at last <u>one</u> CCW loop is restored: a. At least <u>one</u> CCW Pump is running. b. CCW Pump discharge pressure is GREATER THAN 60 psig. - PI-7032, LOOP A DISCH PRESS PSIG. - PI-7042, LOOP B DISCH PRESS PSIG. c. CCW loop flow is GREATER THAN 4500 gpm: - FM-7030, A CCW LOOP (IUR14400, M3/SW 2-1). - FM-7040, B CCW LOOP (IUR14401, M4/SW 2-1).	AOP-118.1
RO	5. Check CCW flow to the Reactor Coolant Pumps: a. Verify CCW flow to the RCP Thermal Barriers is GREATER THAN 110 gpm on FI-7273A(B) THERM BARR FLOW GPM. b. Verify CCW flow to the RCP Bearing Coolers is GREATER THAN 400 gpm on FI-7263A(B), BRG FLOW GPM.	AOP-118.1
RO	6. Verify <u>both</u> trains of CCW are operable.	AOP-118.1
RO	7. If necessary, place Charging and Normal Letdown in service. REFER TO SOP-102, CHEMICAL AND VOLUME CONTROL SYSTEM.	AOP-118.1

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 47 of 51
 Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior	
RO	8. Verify letdown is in a normal line up: a. Letdown Isolation Valves are open: 1) LCV-459, LTDN LINE ISOL. 2) LCV-460, LTDN LINE ISOL. b. The desired Orifice Isolation Valve(s) are open to obtain 60 gpm to 120 gpm: • PVT-8149A, LTDN ORIFICE A ISOL (45 gpm). • PVT-8149B, LTDN ORIFICE B ISOL (60 gpm). • PVT-8149C, LTDN ORIFICE C ISOL (60 gpm). c. PCV-145, LO PRESS LTDN, is controlling in AUTO. d. PVT-8152, LTDN LINE ISOL is open. e. TCV-143, LTDN TO VCT OR DEMIN, in is in the DEMIN/AUTO position. f. TCV-144, CC TO LTDN HX, is controlling in AUTO.	AOP-118.1
RO	9. If necessary, restore normal CCW cooling to the AFFECTED Charging Pump(s). a. Start a Charging Pump that is supplied by CCW. REFER TO SOP-102, CHEMICAL AND VOLUME CONTROL SYSTEM. b. Stop the AFFECTED Charging Pump. REFER TO SOP-102, CHEMICAL AND VOLUME CONTROL SYSTEM. c. Perform the RETURN AS FOUND line up per the appropriate AOP-118.1, LOSS OF COMPONENT COOLING WATER, ATTACHMENT used for alternate cooling. d. Restore the AFFECTED Charging Pump to service. REFER TO SOP-102, CHEMICAL AND VOLUME CONTROL SYSTEM.	AOP-118.1
EVALUATOR NOTE:	Normal CCW Flow has been restored. The US does not need to perform this step.	
US	10. RETURN TO the Procedure and Step in effect.	AOP-118.1

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 48 of 51
Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior	
EVALUTOR NOTE:	THESE ARE THE STEPS OF EOP-1.0, ATTACHMENT 3	
BOP	1	Ensure EFW Pumps are running: a. Ensure both MD EFW Pumps are running. b. Verify the TD EFW Pump is running if necessary to maintain SG levels.
BOP	2	Ensure the following EFW valves are open: • FCV-3531(3541)(3551), MD EFP TO SG A(B)(C). • FCV-3536(3546)(3556), TD EFP TO SG A(B)(C). • MVG-2802A(B), MS LOOP B(C) TO TD EFP.
BOP	3	Verify total EFW flow is GREATER THAN 450 gpm.
BOP	4	Ensure FW Isolation: a. Ensure the following are closed: • FW Flow Control, FCV-478(488)(498). • FW Isolation, PVG-1611A(B)(C). • FW Flow Control Bypass, FCV-3321(3331)(3341). • SG Blowdown, PVG-503A(B)(C). • SG Sample, SVX-9398A(B)(C). b. Ensure all Main FW Pumps are tripped.
BOP Critical Task	5	Ensure SI Pumps are running: • Two Charging Pumps are running. • Both RHR Pumps are running.
EVALUATOR NOTE:	Both RHR Pumps will fail to auto-start. They can be started on this step or when recognized that they failed to start from an auto-start signal per OP-AP-100. Critical Task is to start at least one RHR pump in injection mode prior to RVLIS Narrow Range Level decreasing to less than 34%.	
BOP	6	Ensure two RBCU Fans are running in slow speed (one per train).

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 49 of 51
Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior	
BOP	7	Verify Service Water flow to RBCUs: a. Ensure Service Water Pump A is running. b. Check if Service Water Booster Pump A is running. c. GO TO Step 7.f. f. Ensure Service Water Pump B is running. g. Check if Service Water Booster Pump B is running. ALTERNATIVE ACTION g. GO TO Step 7.i. i. Verify <u>both</u> of the following: • XVB-3107B, RBCU 64B/65B RTN TO SW PND is closed. <u>AND</u> • Alarm XCP-605 1-5 XVB3107B-SW SLOW CLOSURE is <u>NOT</u> lit. j. Start Service Water Booster Pump B. k. Verify GREATER THAN 2000 gpm flow for each train on: (NO) • FI-4466, SWBP A DISCH FLOW GPM. • FI-4496, SWBP B DISCH FLOW GPM. ALTERNATIVE ACTION k. Consult with TSC personnel for evaluation.
BOP	8	Ensure one CCW pump per train is running.
BOP	9	Ensure two Chilled Water Pumps and Chillers are running.
BOP	10	Verify both trains of Control Room Ventilation are running in Emergency Mode.

Attachment 3

Attachment 3

Attachment 3

Attachment 3

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 1 Event # 6 Page: 50 of 51
Event Description: LBLOCA.

Time/ Position	Applicant's Actions or Behavior
BOP	11 Check if Main Steamlines should be isolated: a. Check if any of the following conditions are met: • RB pressure GREATER THAN 6.35 psig. OR • Steamline pressure LESS THAN 675 psig. OR • Steamline flow GREATER THAN 1.6 MPPH AND Tavg LESS THAN 552°F. b. Ensure all the following are closed: • MS Isolation Valves, PVM-2801A(B)(C). • MS Isolation Bypass Valves, PVM-2869A(B)(C).
BOP	12 Ensure Excess Letdown Isolation Valves are closed: • PVT-8153, XS LTDN ISOL. • PVT-8154, XS LTDN ISOL.
BOP	13 Verify ESF monitor lights indicate Phase A AND Containment Ventilation Isolation on XCP-6103, 6104, and 6106. REFER TO ATTACHMENT 4, CONTAINMENT ISOLATION VALVE MCB STATUS LIGHT LOCATIONS, as needed.
BOP	14. Verify proper SI alignment: a. Verify SI valve alignment by verifying SAFETY INJECTION/PHASE A ISOL monitor lights are bright on XCP-6104. b. Verify <u>all</u> SAFETY INJECTION monitor lights are dim on XCP-6106. c. Verify SI flow on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. d. Check if RCS pressure is LESS THAN 325 psig. e. Verify RHR flow on: • FI-605A, RHR DISCHARGE PUMP A FLOW GPM. <u>AND</u> • FI-605B, RHR DISCHARGE PUMP B FLOW GPM. f. Notify the CRS that ATTACHMENT 3, SI EQUIPMENT VERIFICATION, is complete.

Attachment 3

Attachment 3

Attachment 3

Attachment 3

Form 3.3-2 Required Operator Actions

Op Test No: 2021 NRC

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Procedure Revisions used in this Scenario Guide			
Number	Title	Rev	Date
STP-127.001	PRESSURIZER BLOCK VALVE OPERABILITY TEST	8C	6/17/16
GOP-4C	RAPID POWER REDUCTION	1F	12/9/22
SOP-101	REACTOR COOLANT SYSTEM	32I	5/2/23
SOP-106	REACTOR MAKEUP WATER SYSTEM	12B	7/11/19
SOP-214	MAIN TURBINE AND CONTROLS	22	3/8/23
XCP-601	ANNUNCIATOR RESPONSE PROCEDURE	6B	9/15/20
XCP-616	ANNUNCIATOR RESPONSE PROCEDURE	7D	8/16/20
XCP-625	ANNUNCIATOR RESPONSE PROCEDURE	9	11/21/15
AOP-401.3	STEAM FLOW – FEEDWATER FLOW PROTECTION CHANNEL FAILURE	5	1/11/23
EOP-1.0	E-0, REACTOR TRIP OR SAFETY INJECTION	32	7/15/21
EOP-2.0	E-1, LOSS OF REACTOR OR SECONDARY COOLANT	18	2/5/20
EOP-2.2	ES-1.3, TRANSFER TO COLD LEG RECIRCULATION	19	2/5/20
	V.C. SUMMER TECHNICAL SPECIFICATIONS	223	11/10/22

Form 3.3-1 Scenario Outline

Facility:	VC SUMMER	Scenario #:	#2
Scenario Source:	New	Op. Test #:	ILO 22-01 NRC-2023
Examiners:	Applicants/ Operators:		
_____	_____		
_____	_____		
_____	_____		
Initial Conditions:	- Reactor power is 90%. "B" train work week. - XFN-0065B RBCU is OOS.		
Turnover:	Reduce power to 85% at 1/2% per minute in accordance with GOP-4B POWER OPERATION (MODE 1 - DESCENDING).		
Critical Tasks:	- Manually trip the reactor when it fails to AUTO trip with three faulted Steam Generators before SG WR < 12%. - Control the EFW flowrate (minimum of 50 gpm to each SG < 26% level) and terminate SI, in order to minimize the RCS cooldown rate before a severe (orange-path) challenge develops to the Integrity Critical Safety Function Status Tree.		

Event No.	Malfunction No.	Event Type*	Event Description
1	N/A	R-OATC, N-BOP, US	Decrease reactor power to 85%.
2	MAL-RCS008G MAL-RCS008H	TS-US	RCS Loop C T _{HOT} RTD Fails low.
3#	PMP-SW002B	C-RO, US TS-US	Service Water Pump B Bearing failure (Non-Active Train) (2019 NRC scenario #1)
4	OVR-CW019B	I/MC-BOP, US	ALT CLR TEMP Controller fails low.
5	MAL-CCW004	I/MC-OATC, US	TCV-144 fails closed, Letdown temperature control in manual.

Form 3.3-1 Scenario Outline

6	ANN-EG017	C-BOP, US	XTF-2 trouble alarm, transfer BOP busses to alt power.
7	MAL-AUX009BA MAL-AUX009BB MAL-AUX009BC MAL-MSS004A MAL-MSS006A MAL-MSS006B MAL-MSS006C MAL-PCS009AB MAL-PCS009BB MAL-TUR001	M-All	Earthquake Turbine Trip, "A" SG Faults and the MSIVs fail to close automatically or manually. ATWS, can be tripped from the Control Room.
TERMINATE: The scenario may be terminated once the crew has terminated Safety Injection in accordance with EOP-3.1, ECA-2.1, Uncontrolled Depressurization of all Steam Generators or at the discretion of the Lead Examiner.			
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control			

Used on previous two NRC Exams.

The following notation is used in the Form 3.3-2 "Time" column:

IOA designates Immediate Operator Action steps.

***** designates Continuous Action steps.

TURNOVER:

The crew will assume the watch having been pre-briefed on the Initial Conditions, the plan for this shift and any related operating procedures.

Train "B" RBCU, XFN-0065B is tagged out for breaker maintenance and is to be returned to service next shift.

The Unit is at 90% power MOL.

The Main Turbine is at Set Load.

132 gal of Boric Acid have been added.

The crew will be instructed to reduce power to 85% at 1/2% per minute in accordance with GOP-4B, Power Operation (Mode 1 - Descending) to remove 'A' Circ Water Pump for maintenance.

Phoenix display monitor is out of service. The Shift Engineer is tracking all necessary actions in Work Control.

Current RCS Boron concentration by chemistry is 1060 ppm.

Pre-loaded Items

- OVR-AH023A
CS-AH279 RBCU FAN 65B SLOW SPEED GREEN L
FINAL: OFF
- OVR-AH022A
CS-AH280 RBCU FAN 65B FAST SPEED GREEN L
FINAL: OFF

EVENT 1: Lower reactor power.

The crew will take the shift and immediately commence the down power in accordance with GOP-4B, Power Operation (Mode 1 Descending). The US will direct a power decrease at 1/2% per minute and provide oversight during the load decrease. The RO will adjust RCS boron in accordance with a reactivity plan while the BOP operates Turbine EHC system controls to decrease turbine load. Once power has been reduced sufficiently for the chief examiner, the next event may be inserted.

EVENT 2: RCS Loop C THOT RTD Fails low

- **TRIGGER 2**
 - o MAL-RCS008G
RCS RTD FAILURE (LOOP 3 – HOT LEG) 432B1
FINAL: 530
 - o MAL-RCS008H
RCS RTD FAILURE (LOOP 3 – HOT LEG) 432B2
FINAL: 530

On cue from the Examiner, two (2) Loop C THOT RTDs will fail Low. The crew will respond in accordance with XCP-615, 1-2, RCS TAVG LO, which will have them implement AOP-401.2, Protection Channel RCS Loop RTD Failure. They will identify the failed RTD and ensure an operable loop is selected on ΔT TR-412 Input Switch. Once the Tech Spec has been identified, the next event may be inserted.

EVENT 3: Service Water Pump “B” bearing failure (Non-Active Train)

- **TRIGGER 3**
 - o PMP-SW002B
XPP0039B SW PMP B BRG FAILURE
FINAL: 5
- **TRIGGER 10**
 - o LOA-AUX077
CELL SWITCH OF SERVICE WATER PUMP C TRAIN B
FINAL: RACK IN
DELAY: 15 sec
- LOA-AUX003
SW PMP C ISOL TAIN A – 3118A
FINAL: 0
RAMP: 5 sec
- LOA-AUX004
SW PMP C ISOL TRAIN B – 3118B
FINAL: 1
DELAY: 5 sec
RAMP: 5 sec
- LOA-AUX001
SERVICE WATER PUMP C DISCONNECT SWITCH
FINAL: TRAIN B
DELAY: 10 sec
- **TRIGGER 11**
 - o LOA-AUX075
CELL SWITCH OF SERVICE WATER PUMP B
FINAL: RACK OUT

On cue from the examiner, the “B” Service Water Pump bearing will fail causing an indication of a pump overload that will require the candidates to trip the pump. The crew will enter AOP-117.1, LOSS OF SERVICE WATER and rack up the “C” Service Water Pump to restore cooling.

Tech Spec 3.7.4 Action Statement requires: With only one service water loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

Once the crew has restored Service Water with the “C” Service Water pump and identified the Tech Spec, the next event may be inserted.

EVENT 4: ALT Cooler Temp controller output will fail to 0.

- **TRIGGER 4**
 - o CNH-TA004O
ALT CLR TMP OUTPUT
FINAL: 0
- **TRIGGER 12**
 - o LOA-TUR005
GEN AUX PNL XPN-7201 ALARM RESET
FINAL: RESET
- **AUTO TRIGGER 14** x11o063m (ALT CLR MAN LIGHT)
 - o CNH-TA004O
ALT CLR TMP OUTPUT
FINAL: 0
DELETE IN: 1 sec

On cue from the Examiner, the ALT COOLER TEMP controller will fail to 0 output. This will cause XCP-632 3-2 and XCP-632 3-3 to alarm. TI-4270 will be reading >120°F. The BOP will take manual control of this controller and return TI-4270 back into its normal control band. This will be performed in accordance with XCP-632 3-2. Once TI-4270 is back into its normal control band, the next event may be inserted.

EVENT 5: Letdown temperature control valve controller fails to 0% (Closed).

- **TRIGGER 5**
 - o MAL-CCW004
CCW TO LETDOWN HEAT EXCHANGER TCV-144 CONTROLLER FAILURE
FINAL: 0

On cue from the Examiner the Controller for TCV-144, CCW to Letdown HX, fails low in AUTO. The controller will close the temperature control valve causing letdown temperature to rise. Annunciators XCP-613 1-2 DEMIN FLO DIVERT TEMP HI and XCP-603 1-5, LTDN/SL WTR HX FLO LO TEMP HI will be referenced. The RO will take manual control to restore CCW flow to the Letdown Heat Exchanger. Once the RO has restored CCW flow to the Letdown Heat Exchanger and temperatures have stabilized, the next event may be inserted.

EVENT 6: Unit Aux Transformer trouble, transfer BOP busses.

- **TRIGGER 6**
 - o ANN-EG017
UNIT AUX XFMR XTF-2 TRBL
FINAL: ON
- **AUTO-TRIGGER 13** x12i080t (BUS 1C NORM FEED TO TRIP)
 - o ANN-EG017 (NEW)
UNIT AUX XFMR XTF-2 TRBL
FINAL: ON
DELETE IN: 300 sec

On cue from the Examiner, XCP-633 6-3, UNIT AUX XFMR XTF-2 TRBL will come into alarm. The crew will send an AO out to inspect the transformer. Winding temperatures will be reported back as 122°C and slowly rising. In accordance with XCP-633 6-3, the BOP will transfer loads to the emergency auxiliary transformer per SOP-304. Once this has occurred, temperatures will lower on XTF-2 and the alarm will be cleared. Once BOP loads have been transferred to the emergency auxiliary transformer, the next event may be inserted.

EVENT 7: Earthquake leading to all three Steam Generators being faulted and an ATWS

- **PRELOAD**
 - o MAL-PCS009AB
REACTOR TRIP BREAKER A FAILURE (FAIL TO OPEN)
FINAL: AUTO
 - o MAL-PCS009BB
REACTOR TRIP BREAKER B FAILURE (FAIL TO OPEN)
FINAL: AUTO
- **AUTO TRIGGER 7** x12i080t (BUS 1C NORM FEED TO TRIP)
 - o MAL-TUR001
INADVERTENT TURBINE TRIP
DELAY: 30 sec
 - o MAL-AUX009BA
SEISMIC EVENT EARTHQUAKE FULL O.B.E.(NORTH/SOUTH HORIZONTAL)
FINAL: 25.4
DELAY: 30 sec
 - o MAL-AUX009BB
SEISMIC EVENT EARTHQUAKE FULL O.B.E.(UP/DOWN VERTICAL)
FINAL: 25.4
DELAY: 30 sec
 - o MAL-AUX009BC
SEISMIC EVENT EARTHQUAKE FULL O.B.E.(EAST/WEST HORIZONTAL)
FINAL: 25.4
DELAY: 30 sec

Form 3.3-1 Scenario Outline

- o MAL-MSS004A
STEAMLINE S/G A BREAK OUTSIDE CONTAINMENT
FINAL = 1.25E6 lbm/hr
DELAY: 30 sec
RAMP: 15 sec
- o MAL-MSS006A
MAIN STEAM ISOLATION VALVE (S/G A) FAILURE
FINAL: FAILURE TO CLOSE
- o MAL-MSS006B
MAIN STEAM ISOLATION VALVE (S/G B) FAILURE
FINAL: FAILURE TO CLOSE
- o MAL-MSS006C
MAIN STEAM ISOLATION VALVE (S/G A) FAILURE
FINAL: FAILURE TO CLOSE

On cue from the Examiner, an earthquake will occur followed by "A" SG becoming faulted and no MSIVs can be closed. The reactor will fail to trip automatically but can be tripped from the control room. The crew should manually trip the reactor and enter EOP-1.0, E-0 Reactor Trip or Safety Injection. The crew will transition out to EOP-3.0, E-2 Faulted Steam Generator Isolation. They will then transition to EOP-3.1, ECA-2.1 Uncontrolled Depressurization of all Steam Generators.

CRITICAL TASKS:

- Manually trip the reactor when it fails to AUTO trip with three faulted Steam Generators before SG WR <12%.
- Control the EFW flowrate (minimum of 50 gpm to each s/g < 26% level) and terminate SI, in order to minimize the RCS cooldown rate before a severe (orange-path) challenge develops to the Integrity Critical Safety Function Status Tree.

TERMINATION:

The scenario may be terminated once the crew has terminated Safety Injection in accordance with EOP-3.1, ECA-2.1 Uncontrolled Depressurization of all Steam Generators. or at the discretion of the Lead Examiner.

Form 3.3-1 Scenario Outline

2023 NRC #2

Scenario Attributes		Events
Events after EOP entry (1-2)	2	- Three MSIV stuck OPEN, MSIVs can't be closed locally. - ATWS, Reactor can be tripped from the control room.
Abnormal Events (2-4)	4	- SW Pump B Bearing failure (Non-Active Train) TS (2019 NRC #1) - ALT CLR TEMP controller failed low. - TCV-144 fails closed. L/D temp control in manual. - XTF-2 trouble alarm, transfer loads to alternate power.
Major Transients (1-2)	1	Three Faulted Steam Generators.
EOPs Entered (1-2)	1	EOP-3.1, ECA-2.1 UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS.
EOP Contingencies (0-2)	1	EOP-3.1, ECA-2.1 UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS.
Preidentified CTs (≥ 2)	2	- Manually trip the reactor when it fails to AUTO trip with three faulted Steam Generators before SG WR <12%. - Control the EFW flowrate (minimum of 50 gpm to each s/g < 26% level) and terminate SI, in order to minimize the RCS cooldown rate before a severe (orange-path) challenge develops to the Integrity Critical Safety Function Status Tree.

Form 3.3-1 Scenario Outline

SIMULATOR SCENARIO SETUP

INITIAL CONDITIONS:

- IC Set 257
- 90% Power, MOL
- Burnup = 10,004 MWD/MTU
- Current Core Cycle = 28
- RCS Boron Concentration = 1060 ppm
- FCV-113 Pot Setting = 4.54
- Rod Position: Group D = 202
- Tavg = 584.1°F

PRE-EXERCISE:

- Ensure simulator has been checked for hardware problems (DORT, burnt out light bulbs, switch malfunctions, chart recorders, etc.).
- Complete VCS-TQP-0807 Attachment I-A, Unit 1 Booth Instructor Checklist.
- Verify plant aligned for "B1" work week IAW PTP-101.004, Safety Related Train Swap Checklist.
- Verify red Placard on "A" CCW Pump and "B" Charging Pump.
- Verify the Hard Card for Turbine operation is in its proper storage location and cleaned.
- Verify the Hard Card for borating via MVT-8104 is in its proper storage location and cleaned.
- Ensure no NI's are removed from service, on SIPCS type in "add/omit" to verify.
- Ensure 115kV & 230kV setpoints are set to appropriate values for the shutdown condition IAW SOP-304, Enclosure B.
- Verify Rod Bank Update set correctly: 202 Steps on Bank D, 226 steps on all other Banks.
- Place HOLD Tag on RBCU 65B NORM and SLOW Speed Switches.
- Ensure Phoenix computer screen is turned off.
- Ensure you have a turnover sheet for each position.
- Have a blank copy of SOP-117 Attachment VI available upon request.
- Conduct two-minute drill.

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2 Event # 1		Page: 10 of 46	
Event Description: Decrease reactor power to 85%.					
Time/ Position		Applicant's Actions or Behavior			
EVALUATOR NOTE:		Crew will pre-brief and perform a 5% down power IAW GOP-4B.			
BOOTH OPERATOR:		NO TRIGGER			
US		Directs a plant down power to 85% in accordance with GOP-4B, POWER OPERATION (MODE 1 – DESCENDING)			
		<u>GOP- 4B REFERENCE PAGE</u> <u>GENERAL NOTES</u> A. Procedure steps should normally be performed in sequence. However, it is acceptable to perform steps in advance after thorough evaluation of plant conditions and impact by the Shift Manager or Unit Supervisor. B. Axial Flux Difference, ΔI, should be maintained within limits per V.C. Summer Curve Book, Figure I-1 during Reactor Power Operation above 50% per Tech Spec 3.2.1. C. After any Thermal Power change of greater than 15% within any one hour, Attachment III.H. of GTP-702 must be completed. D. If time allows, all load changes should be discussed with the Load Dispatcher prior to commencing the load change. E. If Reactor Power is stabilized during this procedure for the purpose of raising power per GOP-4A, a Power Range Heat Balance shall be performed. <u>REACTOR CONTROL</u> A. During operation with a positive Moderator Temperature Coefficient: 1) Power and temperature changes should be slow and will require constant operator attention. 2) All power and load changes should be performed in small increments. B. Rod Control should be maintained in Automatic if any Pressurizer PORV is isolated. C. If at any time, power decreases unexpectedly below 0.1% on any Power Range NI (computer indication available) OR below 1.0% on any Power Range NI control board indication (computer not available): 1) No positive reactivity will be added by rods or dilution. 2) A complete reactor shutdown shall be performed per GOP-5. 3) A controlled reactor startup may be commenced per GOP-3 once the event has been reviewed by Reactor Engineering. <u>TURBINE CONTROL</u> A. If during power descension plant stabilization is required, HOLD should be selected on the EHC HMI: Control/Load screen. B. To resume power descension select the recommended Load Ramp Rate C. Turbine Load values are approximate and provided as initial starting points for load changes. When desired Reactor or Turbine parameters are achieved stabilize (if necessary) and proceed as directed. D. The load limit "ramp rate" buttons only affect how fast the Load Limit Ref. moves to the new Load Limit Setpoint. Load reductions made using the limiter will always occur at 30% per minute. E. The load limiter will reduce turbine load if it is set more than 2% below the current Load Reference value. Load will only be shed until the Load Reference value is once again within 2% of Load Limit Ref. <u>MSR CONTROL</u> A. Do not exceed 50°F ΔT between the inlets to the Low Pressure Turbine. B. When in Manual, do not exceed 25°F per half-hour temperature change rate for the tube side of the Moisture Separator/Reheater.			

GOP-4B

GOP-4B

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2	Event # 1	Page: 11 of 46	
Event Description: Decrease reactor power to 85%.					
Time/ Position	Applicant's Actions or Behavior				
	<u>NOTE 3.2</u> a. Step 3.2 lowers Reactor Power from 90% to 48%. b. While the plant is being maneuvered, total condensate flow through the Blowdown Heat Exchangers must be maintained greater than 450 gpm, which should maintain condensate outlet temperature at least 30°F below the DA temperature.				GOP-4B
BOP	3.2 Reduce Reactor Power to 48% as follows: a. Using the EHC HMI, Control/Load screen, reduce load per SOP-214, Main Turbine And Controls, Section III.D, Turbine Load Reduction/Shutdown, at a rate of 1% per minute or less.				GOP-4B
EVALUATOR NOTE:	The BOP will now obtain the hard card of SOP-214, Section III.D to reduce load. The steps to reduce load are as follows below.				
BOP	2.1. Ensure the Control/Load screen is selected.				SOP-214
	<u>NOTE 2.2</u> The turbine will come off the limiter and turbine load will lower once Load Set Reference is less than Load Limit Reference. Acknowledging dialog boxes is "skill of the Craft".				SOP-214
BOP	2.2 To lower Turbine Load using Load Set, perform the following: a. To lower Turbine Load using Load Set, perform the following: (NO) b. Select (or enter) the desired Rate %/min on Load Set. c. Select Load on Load Set (a dialog box will open). d. Enter the desired load. (PEER✓) e. Confirm desired load. (PEER✓) f. Verify proper system response. g. If during a load reduction, it is desired to stop the load reduction, perform the following: 1) Select Hold on Load Set. 2) Select the desired Rate %/min to resume load reduction. 3) If desired, place LOAD LIMIT in service per Section III.				SOP-214
EVAULATOR NOTE:	The RO will setup to borate the RCS using SOP-106, Section F. The steps for borating are as follows below.				

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2 Event # 1		Page: 12 of 46
Event Description: Decrease reactor power to 85%.				
Time/ Position		Applicant's Actions or Behavior		
	<u>NOTE 3.2.b</u> The System Controller should be notified prior to manually changing MVARs by more than 50 MVARs in a five minute period, unless the change is needed to prevent equipment damage.			
BOP	b. As load decreases, adjust Megavars using GEN FIELD VOLT ADJ as requested by the System Controller and within the Estimated Generator Capability curve (Enclosure A).			
	<u>NOTE 2.0</u> 1. Energizing additional Pressurizer Heaters will enhance mixing. 2. LCV-115A, LTDN DIVERT TO HU-TK, will begin to modulate to the HU-TK position at 70% level on LI-115, VCT LEVEL %.			
RO	2.0 INSTRUCTIONS 2.1 Ensure at least one Reactor Coolant Pump is running.			
RO	2.2 Place RX COOL SYS MU switch to STOP.			
RO	2.3 Place RX COOL SYS MU MODE SELECT switch to BOR. (Peer ✓)			
RO	2.4 Adjust FCV-113 A&B, BA FLOW SET PT, for desired flow rate. (Peer ✓)			
RO	2.5 Set FIS-113, BA TO BLNDR FLOW, batch integrator to the desired volume. (Peer ✓)			
RO	2.6 Place RX COOL SYS MU switch to START.			
RO	NOTE 2.7 Step 2.7 may be omitted when borating less than 10 gallons. 2.7 Place FCV-113 A&B, BA FLOW, controller in AUTO.			
RO	NOTE 2.8 The AUTO setpoint dial for FCV-113A&B, BA FLOW, controller may be adjusted slowly to obtain the desired flow rate. 2.8 Verify the desired Boric Acid flow rate on FR-113, BA TO BLNDR GPM (F-113).			
RO	2.9 When the preset volume of boric acid has been reached, perform the following: a. Place FCV-113A&B, BA flow controller in MAN. b. Verify boration stops.			
RO	2.10 Place RX COOL SYS MU switch to STOP.			

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2	Event # 1	Page: 13 of 46
Event Description: Decrease reactor power to 85%.				
Time/ Position		Applicant's Actions or Behavior		
RO	NOTE 2.11 a. If plant conditions require repeated borations, Step 2.11 may be omitted. b. The volume in the piping between the blender and the VCT outlet is approximately 3.8 gallons. 2.11 Alternate Dilute 4 to 6 gallons of Reactor Makeup Water to flush the line down stream of the blender by performing the following: a. Place RX COOL SYS MU MODE SELECT switch to ALT DIL. (Peer ✓) b. Adjust FCV-168, TOTAL MU FLOW SET PT, to desired flow rate. (Peer ✓) c. Set FIS-168, TOTAL MU FLOW, batch integrator to desired volume. (Peer ✓) d. Place RX COOL SYS MU switch to START. e. Verify desired flow rate on FR-113, TOTAL MU GPM (F-168). f. Verify alternate dilution stops when preset volume is reached on FIS-168, TOTAL MU FLOW, batch integrator. g. Place RX COOL SYS MU switch to STOP.			
RO	2.12 Place RX COOL SYS MU MODE SELECT switch to AUTO. (Peer ✓)			
RO	2.13 Adjust FCV-168, TOTAL MU FLOW SET PT, to 7.5 (120 gpm). (Peer ✓)			
RO	2.14 In MAN, adjust FCV-113 A&B, BA FLOW OUTPUT, to the required position which will ensure proper Boric Acid addition for subsequent Automatic Makeup operations.			
RO	2.15 Adjust FCV-113 A & B, BA FLOW, SET PT per one of the following: a. OAP-100.6, Attachment IA, Reactivity Control Parameters. b. Desired position to ensure proper boric acid addition based on current RCS conditions.			
RO	2.16 Place RX COOL SYS MU switch to START. (Peer ✓)			
RO	2.17 Perform the following: a. Start XPP-13A(B), BA XFER PP A(B), for the in-service Boric Acid Tank. b. If necessary, start XPP-13A(B), BA XFER PP A(B), for the Boric Acid Tank on recirculation.			

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC	Scenario # 2	Event # 1	Page: 14 of 46
Event Description: Decrease reactor power to 85%.			

Time/ Position	Applicant's Actions or Behavior

EVALUATOR NOTE:	The next event will be initiated at the discretion of the Lead Examiner.

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2	Event # 2	Page: 15 of 46
Event Description: RCS Loop C T _{HOT} RTD Fails low.				
Time/ Position	Applicant's Actions or Behavior			
EVALUATOR NOTE:	On cue from the Examiner, two (2) Loop C THOT RTDs will fail Low. The crew will respond in accordance with XCP-615, 1-2, RCS TAVG LO, which will have them implement AOP-401.2, Protection Channel RCS Loop RTD Failure. They will identify the failed RTD and ensure an operable loop is selected on ΔT TR-412 Input Switch.			
BOOTH OPERATOR:	When directed – initiate Event 2 (TRIGGER 2).			
Symptoms/ Cues:	• XCP-615 1-2, RCS TAVG LO • XCP-615 1-5, RCS TAVG DEV HI/LO • XCP-615 3-5, RCS ΔT DEV HI/LO			
RO	Corrective Actions: 1. Monitor TI-412D, TI-422D, and TI-432D to determine if a channel failed. 2. Place Rod Control in MAN and match Tavg to Tref. When plant conditions allow, return Rod Control to AUTO with Shift Manager Concurrence.			XCP-615 1-2
BOP	Supplemental Actions: 1. If a channel has failed, perform the following: a. Refer to AOP-401.2 to trip all bistable associated with that channel. b. Refer to Technical Specification Table 3.3-3 for minimum channel requirements.			XCP-615 1-2
US	Enters AOP-401.2, PROTECTION CHANNEL RCS LOOP RTD FAILURE.			AOP-401.2
RO	1. Determine which RCS loop has a failed RTD by comparing loop ΔT and Tavg indicators.			AOP-401.2
EVALUATOR NOTE:	The RO should determine that TI-432D has failed.			AOP-401.2
RO	2. Ensure an operable loop is selected on ΔT TR-412 INPUT SEL Switch.			AOP-401.2

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 2 Event # 2 Page: 16 of 46
 Event Description: RCS Loop C T_{HOT} RTD Fails low.

Time/ Position	Applicant's Actions or Behavior	
RO	3. Within <u>one</u> hour, verify P-12, Tavg LO-LO status light is in the required state for the existing plant conditions. Time of Failure _____ Time Permissives verified _____	AOP-401.2
US	4. Within 72 hours, have I&C place the failed channel in a tripped conditions using the appropriate attachment: • ATTACHMENT 1, PROTECTION CHANNEL RCS LOOP A RTD INSTRUMENTATION. • ATTACHMENT 2, PROTECTION CHANNEL RCS LOOP B RTD INSTRUMENTATION. • ATTACHMENT 3, PROTECTION CHANNEL RCS LOOP C RTD INSTRUMENTATION.	AOP-401.2
CREW	5. Determine and correct the cause of the channel failure.	AOP-401.2
US	Enters Tech Spec 3.3.1 Reactor Trip System Instrumentation Table 3.3-1, Function 7; Overtemperature ΔT Three Loop Operation – Action 6. The inoperable channel must be placed in the tripped condition within 72 hours. Enters Tech Spec 3.3.1 Reactor Trip System Instrumentation Table 3.3-1, Function 8; Overpower ΔT Three Loop Operation – Action 6. The inoperable channel must be placed in the tripped condition within 72 hours.	T.S. 3.3.1
US	Enters Tech Spec 3.3.2 Engineered Safety Feature Actuation System Instrumentation Table 3.3-3, Function 4.d; Steam Flow in Two Steam Lines – High COINCIDENT with Tavg – Low-Low - Action 24. This Tech Spec also requires the inoperable channel must be placed in the tripped condition within 72 hours. Enters Tech Spec 3.3.2 Engineered Safety Feature Actuation System Instrumentation Table 3.3-3, Function 9.b; Engineered Safety Feature Actuation System Interlocks – Low-Low Tavg, P-12 - Action 20. This Tech Spec condition is MET since the Minimum Number of Channels OPERABLE is met.	T.S. 3.3.2
BOOTH OPERATOR:	When called to investigate the failure and trip the appropriate bistables as I&C, acknowledge the request.	

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 2 Event # 2 Page: 17 of 46
Event Description: RCS Loop C T_{HOT} RTD Fails low.

Time/ Position Applicant's Actions or Behavior

AOP-401.2
REVISION 3
ATTACHMENT 3
PAGE 1 of 1

Attachment 3

PROTECTION CHANNEL RCS LOOP C RTD INSTRUMENTATION

TRIPPED BISTABLE STATUS

INSTRUMENT	ASSOCIATED BISTABLE	BISTABLE LOCATION	TRIP STATUS LIGHT
LOOP C	TB-432-B-1	C3-721-BS-1	CHAN III LP C OPΔT
	TB-432-B-2	C3-721-BS-2	CHAN III W/DRWL ROD BLCK
ITE00432-B1	TB-432-C-1	C3-721-BS-3	CHAN III LP C OTΔT
ITE00432-B2	TB-432-C-2	C3-721-BS-4	CHAN III W/DRWL ROD BLCK
ITE00432-B3	TB-432-D-1	C3-722-BS-2	CHAN III RCS LP C TAVG LO
ITE00432-D	TB-432E	C3-722-BS-1	CHAN III LP C P-12

R&R# _____

TRIP

APPLICABLE STPS	STP # USED TO TRIP BISTABLE	TRIP STATUS LIGHT ON	TRIPPED BY	VERIFIED BY
302.003				
345.003				

RESTORATION

APPLICABLE STP(S) COMPLETED	STP # USED TO RESTORE BISTABLE	TRIP STATUS LIGHT OFF	RESTORED BY	VERIFIED BY

REVIEWED BY: _____ /
SHIFT MANAGER DATE

TECH SPECS

TABLE 3.3-1 ITEMS 7, 8

TABLE 3.3-3 ITEMS 4.d, 9.b

EVALUATOR NOTE: The next event will be initiated at the discretion of the Lead Examiner.

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2 Event # 3		Page: 18 of 46
Event Description: Service Water Pump "B" bearing failure (Non-Active Train).				
Time/ Position		Applicant's Actions or Behavior		
EVALUATOR NOTE:		On cue from the examiner, the "B" Service Water Pump bearing will fail causing an indication of a pump overload that will require the candidates to trip the pump. The crew will enter AOP-117.1, LOSS OF SERVICE WATER and rack up the "C" Service Water Pump to restore cooling.		
BOOTH OPERATOR:		When directed – initiate Event 3 (TRIGGER 3).		
Symptoms/ Cues:		• XCP-605 1-3, SWP B/C MOTOR OVRLD If Pump Trips before securing: • XCP-605 1-2, SWP B/C TRIP • XCP-605 1-4, SWP B/C DISCH PRESS LO		
US		Corrective Actions: 1. If total flow is excessive, reduce flow to all components with excessive flow. 2. If the overload condition cannot be cleared, stop the overloaded pump. 3. Place the spare Service Water Pump in service per SOP-117.		
US		Corrective Actions: 1. Place the spare Service Water Pump in service per SOP-117.		
EVALUATOR NOTE:		The US should order the "C" SW Pump to be placed in service while transitioning to AOP-117.1. Actions of SOP-117, Section III.F, SHIFTING LOOP B SERVICE WATER PUMPS, is on Page 43 of 46 for reference. SOP-117 Att. VI is not in the simulator. When requested, provided a blank copy to the crew.		
BOOTH OPERATOR:		When called to investigate the cause of the "B" SW Pump failure, wait 1 minute and report back the motor is hot to the touch. If called to investigate the "B" SW Pump breaker, wait 1 minute and report back nothing wrong with the breaker. If called to silence the HVAC alarm, wait 1 minute and report the "B" Chiller High Temperature alarm came in (XCP-6210-LCB8 8-22, "HIGH TEMP").		

XCP-605 1-3

XCP-605 1-2

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2	Event # 3	Page: 19 of 46
Event Description: Service Water Pump "B" bearing failure (Non-Active Train).				
Time/ Position	Applicant's Actions or Behavior			
US	Enters AOP-117.1, LOSS OF SERVICE WATER.			
	<u>NOTE</u> <u>IF</u> a reactor trip occurs, <u>THEN</u> this procedure should be continued concurrently with the recovery actions of EOP-1.0, E-0, REACTOR TRIP OR SAFETY INJECTION.			
RO	1. Check if <u>any</u> Service Water Loop is operating: • Stable PUMP AMPS. • Pump Discharge Pressure indicated.			
RO	2. Check if Service Water loop A is in service: • <u>One</u> Service Water Loop A pump is running. • Service Water loop A discharge pressure is GREATER THAN Service Water loop B discharge pressure.			
RO	3. Check if A Train is the Active Train.			
EVALUATOR NOTE:	The RO determines that the Service Water Loop A is in service as the Active Train.			
RO	4. Perform the following: - Place XPP0045B, SW BOOSTER PUMP B in Pull to Lock. - Open PVG-3105B-SW, FS TO DG B. - Verify GREATER THAN 370 gpm Fire Service flow through the B Diesel Generator coolers on FM-4492, B CLG (IUR14401, M4/SW 6-2).			
RO	5. Shift Loop B Service Water Pumps to the standby pump running. REFER TO SOP-117, SERVICE WATER SYSTEM. 6. GO TO Step 10.			
	<u>NOTE – Step 10</u> SI or Blackout signal disables the SW screen wash system. Local action to wash the Service Water traveling screens will be ineffective until the associated ESF LOADING SEQ A(B) RESETS is taken to NON-ESF LCKOUTS.			
RO	10. Verify the Active Train Service Water Pump discharge pressure is GREATER THAN 50 psig.			

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2	Event # 3	Page: 20 of 46
Event Description: Service Water Pump "B" bearing failure (Non-Active Train).				
Time/ Position		Applicant's Actions or Behavior		
RO	11. Check if Component Cooling Water temperatures are stable <u>OR</u> decreasing.			
RO	12. Verify A Service Water Loop is operating.			
RO	13. Place PVG-3105A-SW, FS TO DG A in AUTO.			
RO	14. Restore A Service Water Booster Pump as follows: a. Verify <u>both</u> of the following: - XVB-3107A, RBCU 64A/65A RTN TO SW PND is closed. <u>AND</u> - Alarm XCP-604 1-5 XVB3107A-SW SLOW CLOSURE is <u>NOT</u> lit. b. Place XPP0045A, SW BOOSTER PUMP A in standby.			
RO	15. Verify B Service Water Loop is operating.			
US	15. ALTERNATIVE ACTION GO TO Step 18.			
RO	18. Check if Service Water loop A is in service.			
RO	19. Check if Service Water loop B is in service.			
US	19. ALTERNATIVE ACTION RETURN to Step 3.			
US	Enters Tech Spec 3.7.4. Action Statement requires: With only one service water loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.			
BOOTH OPERATOR:	When requested to complete SOP-117 Attachment VI with the exception of racking down the "B" SW PP breaker, wait 2 minutes and insert TRIGGER 10.			
BOOTH OPERATOR:	When requested to rack down "B" SW Pump breaker, wait 2 minutes and insert TRIGGER 11.			

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC	Scenario # 2	Event # 3	Page: 21 of 46
Event Description: Service Water Pump "B" bearing failure (Non-Active Train).			

Time/ Position	Applicant's Actions or Behavior

EVALUATOR NOTE:	Once the crew has restored Service Water with the "C" Service Water pump and identified the Tech Spec, or at the Lead Examiner's discretion, the next event may be inserted.

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2	Event # 4	Page: 22 of 46
Event Description: Alternator Cooler Temperature Controller Failure.				
Time/ Position	Applicant's Actions or Behavior			
EVALUATOR NOTE:	On cue from the Examiner, the ALT COOLER TEMP controller will fail to 0 output. This will cause XCP-632 3-2 and XCP-632 3-3 to alarm. TI-4270 will be reading >120°F. The BOP will take manual control of this controller and return TI-4270 back into its normal control band. This will be performed in accordance with XCP-632 3-2. Alarm takes about 3.5 minutes to come in from the time the malfunction is inserted.			
BOOTH OPERATOR:	When directed – initiate Event 4 (TRIGGER 4)			
Symptoms/ Cues:	• XCP-632 3-2, ALT CLR TEMP HI/LO • XCP-632 3-3, GEN AUX PNL TRBL • TI-4270, ALT CLR TEMP °F			
BOP	Corrective Actions: 1. Verify alternator temperature on TI-4270, ALT CLR TEMP °F. 2. Refer to Curve Book Figure VII-12 ALT COOLER TEMP (DEGF) to adjust ALT COOLER TEMP controller, as required. 3. Verify proper operation of ITV04270-TC, ALTERNATOR COOLER TEMP CNTRL VLV (TB-436).			XCP-632 3-2
BOP	Supplemental Actions: 1. Verify correct valve alignment per SOP-219. 2. If ITV04270-TC, ALTERNATOR COOLER TEMP CNTRL VLV (TB-436), has failed, throttle XVT03419-TC, ALT CLR TEMP CNTRL VLV BYPASS (TB-436), as necessary to control temperature. 3. Determine and correct the alarm cause.			XCP-632 3-2
EVALUATOR NOTE:	The BOP should take manual control of the Alternate Cooler Temperature Controller on the MCB and adjust in Manual to control temperature on TI-4270.			
BOOTH OPERATOR:	When called as I&C to investigate the failure, acknowledge request. When called as AO to investigate XCP-632 3-3, GEN AUX PNL TRBL, wait 2 minutes and insert TRIGGER 12 and report back “ALTERNATOR AIR TEMP HIGH” alarm is in. TRIGGER 12 clears the MCB alarm.			

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 2 Event # 4 Page: 23 of 46
Event Description: Alternator Cooler Temperature Controller Failure.

Time/ Position	Applicant's Actions or Behavior

EVALUATOR NOTE:	Once TI-4270 is back into its normal control band or at the Lead Examiner's discretion, the next event may be inserted.

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 2 Event # 5 Page: 24 of 46
 Event Description: TCV-144, CCW to Letdown HX Controller Failure.

Time/ Position	Applicant's Actions or Behavior
EVALUATOR NOTE:	On cue from the Examiner the Controller for TCV-144, CCW to Letdown HX, fails low in AUTO. The controller will close the temperature control valve causing letdown temperature to rise. Annunciators XCP-613 1-2 DEMIN FLO DIVERT TEMP HI and XCP-603 1-5, LTDN/SL WTR HX FLO LO TEMP HI will be referenced. The RO will take manual control to restore CCW flow to the Letdown Heat Exchanger.
BOOTH OPERATOR:	When directed – initiate Event 5 (TRIGGER 5)
Symptoms/ Cues:	• XCP-613 1-2 DEMIN FLO DIVERT TEMP HI • XCP-603 1-5, LTDN/SL WTR HX FLO LO TEMP HI • TI-144, HX (CC CNTRL) TEMP °F • TI-143, HX (DIVERT CNTRL) °F
RO	Corrective Actions: 1. If necessary, reduce Letdown flow to minimum by ensuring the 45 gpm orifice is in service and both 60 gpm orifices are isolated. 2. Verify proper operation of TCV-144, CC TO LTDN HX. 3. If necessary, place TCV-144, CC TO LTDN HX, in MAN and increase flow.
BOOTH OPERATOR:	When called as I&C to investigate the failure, acknowledge request.
EVALUATOR NOTE:	Once the RO has restored CCW flow to the Letdown Heat Exchanger and temperatures have stabilized or at the Lead Examiner's discretion, the next event may be inserted.

XCP-613 1-2

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 2 Event #6 Page: 25 of 46
 Event Description: Rising Temperatures on XTF-2, UNIT AUX TRANSFORMER.

Time/ Position	Applicant's Actions or Behavior
EVALUATOR NOTE:	On cue from the Examiner, XCP-633 6-3, UNIT AUX XFMR XTF-2 TRBL will come into alarm. The crew will send an AO out to inspect the transformer. Winding temperatures will be reported back as 122°C and slowly rising. In accordance with XCP-633 6-3, the BOP will transfer loads to the emergency auxiliary transformer per SOP-304. Once this has occurred, temperatures will lower on XTF-2 and the alarm will be cleared.
BOOTH OPERATOR:	When directed – initiate Event 6 (TRIGGER 6)
Symptoms/ Cues:	XCP-633 6-3, UNIT AUX XFMR XTF-2 TRBL
US	Corrective Actions: 1. If a trip occurs, refer to UNIT AUX DIFF LCKOUT 86T2-1 (XCP-639 3-2). 2. Dispatch an Operator to XTF0002, UNIT AUXILIARY TRANSFORMER, to determine the cause of the alarm. If necessary, contact PSE/Substation Maintenance for assistance. 3. Notify the System Controller.
BOOTH OPERATOR:	When sent as AO to investigate XTF-2 Trouble Alarm, wait 1 minute and report back that Winding Temperature is 122°C and slowly rising. Oil Temperature is 101°C and slowly rising. No pumps or fans are running. If the crew asks for updated temperature BEFORE BOP Buses have been transferred to alternate power, increase Winding and Oil Temperature by 1°C every 5 minutes NOT TO EXCEED 105°C for Oil Temperature or 135°C for Winding Temperature (these are Reactor Trip Setpoints). If called as System Control about the grid, report that the grid is stable.

XCP-633 6-3

XCP-633 6-3

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2 Event #6		Page: 26 of 46
Event Description: Rising Temperatures on XTF-2, UNIT AUX TRANSFORMER.				
Time/ Position		Applicant's Actions or Behavior		
US	Supplemental Actions: 1. If oil temperatures exceed 100° C or winding temperatures exceed 120° C, transfer loads to the Emergency Auxiliary Transformers per SOP-304, 115KV/7.2KV Operations. 2. If oil temperatures exceed 105° C or winding temperatures exceed 135° C, trip the plant per EOP-1.0, E-0, Reactor Trip Or Safety Injection, or AOP-214.1, Turbine Trip, and de-energize XTF0002, UNIT AUXILIARY TRANSFORMER, per SOP-302, 230 KV Substation. 3. Perform ISP-032, Large Power Transformer Hazardous Zone Traffic Exclusion, to keep people clear. 4. When the cause has been corrected, verify XTF0002, UNIT AUXILIARY TRANSFORMER, auxiliaries are returned to normal operation per SOP-302, 230 KV Substation.			XCP-633 6-3
EVALUATOR NOTE:	The crew should transfer BOP Buses to alternate power per SOP-304, 115KV/7.2KV OPERATIONS.			
BOP	Enters SOP-304, 115KV/7.2KV OPERATIONS, Section IV.A, TRANSFERRING BOP BUSES FROM NORMAL TO ALTERNATE FEED.			SOP-304
BOP	<u>INITIAL CONDITIONS</u> 1.1 XTF0031 and XTF0032, EMERGENCY AUXILIARY TRANSFORMER #1 and #2, are in service per SOP-302. 1.2 Conditions exist which require removal of normal feed for the buses. 1.3 XTF0001, MAIN TRANSFORMER, and XTF0002, UNIT AUXILIARY TRANSFORMER, are in service per SOP-302.			SOP-304
	<u>CAUTION 2.0</u> For the protection of equipment, parallel operations should be kept to a minimum with both normal and alternate feeder breakers closed. Due to the fact that with both breakers closed, currents may exceed long term overcurrent trip setpoints. Trips may occur in 40 to 100 seconds. The bus ammeters will peg high due to the CTs seeing the sum of both the applicable BOP bus and XTF0002 being in parallel.			SOP-304
BOP	2.1 Verify the applicable bus voltage from Enclosure B is within the limits for the oncoming configuration.			SOP-304

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 2 Event #6 Page: 27 of 46
Event Description: Rising Temperatures on XTF-2, UNIT AUX TRANSFORMER.

Time/ Position	Applicant's Actions or Behavior

BOP	2.2 If required, have the System Controller adjust the 115KV and/or 230KV voltages for the oncoming configuration prior to transferring BOP buses.	SOP-304
	<u>NOTE 2.3 through 2.5</u> a. When BUS 1A, 1B, or 1C is aligned to its alternate feed, automatic transfer to its normal feed is not available. b. When transferring the bus, there is a delay while the bus synchronizes. Hold the switch in the closed position until the breaker closes.	SOP-304
BOP	2.3 Manually transfer Bus 1A to alternate feed as follows: a. Place BUS 1A AUTO-MAN XFER Switch in MAN. b. Close BUS 1A ALT FEED breaker. (PEER ✓) c. Open BUS 1A NORM FEED breaker. (PEER ✓) d. Verify BUS 1A potential lights remain lit. e. Place BUS 1A AUTO-MAN XFER Switch in AUTO. (PEER ✓)	SOP-304
BOP	2.3 Manually transfer Bus 1B to alternate feed as follows: a. Place BUS 1B AUTO-MAN XFER Switch in MAN. b. Close BUS 1B ALT FEED breaker. (PEER ✓) c. Open BUS 1B NORM FEED breaker. (PEER ✓) d. Verify BUS 1B potential lights remain lit. e. Place BUS 1B AUTO-MAN XFER Switch in AUTO. (PEER ✓)	SOP-304
BOP	2.5 Manually transfer BUS 1C to alternate feed as follows: a. Ensure the following annunciators on Panel XCP-638 are clear: 1) 3-5, XTF31 OPC. 2) 3-6, XTF31 OPIS TRBL. b. Place BUS 1C AUTO-MAN XFER Switch in MAN. c. Close BUS 1C ALT FEED breaker. (PEER ✓) d. Open BUS 1C NORM FEED breaker. (PEER ✓) e. Verify BUS 1C potential lights remain lit. f. Place BUS 1C AUTO-MAN XFER Switch in AUTO. (PEER ✓)	SOP-304

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 2 Event #6 Page: 28 of 46
Event Description: Rising Temperatures on XTF-2, UNIT AUX TRANSFORMER.

Time/ Position	Applicant's Actions or Behavior

BOP	2.6 If required, adjust the 115KV and/or 230KV alarm setpoints per Attachment VA and/or Attachment VB for the current lineup.

SOP-304

BOP	2.7 Notify the System Controller of the applicable bus voltage limits from Enclosure B.

SOP-304

BOOTH OPERATOR:	If contacted after BOP Buses have been transferred for an update in XTF-2 Winding and Oil Temperature, report 1°C lower temperature than most recent report and slowly lowering.

EVALUATOR NOTE:	Once BOP loads have been transferred to the emergency auxiliary transformer, the next event will automatically insert after 30 seconds.

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2 Event #7		Page: 29 of 46	
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.					
Time/ Position		Applicant's Actions or Behavior			
EVALUATOR NOTE:		An Earthquake will occur, this will cause the faulted Steam Generators and an ATWS.			
BOOTH OPERATOR:		Auto initiate Event 7 (TRIGGER 7)			
Symptoms/ Cues		- Both Reactor Trip breakers – RED light lit and GREEN light dim. - XCP-626 4-4, TURB TRIP - XCP-638 4-5, RB FOUND SEIS SWITCH OBE EXCEED - XCP-638 4-6, SEIS RCDR SYS START/PWR LOSS - XCP-638 5-6, SEIS RESPNS SPECTRUM ANNUN TRBL			
US		Directs RO and BOP to perform immediate actions of EOP-1.0, REACTOR TRIP OR SAFETY INJECTION.			
US		Enters EOP-1.0, E-0 Reactor Trip or Safety Injection.			
EVALUATOR NOTE:		Critical Task is to manually trip the reactor when it fails to AUTO trip with three faulted Steam Generators before SG WR < 12%.			
RO (IOA) Critical Task		1. Verify Reactor Trip: - Trip the Reactor using both Reactor Trip Switches. - Verify all Reactor Trip and Bypass Breakers are open. - Verify all Rod Bottom Lights are lit. - Verify Reactor Power level is decreasing.			EOP-1.0
RO (IOA)		2. Verify Turbine/Generator Trip: - Verify all Turbine STM STOP VLVs are closed. - Ensure Generator Trip (after 30 second delay): - Ensure the GEN BKR is open. - Ensure the GEN FIELD BKR is open. - Ensure the EXC FIELD CNTRL is tripped.			EOP-1.0
RO (IOA)		3. Verify both ESF buses are energized.			EOP-1.0
RO (IOA)		4. Check if SI is actuated: - Check if either: - SI ACT status light is bright on XCP-6107 1-1. OR - Any red first-out SI annunciator is lit on XCP-626 top row. - Actuate SI using either SI ACTUATION Switch.			EOP-1.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC	Scenario # 2 Event #7	Page: 30 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.		
Time/ Position	Applicant's Actions or Behavior	

REFERENCE PAGE FOR EOP-1.0

1 RCP TRIP CRITERIA

- a. IF Phase B Containment Isolation has actuated (XCP-612 4-2), THEN trip all RCPs.
- b. IF both of the following conditions occur, THEN trip all RCPs:
 - SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM.
 - AND
 - RCS Wide Range pressure is LESS THAN 1418 psig.

2 REDUCING CONTROL ROOM EMERGENCY VENTILATION

Reduce Control Room Emergency Ventilation to one train in operation within 30 minutes of actuation. REFER TO SOP-505, CONTROL BUILDING VENTILATION SYSTEM.

3 MONITOR SPENT FUEL COOLING

Periodically check status of Spent Fuel Cooling by monitoring the following throughout event recovery:

- Spent Fuel Pool level.
- Spent Fuel Pool temperature.

4 RUPTURED STEAM GENERATOR

IF a RUPTURED Steam Generator has been positively identified, THEN throttle EFW to the RUPTURED Steam Generator WHEN its Narrow Range Level is GREATER THAN 26%[41%].

5 FAULTED STEAM GENERATOR

- IF a FAULTED Steam Generator has been positively identified, THEN isolate EFW to the faulted Steam Generator as soon as possible UNLESS all three Steam Generators are FAULTED.
- IF all three Steam Generators are FAULTED, THEN throttle EFW flow to all three Steam Generators to 50 gpm.

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2	Event #7	Page: 31 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.				
Time/ Position	Applicant's Actions or Behavior			
BOP	6. Initiate ATTACHMENT 3, SI EQUIPMENT VERIFICATION.			
EVALUATOR NOTE:	Attachment 3 can be found on Page 40 of 46 for reference.			
US	7. Announce plant conditions over the page system.			
RO	8. Verify RB pressure has remained LESS THAN 12 psig on PR-951, RB PSIG (P-951), red pen.			
RO	9. Check RCS temperature: - With any RCP running, RCS Tavg is stable at OR trending to 557°F. (NO) - OR - With no RCP running, RCS Tcold is stable at OR trending to 557°F.			
RO	Alternative Action Step: 9. IF RCS temperature is LESS THAN 557°F AND decreasing, THEN stabilize temperature by performing the following as required: - Close IPV-2231, MS/PEGGING STM TO DEAERATOR. - Perform one of the following: - IF Narrow Range SG level is LESS THAN 26% [41%] in all SGs, THEN reduce EFW flow as necessary to stop cooldown, while maintaining total EFW flow GREATER THAN 450 gpm. - OR - WHEN Narrow Range SG level is GREATER THAN 26% [41%] in at least one SG, THEN control EFW flow as necessary to stabilize RCS temperature at 557°F. - Initiate ATTACHMENT 6, STEAM VALVE ISOLATION, while continuing with this procedure. - IF RCS cooldown continues, THEN close: - MS Isolation Valves, PVM-2801A(B)(C). - MS Isolation Bypass Valves, PVM-2869A(B)(C).			

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2	Event #7	Page: 32 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.				
Time/ Position		Applicant's Actions or Behavior		
RO	10. Check PZR PORVs and Spray Valves: a. PZR PORVs are closed. b. PZR Spray Valves are closed. c. Verify power is available to at least one PZR PORV Block Valve: • MVG-8000A, RELIEF 445 A ISOL. • MVG-8000B, RELIEF 444 B ISOL. • MVG-8000C, RELIEF 445 B ISOL. d. Ensure one of the following Block Valves is open unless it was closed to isolate an open PZR PORV: • MVG-8000A, RELIEF 445 A ISOL. • MVG-8000B, RELIEF 444 B ISOL.			
NOTE - Step 11 Seal Injection flow should be maintained to all RCPs.				
RO	11. Check if RCPs should be stopped: a. Check if either of the following criteria is met: • Annunciator XCP-612 4-2 is lit (PHASE B ISOL). OR • RCS pressure is LESS THAN 1418 psig AND SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. b. Stop all RCPs.			
RO	12. Verify no SG is FAULTED: • No SG pressure is decreasing in an uncontrolled manner. (NO) • No SG is completely depressurized.			
RO	Alternative Action Step: 12. GO TO EOP-3.0, E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1.			
EVALUATOR NOTE:	The crew may have a red path on Heat Sink because IF they throttled EFW flow to <450 gpm. If so, they will transition to EOP-15.0, Response to Loss of Secondary Heat Sink. They will read a Caution at the beginning of the procedure and immediately transition out of EOP-15.0 because they throttled EFW on purpose.			
US/CREW	Notices a Red Path on Heat Sink and transitions to EOP-15.0, Response to Loss of Secondary Heat Sink.			

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2 Event #7		Page: 33 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.				
Time/ Position		Applicant's Actions or Behavior		
CAUTION				
- If total EFW flow is LESS THAN 450 gpm due to operator action, this procedure should NOT be performed, since these actions are NOT appropriate if 450 gpm EFW flow is available. - If a NON-FAULTED SG is available, feed flow should NOT be reestablished to any FAULTED SG, to prevent thermal shock to SG tubes.				
US	Transitions out of EOP-15.0 into EOP-3.0, E-2 Faulted Steam Generator Isolation.			
BOP	1. Ensure all the following are closed: - MS Isolation Valves, PVM-2801A(B)(C). - MS Isolation Bypass Valves, PVM-2869A(B)(C).			
BOOTH OPERATOR:	When contacted to shut MSIVs, Wait 2 minutes and report back that you were unable to close the MSIVs.			
BOP	2. Check if any SG is NON-FAULTED: - Pressure in any SG is stable OR increasing. (NO) - Any SG is NOT completely depressurized.			
BOP	Alternative Action Step: 2. IF all SG pressures are decreasing in an uncontrolled manner OR completely depressurized, THEN GO TO EOP-3.1, ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, Step 1.			
US	Enters EOP-3.1, ECA-2.1 Uncontrolled Depressurization of all Steam Generators.			

EOP-15.0

EOP-3.0

EOP-3.0

EOP-3.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC	Scenario # 2	Event #7	Page: 34 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.			
Time/ Position	Applicant's Actions or Behavior		

REFERENCE PAGE FOR EOP-3.1

1 SI REINITIATION CRITERIA

IF either of the following conditions occurs, THEN start Charging Pumps and operate valves as necessary:

- RCS subcooling on TI-499A(B), A(B) TEMP °F, is LESS THAN 52.5°F [67.5°F].

OR

- PZR level can NOT be maintained GREATER THAN 10% [28%].

2 SECONDARY INTEGRITY TRANSITION CRITERION

IF any SG pressure increases at any time, except while performing SI Termination in Steps 13 through 18, THEN GO TO EOP-3.0, E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1.

3 TUBE RUPTURE TRANSITION CRITERIA

IF any SG level increases in an uncontrolled manner OR if any SG has abnormal radiation, THEN start Charging Pumps and operate valves as necessary, and GO TO EOP-4.0, E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.

4 COLD LEG RECIRCULATION TRANSITION CRITERION

IF RWST level decreases to LESS THAN 18%, THEN GO TO EOP-2.2, ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, Step 1.

5 REDUCING CONTROL ROOM EMERGENCY VENTILATION

Reduce Control Room Emergency Ventilation to one train in operation within 30 minutes of actuation. REFER TO SOP-505, CONTROL BUILDING VENTILATION SYSTEM.

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2 Event #7		Page: 35 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.				
Time/ Position		Applicant's Actions or Behavior		
BOP		1. Isolate secondary pressure boundaries for all SGs: a. Close all of the following valves: - MS Isolation, PVM-2801A(B)(C). - MS Isolation Bypass, PVM-2869A(B)(C). - FW Flow Control, FCV-478(488)(498). - FW Isolation, PVG-1611A(B)(C). - SG Blowdown, PVG-503A(B)(C). - FW Flow Control Bypass, FCV-3321(3331)(3341). CAUTION - Step 1.b If the TD EFW Pump is the only available source of feed flow, the steam supply to the TD EFW Pump must be maintained from at least one SG, to maintain a secondary heat sink. b. Complete isolation of all SGs: 1. Close all the following valves: - SG Chemical Feed Isolation, MVK-1633A(B)(C). - MS Drain Isolation, PVT-2843A(B)(C) PVT-2877A(B). 2. Locally open the following breakers: - XMC1DA2X 05EH, EF PUMP MAIN STEAM BLOCK VLV XVG2802A-MS (IB-463). - XMC1DB2Y 05EH, EMERG FEEDWATER PUMP MAIN STEAM BLOCK XVG2802B-MS (AB-463). 3. Locally close the following valves (IB-436 East Pen): - XVG02802A-MS, MS HEADER B EF PUMP TURBINE SUPPLY VLV. - XVG02802B-MS, MS HEADER C EF PUMP TURBINE SUPPLY VLV. 4. Place all Steamline PWR RELIEF A(B)(C) SETPT Controllers in MAN and closed. 5. Place all Steamline Power Relief A(B)(C) Mode Switches in PWR RLF.		
BOOTH OPERATOR:		When contacted to locally open breakers and close 2802A/B, wait 3 minutes, use the LOAs on the LOA RESET PANEL to open the breakers and close the valves, Then report back "I've opened the breakers for 2802A/B and have closed both valves".		

EOP-3.1

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2 Event #7		Page: 36 of 46	
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.					
Time/ Position		Applicant's Actions or Behavior			
CAUTION - Step 2 A minimum EFW flow of 50 gpm must be maintained to each SG that has a Narrow Range level LESS THAN 26% [41%], to minimize thermal shock to SG components.					EOP-3.1
NOTE – Step 2 Shutdown margin should be monitored during RCS cooldown.					EOP-3.1
BOP	2. Ensure the RCS cooldown is minimized: a. Place MD EFP RESET to RESET. b. Place TD EFP RESET to RESET. c. Verify the cooldown rate in the RCS Cold Legs is LESS THAN 100°F/hr. d. Verify Narrow Range level in all SGs is LESS THAN 60%. e. Verify RCS Thot is stable OR decreasing.			EOP-3.1	
NOTE - Step 3 Seal Injection flow should be maintained to all RCPs.					EOP-3.1
RO	3. Check if RCPs should be stopped: a. Verify annunciator XCP-612 4-2 is NOT lit (PHASE B ISOL). b. Check if RCS pressure is LESS THAN 1418 psig AND SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. NOTE - Step 3.c RCPs should NOT be stopped if the RCS pressure decrease is due solely to the cooldown. c. Stop all RCPs.			EOP-3.1	
RO	4. Check PZR PORVs and Block Valves: a. Verify power is available to the PZR PORV Block Valves: 1. MVG-8000A, RELIEF 445 A ISOL. 2. MVG-8000B, RELIEF 444 B ISOL. 3. MVG-8000C, RELIEF 445 B ISOL. CAUTION - Step 4.b If any PZR PORV opens because of high PZR pressure, Step 4.b should be repeated after pressure decreases to LESS THAN 2330 psig, to ensure the PORV recloses. b. Verify all PZR PORVs are closed. c. Verify at least one PZR PORV Block Valve is open.			EOP-3.1	

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC	Scenario # 2	Event #7	Page: 37 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.			
Time/ Position	Applicant's Actions or Behavior		

RO	5. Reset both SI RESET TRAIN A(B) Switches.	EOP-3.1
RO	6. Reset Containment Isolation: - RESET PHASE A - TRAIN A(B) CNTMT ISOL. - RESET PHASE B - TRAIN A(B) CNTMT ISOL.	EOP-3.1
NOTE - Step 7 Any high radiation level received on a radiation monitor that was unisolated at event initiation, may be considered a valid alarm.		EOP-3.1
BOP	7. Check if Secondary radiation levels are normal: a. Check radiation levels normal on all unisolated radiation monitors: - RM-G19A(B)(C), STMLN HI RNG GAMMA. - RM-L3, STEAM GENERATOR BLOWDOWN LIQUID MONITOR. - RM-L10, SG BLOWDOWN CW DISCHARGE LIQUID MONITOR. - RM-A9, CNDSR EXHAUST GAS ATMOS MONITOR. b. Place SVX-9398A(B)(C), SG A(B)(C) SMPL ISOL, in AUTO. c. Notify Chemistry to sample all SG secondary sides, and screen samples for abnormal activity using a frisker.	EOP-3.1
CAUTION - Step 8 RCS pressure should be monitored. If RCS pressure decreases in an uncontrolled manner to LESS THAN 325 psig, the RHR Pumps must be manually restarted to supply water to the RCS.		EOP-3.1
RO	8. Check if RHR Pumps should be stopped: a. Check if any RHR Pump is running with suction aligned to the RWST. b. Check RCS pressure: 1. RCS pressure is GREATER THAN 325 psig. 2. RCS pressure is stable OR increasing. c. Stop any RHR Pump which is running with suction aligned to the RWST and place in Standby.	EOP-3.1
BOP	9. Verify RWST level is GREATER THAN 18%.	EOP-3.1

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2	Event #7	Page: 38 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.				
Time/ Position	Applicant's Actions or Behavior			
RO	10. Establish Instrument Air to the RB: a. Start one Instrument Air Compressor and place the other in Standby. b. Verify PI-8342, INSTR AIR HDR PRESS PSIG, indicates GREATER THAN 60 psig. c. Open PVA-2659, INST AIR TO RB AIR SERV. d. Open PVT-2660, AIR SPLY TO RB.			EOP-3.1
RO	11. Check if SI Accumulators should be isolated: a. Verify RCS pressure is LESS THAN 315 psig. (NO)			EOP-3.1
RO	Alternative Action Step: 11. Check if SI Accumulators should be isolated: a. WHEN RCS pressure is LESS THAN 315 psig, THEN COMPLETE Step 11. CONTINUE WITH Step 12.			EOP-3.1
RO	12. Check if SI flow should be reduced: a. Verify RCS subcooling on TI-499A(B), A(B) TEMP °F, is GREATER THAN 52.5°F [67.5°F]. b. Verify RCS pressure is stable OR increasing. NOTE - Step 12.c If PZR level is LESS THAN 10% [28%], the PZR should refill from SI flow after pressure is stabilized. c. Verify PZR level is GREATER THAN 10% [28%].			EOP-3.1
RO	13. Stop all but one Charging Pump and place in Standby.			EOP-3.1
RO	14. Verify RCS pressure is stable OR increasing.			EOP-3.1
RO Critical Task	15. Establish Normal Charging: a. Close FCV-122, CHG FLOW. b. Open both MVG-8107 and MVG-8108, CHG LINE ISOL. c. Adjust FCV-122, CHG FLOW, to obtain 70 gpm Charging flow. d. Close both MVG-8801A(B), HI HEAD TO COLD LEG INJ.			EOP-3.1
RO	16. Control FCV-122, CHG FLOW, to maintain PZR level between 22% [39%] and 76% [69%].			EOP-3.1

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 2	Event #7	Page: 39 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.				
Time/ Position	Applicant's Actions or Behavior			
EVALUATOR NOTE:	Critical Task is to control the EFW flowrate (minimum of 50 gpm to each SG < 26% level) and terminate SI, in order to minimize the RCS cooldown rate before a severe (orange-path) challenge develops to the Integrity Critical Safety Function Status Tree.			
EVALUATOR NOTE:	The scenario may be terminated once the crew has terminated Safety Injection in accordance with EOP-3.1 or at the discretion of the Lead Examiner			

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC	Scenario # 2	Event #7	Page: 40 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.			
Time/ Position	Applicant's Actions or Behavior		

EVALUTOR NOTE:	THESE ARE THE STEPS OF EOP-1.0, ATTACHMENT 3	
BOP	1. Ensure EFW Pumps are running: a. Ensure both MD EFW Pumps are running. b. Verify the TD EFW Pump is running if necessary to maintain SG levels.	EOP-1.0 Attachment 3
BOP	2. Ensure the following EFW valves are open: • FCV-3531(3541)(3551), MD EFP TO SG A(B)(C). • FCV-3536(3546)(3556), TD EFP TO SG A(B)(C). • MVG-2802A(B), MS LOOP B(C) TO TD EFP.	Attachment 3
BOP	3. Verify total EFW flow is GREATER THAN 450 gpm.	Attachment 3
BOP	4. Ensure FW Isolation: a. Ensure the following are closed: • FW Flow Control, FCV-478(488)(498). • FW Isolation, PVG-1611A(B)(C). • FW Flow Control Bypass, FCV-3321(3331)(3341). • SG Blowdown, PVG-503A(B)(C). • SG Sample, SVX-9398A(B)(C). b. Ensure all Main FW Pumps are tripped.	Attachment 3
BOP	5. Ensure SI Pumps are running: • Two Charging Pumps are running. • Both RHR Pumps are running.	Attachment 3
BOP	6. Ensure two RBCU Fans are running in slow speed (one per train).	Attachment 3

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC	Scenario # 2	Event #7	Page: 41 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.			
Time/ Position	Applicant's Actions or Behavior		

BOP	7. Verify Service Water flow to RBCUs: a. Ensure Service Water Pump A is running. b. Check if Service Water Booster Pump A is running. c. GO TO Step 7.f. f. Ensure Service Water Pump B is running. g. Check if Service Water Booster Pump B is running. h. GO TO Step 7.k. k. Verify GREATER THAN 2000 gpm flow for each train on: (NO) • FI-4466, SWBP A DISCH FLOW GPM. • FI-4496, SWBP B DISCH FLOW GPM.	Attachment 3
BOP	8. Ensure one CCW pump per train is running.	Attachment 3
BOP	9. Ensure two Chilled Water Pumps and Chillers are running.	Attachment 3
BOP	10. Verify both trains of Control Room Ventilation are running in Emergency Mode.	Attachment 3
BOP	11. Check if Main Steamlines should be isolated: a. Check if any of the following conditions are met: • RB pressure GREATER THAN 6.35 psig. - OR • Steamline pressure LESS THAN 675 psig. - OR • Steamline flow GREATER THAN 1.6 MPPH AND Tavg LESS THAN 552°F. b. Ensure all the following are closed: • MS Isolation Valves, PVM-2801A(B)(C). • MS Isolation Bypass Valves, PVM-2869A(B)(C).	Attachment 3

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC	Scenario # 2	Event #7	Page: 42 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.			
Time/ Position	Applicant's Actions or Behavior		

BOP	12. Ensure Excess Letdown Isolation Valves are closed: • PVT-8153, XS LTDN ISOL. • PVT-8154, XS LTDN ISOL.	Attachment 3
BOP	13. Verify ESF monitor lights indicate Phase A AND Containment Ventilation Isolation on XCP-6103, 6104, and 6106. REFER TO ATTACHMENT 4, CONTAINMENT ISOLATION VALVE MCB STATUS LIGHT LOCATIONS, as needed.	Attachment 3
BOP	14. Verify proper SI alignment: a. Verify SI valve alignment by verifying SAFETY INJECTION/PHASE A ISOL monitor lights are bright on XCP-6104. b. Verify <u>all</u> SAFETY INJECTION monitor lights are dim on XCP-6106. c. Verify SI flow on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. d. Check if RCS pressure is LESS THAN 325 psig.	Attachment 3
BOP	14.d. ALTERNATIVE ACTION Notify the CRS that ATTACHMENT 3, SI EQUIPMENT VERIFICATION, is complete.	Attachment 3

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC	Scenario # 2	Event #7	Page: 43 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.			
Time/ Position	Applicant's Actions or Behavior		

EVALUTOR NOTE	These are steps for SOP-117, SECTION III.F, SHIFTING LOOP B SERVICE WATER PUMPS.	
Crew	Enters SOP-117, SECTION III.F, SHIFTING LOOP B SERVICE WATER PUMPS	
RO/BOP	2.1 Shift from Service Water Pump B to Service Water Pump C in service, as follows: a. With the exception of racking down XSW1EB 04, SERVICE WATER PUMP XPP0039B-SW, complete Attachment VI.	SOP-117 Section III.F
EVALUATOR NOTE:	SOP-117 Att. VI is not in the simulator. When requested, provided a blank copy to the crew.	
BOOTH OPERATOR:	When requested to complete SOP-117 Attachment VI with the exception of racking down the "B" SW PP breaker, wait 2 minutes and insert TRIGGER 10.	Section III.F
BOOTH OPERATOR:	XVT-3157C/3158C ARE not modeled in the simulator. When requested, wait 1 minute and report actions complete.	Section III.F
RO/BOP	b. Close XVT03158C-SW, SW PP C MTR LOWER BRG CLG WTR SUP VALVE (SW-436).	Section III.F
RO/BOP	c. Start XPP-0039C, PUMP C TRAIN B.	Section III.F
RO/BOP	d. Ensure sufficient Service Water Pump C cooling water flow by throttling XVT03158C-SW, SW PP C MTR LOWER BRG CLG WTR SUP VALVE, to obtain lower bearing flow between 3 gpm and 4 gpm (SW-436).	Section III.F
RO/BOP	e. Verify MVB-3116C, SWP C DISCH, automatically opens.	Section III.F
RO/BOP	f. Ensure Service Water Pump C cooling water flow has remained between 3 gpm and 4 gpm. If not throttle XVT03158C-SW, SW PP C MTR LOWER BRG CLG WTR SUP VALVE as necessary (SW-436).	Section III.F
RO/BOP	g. Ensure sufficient Service Water Pump C cooling water flow by throttling XVT03157C-SW, SW PP C MTR UPPER BRG CLG WTR SUP VALVE, to obtain upper bearing flow between 10 gpm and 12 gpm (SW-436).	Section III.F

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC	Scenario # 2	Event #7	Page: 44 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.			
Time/ Position	Applicant's Actions or Behavior		

RO/BOP	h. At XPN-13, C SERVICE WATER SCREEN, Control Panel (SW-436), verify proper traveling screen operation as follows: 1) Place the Screen Selector in HAND. 2) Verify proper screen operation and screen wash flow. 3) Place the Screen Selector Switch in AUTO.	Section III.F
BOOTH OPERATOR:	The Service Water Screen is not modeled in the simulator. When requested to complete Step 2.1.h, wait 2 minutes and report back completion and proper operation of the "C" SW PP Screen.	Section III.F
RO/BOP	i. Stop XPP-0039B, PUMP B, and place the control switch in PULL TO LK NON-A.	Section III.F
RO/BOP	j. Verify MVB-3116B, SWP B DISCH, automatically closes.	Section III.F
BOOTH OPERATOR:	The "B" SW PP is already secured and MVB-3116B is already closed.	Section III.F
RO/BOP	k. Re-verify Service Water Pump C cooling water flow and adjust, as necessary, by throttling the following (SW-436): 1) XVT03157C-SW, SW PP C MTR UPPER BRG CLG WTR SUP VALVE, to obtain upper bearing flow between 10 gpm and 12 gpm. 2) XVT03158C-SW, SW PP C MTR LOWER BRG CLG WTR SUP VALVE, to obtain lower bearing flow between 3 gpm and 4 gpm.	Section III.F
BOOTH INSTRUCTOR:	When requested, "C" SW PP cooling water flow is sufficient, within the ranges given.	Section III.F
RO/BOP	l. Rack down XSW1EB 04, SERVICE WATER PUMP XPP0039B-SW (SW-440).	Section III.F
BOOTH OPERATOR:	When requested to rack down "B" SW Pump breaker, wait 2 minutes and insert TRIGGER 11.	Section III.F
RO/BOP	m. At XPN-12, B SERVICE WATER SCREEN, Control Panel (SW-436), place the Screen Selector Switch to OFF.	Section III.F
BOOTH OPERATOR:	"C" SW Screen is not modeled in simulator. When requested, report you have place the Screen Selector Switch to OFF.	Section III.F
RO/BOP	n. Complete Attachment VI.	Section III.F

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC	Scenario # 2	Event #7	Page: 45 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.			
Time/ Position	Applicant's Actions or Behavior		

EVALUATOR NOTE:	There are no additional actions to take per Attachment VI.
RO/BOP	o. Adjust flow through service water loads, as necessary.
RO/BOP	p. Ensure proper Service Water flow through the operable Train B Chiller per SOP-501.

Section III.F

Section III.F

Section III.F

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC	Scenario # 2	Event #7	Page: 46 of 46
Event Description: Earthquake, followed by three faulted Steam Generators and an ATWS.			
Time/ Position	Applicant's Actions or Behavior		

Procedure Revisions used in this Scenario Guide			
Number	Title	Rev	Date
GOP-4B	POWER OPERATION (MODE 1 – DESCENDING)	1J	3/21/23
SOP-106	REACTOR MAKEUP WATER SYSTEM	12B	7/11/19
SOP-117	SERVICE WATER SYSTEM	26A	12/2/22
SOP-214	MAIN TURBINE AND CONTROLS	22	3/8/23
SOP-304	115KV/7.2KV/ OPERATIONS	15	7/28/22
XCP-605	ANNUNCIATOR RESPONSE PROCEDURE	7B	7/6/21
XCP-613	ANNUNCIATOR RESPONSE PROCEDURE	9H	1/24/22
XCP-615	ANNUNCIATOR RESPONSE PROCEDURE	8	3/2/22
XCP-632	ANNUNCIATOR RESPONSE PROCEDURE	8B	5/26/23
XCP-633	ANNUNCIATOR RESPONSE PROCEDURE	10	11/19/21
AOP-117.1	LOSS OF SERVICE WATER	6	5/12/22
AOP-401.2	PROTECTION CHANNEL RCS LOOP RTD FAILURE	3	11/28/15
EOP-1.0	E-0, REACTOR TRIP OR SAFETY INJECTION	32	7/15/21
EOP-3.0	E-2, FAULTED STEAM GENERATOR ISOLATION	14	2/5/20
EOP-3.1	ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS	19	2/5/20
	V.C. SUMMER TECHNICAL SPECIFICIATIONS	223	11/10/22

Form 3.3-1 Scenario Outline

Facility:	VC SUMMER	Scenario #:	#3
Scenario Source:	New	Op. Test #:	ILO 22-01 NRC-2023
Examiners:	Applicants/ Operators:		
Initial Conditions:	- Reactor power is 75%. "B" train work week. - XFN-0065B RBCU is OOS.		
Turnover:	Continue power ascension to 100%.		
Critical Tasks:	- Control initial RCS cooldown in EOP-4.0 such that no RCS Cold Leg Temperature goes $\leq 250^{\circ}\text{F}$. - Isolate Steam flow from Ruptured SG before S/G pressure lowers to 460 psig.		

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N-BOP, US R-RO	Increase power to 100% in accordance with GOP-4A.
2	MAL-NIS003D	I/MC-RO, US TS-US	Power Range Channel N-44 fails low, causing automatic control rods to withdraw.
3#	PMP-CS004S	C-RO, US TS-US	The running Charging Pump shaft shears. (2019 NRC Scenario #2)
4	MAL-FWM002A	C-BOP, US	"A" Condensate Pump Trip.
5	XMT-FW017O	I/MC-BOP, US	PT-508 (FW PP DISCH HDR PRESS) fails low causing Main Feed Pumps to speed up.

Form 3.3-1 Scenario Outline

6	MAL-RCS002B	M-All	"B" SGTR
	VLV-MS003P		"B" SG PORV opens after reactor trip. Creates a faulted ruptured SG that can be isolated.
	PMP-AH022F PMP-AH023F PMP-AH025F		Control Room Emergency Ventilation fails to actuate when the Safety Injection actuates.
TERMINATE: The scenario may be terminated when the crew has stopped the first charging pump after the depressurization in EOP-4.0 or at the discretion of the Lead Examiner.			
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control			

Used on previous two NRC Exams.

The following notation is used in the Form 3.3-2 "Time" column:

IOA designates Immediate Operator Action steps.

***** designates Continuous Action steps.

Form 3.3-1 Scenario Outline

TURNOVER:

The crew will assume the watch having been pre-briefed on the Initial Conditions, the plan for this shift and any related operating procedures.

Train "B" RBCU, XFN-0065B is tagged out for breaker maintenance and is to be returned to service next shift.

The Unit is at 75% power MOL, plant stable.

Management directs that the Unit power be increased to 100% at ½% per minute in accordance with GOP-4A POWER OPERATION (MODE 1 - ASCENDING) continuing with step 3.16.e in accordance with the reactivity plan provided.

Phoenix display monitor is out of service. The Shift Engineer is tracking all necessary actions in Work Control.

Current RCS Boron concentration by chemistry is 1103 ppm.

Pre-loaded Items

- OVR-AH022A
CS-AH280 RBCU FAN 65B FAST SPEED GREEN L
FINAL: OFF
- OVR-AH023A
CS-AH279 RBCU FAN 65B SLOW SPEED GREEN L
FINAL: OFF

EVENT 1: Raise Reactor Power.

GOP-4A, Power Operation (Mode 1 - ASCENDING) will be used to guide the actions of the crew. The US will direct a power increase at 1/2% per minute or less and provide oversight during the load increase. The RO will adjust RCS boron in accordance with a reactivity plan while the BOP operates Turbine EHC system controls to increase turbine load. Once power has been raised sufficiently for the chief examiner, the next event may be inserted.

EVENT 2: Power Range NI Channel N-44 fails LOW.

- **TRIGGER 2**
 - o MAL-NIS003D
POWER RANGE CHANNEL 44 FAILURE
FINAL: 0%

On cue from the Examiner Power Range NI Channel N-44 will fail low. This will cause rods to withdraw automatically. The crew will implement AOP-401.10, Power Range Channel Failure and place the Rod Control Bank Select switch in MAN. The channel will be removed from service.

The US applies Tech Spec 3.3.1, Reactor Trip System Instrumentation Table 3.3-1 function 2, Power Range Neutron Flux high trip and function 3, Power Range Neutron Flux – high positive rate, both of which specify action 2. Action 2 requires that the inoperable channel be placed in the tripped condition within 72 hours.

In addition the US must apply Tech Spec 3.3.1, Table 3.3-1 function 19, Reactor Trip System Interlocks; B. Low Power Reactor Trips Block, P-7, C. Power Range Neutron Flux, P-8, D. Power Range Neutron Flux, P-10 and F. Power Range Neutron Flux, P-9 all of which specify action 7. Action 7 requires that within one hour determine by observation of the associated permissive annunciators window(s) that the interlock is in its required state for the existing plant condition, or apply Specification 3.0.3

Once the crew has stabilized Tavg with rods in manual and addressed the Tech Specs, the next event may be inserted.

EVENT 3: The running Charging Pump shaft shears

- **TRIGGER 3**
 - o PMP-CS004S
XPP0043A CHRG/SI PMP A SHEARED SHAFT
- **TRIGGER 12**
 - o LOA-CVC043
CHARGING PUMP C SUPPLY BRKR TRAIN A
FINAL: RACKED IN
- **TRIGGER 13**
 - o LOA-CVC041
CHARGING PUMP A SUPPLY BRKR
FINAL: RACKED OUT
- **TRIGGER 16**
 - LOA-CVC070
XPN5585 – ALT SEAL INJ SYSTEM CONTROL SWITCH
FINAL: OFF
- **TRIGGER 22**
 - LOA-CVC070
XPN5585 – ALT SEAL INJ SYSTEM CONTROL SWITCH
FINAL: AUTO

On cue from the Examiner the running Charging Pump “A” shaft will shear. This will cause a loss of charging flow and a lowering Pressurizer level. The crew will respond using AOP-102.2, LOSS OF CHARGING. Letdown will be isolated and either the “B” or “C” Charging pump will be started in accordance with SOP-102, CHEMICAL AND VOLUME CONTROL SYSTEM. The RO will maintain RCS inventory using the charging system.

The US will refer to TS 3.5.2, Emergency Core Cooling Systems, ECCS Subsystems - $T_{avg} > 350^{\circ}\text{F}$. Action a: With one ECCS subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

Once the crew has re-established charging and Tech Specs have been addressed, the next event may be inserted.

EVENT 4: “A” Condensate Pump trip.

- **TRIGGER 4**

- o MAL-FWM002A
CONDENSATE PUMP A TRIP

On cue from the Examiner, the “A” Condensate Pump will trip. The crew will enter AOP-208.1, Condensate Pump Trip/Loss of Condensate Flow. The BOP will start the “C” Condensate pump and open XVB-614C, C DISCH ISOL to restore normal condensate flow for the current conditions. Once “C” Condensate pump has been started and DA level has stabilized, the next event may be inserted.

EVENT 5: PT-508 fails low, causing Main Feedwater Pumps to speed up.

- **TRIGGER 5**

- o XMT-FW017O
IPT00508 FW PP DSCHG HDR PRESS PI-508 FAIL TO POSN
FINAL: 200 psig
RAMP: 15 sec

On cue from the Examiner, PT-508 will fail low, causing main feedwater pumps to speed up. The BOP will take manual control of the Main Feedwater Pump Master Controller and raise main feedwater pump speed. The crew will enter AOP-210.3, Feedwater Pump Malfunction. They will restore main feedwater pump D/P to the proper program band in manual. Once main feedwater pump D/P has been restored to the proper program band, the next event may be inserted.

EVENT 6: SGTR, Ruptured SG becomes faulted

- **PRELOAD**
 - o PMP-AH022F
XFN0030A CNTRL ROOM EMERG FAN A FAIL TO START
 - o PMP-AH023F
XFN0030B CNTRL ROOM EMERG FAN B FAIL TO START
 - o PMP-AH025F
XFN0032B CNTRL ROOM VENT FAN B FAIL TO START
- **TRIGGER 6**
 - o MAL-RCS002B
STEAM GENERATOR B TUBE LEAK
FINAL: 300
- **AUTO-TRIGGER 14** x06o013a (B SG PORV OPENS)
 - o VLV-MS003P
IPV02010-MS STM DMP PWR REL VLV FAIL POSITION
FINAL: 25%
- **AUTO-TRIGGER 15** x10o021m (ALLOWS B SG PORV TO BE CLOSED)
 - o VLV-MS003P (NEW)
IPV02010-MS STM DMP PWR REL VLV FAIL POSITION
DELETE IN: 1 sec
- **AUTO-TRIGGER 17** x16i036t (ALLOWS XFN-30A TO BE STARTED)
 - o PMP-AH022F
XFN0030A CNTRL ROOM EMERG FAN A FAIL TO START
DELETE IN: 00:01
- **AUTO-TRIGGER 18** x16i037t (ALLOWS XFN-32B TO BE STARTED)
 - o PMP-AH025F
XFN0032B CNTRL ROOM VENT FAN B FAIL TO START
DELETE IN: 1 sec
- **AUTO-TRIGGER 19** x16i038t (ALLOWS XFN-30B TO BE STARTED)
 - o PMP-AH023F
XFN0030B CNTRL ROOM EMERG FAN B FAIL TO START
DELETE IN: 00:01
- **TRIGGER 20**
 - o LOA-AUX130
DIESEL AIR COMPRESSOR LOCAL CONTROL
FINAL: START

Form 3.3-1 Scenario Outline

- **TRIGGER 21**
 - LOA-FWM163
SG B MTR DR EF PUMP SUPPLY HEADER VALVE – 1017B
FINAL: 0
- **TRIGGER 21**
 - LOA-FWM166
SG B TURB DR EF PUMP SUPPLY HDR VALVE – 1018B
FINAL: 0

On cue from the Examiner, the “B” SG will become ruptured. This will lead to a reactor trip and entry into EOP-1.0. When the reactor trips, the “B” SG PORV will open. Control Room Emergency Ventilation will fail to start automatically but can be started manually using Attachment 3 of EOP-1.0. The crew can isolate the SG PORV using Attachment 6 of EOP-1.0 or they may transition to EOP-3.0 and isolate it in this procedure. The crew will transition to EOP-4.0 where they will isolate the “B” SG, cooldown, depressurize and get off Safety Injection.

CRITICAL TASKS:

- Control initial RCS cooldown in EOP-4.0 such that no RCS Cold Leg Temperature goes $\leq 250^{\circ}\text{F}$.
- Isolate Steam flow from Ruptured SG before S/G pressure lowers to 460 psig.

TERMINATION:

The scenario may be terminated when the crew has stopped the first charging pump after the depressurization in EOP-4.0 or at the discretion of the Lead Examiner.

Form 3.3-1 Scenario Outline

2023 NRC #3

Scenario Attributes		Events
Events after EOP entry (1-2)	1	Ruptured SG PORV Opens on TRIP, can be manually closed.
Abnormal Events (2-4)	4	- NI-44 fails low, rods withdraw. "A" Condensate Pump trip start standby Pump. - PT-508, FW PP DISCH HDR PRESS PSIG, fails low. "A" Charging pump sheared shaft. (2019 NRC #2).
Major Transients (1-2)	1	Steam Generator Tube Rupture.
EOPs Entered (1-2)	2	- EOP-3.0, E-2 FAULTED STEAM GENERATOR ISOLATION. - EOP-4.0, E-3 STEAM GENERATOR TUBE RUPTURE.
EOP Contingencies (0-2)	0	N/A
Preidentified CTs (≥ 2)	2	- Control the initial RCS cooldown in EOP-4.0 such that a transition to EOP-16.0 is not required. - Isolate Steam flow from Ruptured SG before transition to EOP-4.2 is required.

Form 3.3-1 Scenario Outline

SIMULATOR SCENARIO SETUP

INITIAL CONDITIONS:

- IC Set 258
- 75% Power, MOL
- Burnup = 10,000 MWD/MTU
- Current Core Cycle = 28
- RCS Boron Concentration = 1103 ppm
- FCV-113 Pot Setting = 4.73
- Rod Position: Group D = 191
- Tavg = 579.8°F

PRE-EXERCISE:

- Ensure simulator has been checked for hardware problems (DORT, burnt out light bulbs, switch malfunctions, chart recorders, etc.).
- Complete VCS-TQP-0807 Attachment I-A, Unit 1 Booth Instructor Checklist.
- Verify plant aligned for "B1" work week IAW PTP-101.004, Safety Related Train Swap Checklist.
- Verify red Placard on "A" CCW Pump and "B" Charging Pump.
- Verify the Hard Card for Turbine operation is in its proper storage location and cleaned.
- Verify the Hard Card for borating via MVT-8104 is in its proper storage location and cleaned.
- Ensure no NI's are removed from service, on SIPCS type in "add/omit" to verify.
- Ensure 115kV & 230kV setpoints are set to appropriate values for the shutdown condition IAW SOP-304, Enclosure B.
- Place HOLD Tag on RBCU 65B NORM and SLOW Speed Switches.
- Ensure Phoenix computer screen is turned off.
- Ensure you have a turnover sheet for each position.
- Conduct two-minute drill.

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 1 Page: 11 of 61
Event Description: Raise power IAW GOP-4A.

Time/ Position	Applicant's Actions or Behavior
EVALUATOR NOTE:	Crew will increase power in accordance with GOP-4A POWER OPERATION (MODE 1 - ASCENDING) continuing with step 3.16.e.
BOOTH OPERATOR:	NO TRIGGER
Symptoms/ Cues:	None
US	Directs a power increase in accordance with GOP-4A, POWER OPERATION (MODE 1 ASCENDING).

GOP-4A

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC

Scenario # 3 Event # 1

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Event Description: Raise power IAW GOP-4A.

Time/ Position	Applicant's Actions or Behavior
	<u>GOP- 4A REFERENCE PAGE</u> <u>GENERAL NOTES</u> A. Procedure steps should normally be performed in sequence. However, it is acceptable to perform steps in advance after thorough evaluation of plant conditions and impact by the Shift Manager or Unit Supervisor. B. Axial Flux Difference, ΔI, should be maintained within limits per V.C. Summer Curve Book, Figure I-1 during Reactor Power Operation above 50% per Tech Spec 3.2.1. C. After any Thermal Power change of greater than 15% within any one hour, Attachment III.H. of GTP-702 must be completed. D. If time allows, all load changes should be discussed with the System Controller prior to commencing the load change. <u>REACTOR CONTROL</u> A. During operation with a positive Moderator Temperature Coefficient: 1) Power and temperature changes should be slow and will require constant operator attention. 2) T_{avg} should be maintained within 0.5°F of T_{ref} unless T_{avg} is being increased in preparation for Turbine startup. 3) All power and load changes should be performed in small increments. B. Reactor Power increases should be made in accordance with the guidelines established in GOP Appendix A. The recommended rate of power increase is 1/2% per minute and need not be continuous. C. Rod Control should be maintained in Automatic if any Pressurizer PORV is isolated. <u>TURBINE CONTROL</u> A. If during load changes, plant stabilization is required, under the Turbine HMI: Control/Load screen, select HOLD. B. To resume power ascension select the recommended Load Ramp Rate. C. Turbine Load values are approximate and provided as initial starting points for load changes. When desired Reactor or Turbine parameters are achieved stabilize (if necessary) and proceed as directed. <u>MSR CONTROL</u> A. Do not exceed 50°F ΔT between the inlets to the Low Pressure Turbine. B. When in Manual, do not exceed 25°F per half-hour temperature change rate for the tube side of the Moisture Separator/Reheater.
	<u>NOTE 3.14 through 3.16</u> Steps 3.14 through 3.16 raise Reactor Power from 48% to 90%.

GOP-4A

GOP-4A

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 3	Event # 1	Page: 13 of 61
Event Description: Raise power IAW GOP-4A.				
Time/ Position		Applicant's Actions or Behavior		
BOP	3.16.e At 80% Reactor Power, align Control Valve drain valves as follows: 1) Ensure PVG-2898B, DV-4, is open as follows: a) Verify Control Valve #4 is closed. b) Verify PVG-2898B, DV-4, is open. c) If both PVG-2898B, DV-4, and Control Valve #4 are closed, open PVG-2898B, DV-4, by opening PVG-2898D, STM LEAD DRN FOR CV-1. 2) Open MVG-2897, COMB CNTRL VLV BSD. f. When Control Valve #4 indicates greater than 5% open, perform the following: 1) Ensure PVG-2898B, DV-4, is CLOSED. 2) Close MVG-2897, COMB CNTRL VLV BSD.			GOP-4A
EVAULATOR NOTE	The RO will setup to alternate dilute the RCS using SOP-106, Section III.E. The steps for alternate diluting are as follows below.			
	NOTE 2.0 1. Energizing additional Pressurizer Heaters will enhance mixing. 2. LCV-115A, LTDN DIVERT TO HU-TK, will begin to modulate to the HU-TK position at 70% level on LI-115, VCT LEVEL %.			SOP-106
RO	2.0 INSTRUCTIONS 2.1 Ensure at least one Reactor Coolant Pump is running.			SOP-106
RO	2.2 Place RX COOL SYS MU switch to STOP.			SOP-106
RO	2.3 Place RX COOL SYS MU MODE SELECT switch to ALT DIL. (Peer ✓)			SOP-106
RO	2.4 Adjust FCV-168, TOTAL MU FLOW, for desired flow rate. (Peer ✓)			SOP-106
RO	2.5 Set FIS-168, TOTAL MU FLOW, batch integrator to desired volume. (Peer ✓)			SOP-106
RO	2.6 Place RX COOL SYS MU switch to START.			SOP-106
RO	2.7 Verify desired flow rate on FR-113, TOTAL MU GPM (F-168).			SOP-106

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 3 Event # 1		Page: 14 of 61
Event Description: Raise power IAW GOP-4A.				
Time/ Position	Applicant's Actions or Behavior			
RO	2.8	Verify alternate dilution stops when preset volume is reached on FIS-168, TOTAL MU FLOW, batch integrator.		SOP-106
RO	2.9	Place RX COOL SYS MU switch to STOP.		SOP-106
RO	2.10	Place RX COOL SYS MU MODE SELECT switch to AUTO. (Peer ✓)		SOP-106
RO	2.11	Adjust FCV-168, TOTAL MU FLOW SET PT, to 7.5 (120 gpm). (Peer ✓)		SOP-106
RO	2.12	Place RX COOL SYS MU switch to START. (Peer ✓)		SOP-106
EVALUATOR NOTE	The BOP will now obtain the hard card of SOP-214, Section III.E to raise load. The steps to raise load are as follows below.			
	<u>CAUTION 2.0</u> The load set should not be raised drastically and kept close to the actual load. Large load increases could occur if a runback occurs.			SOP-214
BOP	2.1	Select Ramp Rate and enter desired rate of 1% or less.		SOP-214
BOP	2.2	Raise Turbine Load by one of the following methods: a. Slowly Raise Turbine load automatically as follows (preferred method): 1) Select the Load pushbutton (a dialog box opens). 2) Enter the desired load setpoint. (Peer ✓) 3) Confirm setpoint. (Peer ✓) 4) Verify proper plant response.		SOP-214
EVALUATOR NOTE:	The next event will be initiated at the discretion of the Lead Examiner.			

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 2 Page: 15 of 61
 Event Description: N-44 fails low.

Time/ Position	Applicant's Actions or Behavior	
EVALUATOR NOTE:	On cue from the Examiner, Power Range Channel N-44 fails low, causing automatic control rods to withdraw. The crew will enter AOP-401.10, POWER RANGE CHANNEL FAILURE, in response.	
BOOTH OPERATOR:	When directed – initiate Event 2 (TRIGGER 2).	
Symptoms/ Cues:	• XCP-620 1-4, PR CHAN DEV. • RODS OUT white light lit. • NIS-44B, NIS POWER % FULL POWER, indicates zero. • Step Counters for Control Bank “D” indicating rods withdrawing.	
US	Enters AOP-401.10, POWER RANGE CHANNEL FAILURE.	AOP-401.10
RO (IOA)	1. Verify normal indication on Power Range Channel N-44.	AOP-401.10
RO (IOA)	1. ALTERNATIVE ACTION IF Power Range Channel N-44 has failed, <u>THEN</u> place the ROD CNTRL BANK SEL Switch in MAN.	AOP-401.10
RO (IOA)	2. Stabilize <u>any</u> plant transients in progress.	AOP-401.10
BOP	*3. Maintain stable plant conditions.	AOP-401.10
US	4. Verify <u>no</u> testing is in progress on the operable Power Range channels.	AOP-401.10
BOOTH OPERATOR:	If called as I&C to verify no testing is in progress, respond that no testing is in progress.	
BOP	5. Place ROD STOP BYPASS Switch (on the MISCELLANEOUS CONTROL AND INDICATION PANEL) for the failed Power Range channel in BYPASS.	AOP-401.10

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 2 Page: 16 of 61

Event Description: N-44 fails low.

Time/ Position	Applicant's Actions or Behavior	
RO	6. Verify the appropriate Rod Stop Bypass status light is bright: • For N-41, A1 OP ROD STOP BYP (XCP-6111 4-1). • For N-42, B1 OP ROD STOP BYP (XCP-6111 4-2). • For N-43, A2 OP ROD STOP BYP (XCP-6111 4-3). • For N-44, B2 OP ROD STOP BYP (XCP-6111 4-4).	AOP-401.10
RO	7. Adjust Control Rods to maintain Tavg within 1.0°F of Tref .	AOP-401.10
RO	8. Align the Power Range channel comparator circuits: a. Place the following switches to the failed Power Range channel position: 1) COMPARATOR CHANNEL DEFEAT Switch (on the COMPARATOR AND RATE drawer). 2) UPPER SECTION Switch (on the DETECTOR CURRENT COMPARATOR drawer). 3) LOWER SECTION Switch (on the DETECTOR CURRENT COMPARATOR drawer).	AOP-401.10
EVALUATOR NOTE:	The candidate should select any position other than the “P4” or the “ΔFIV” positions.	AOP-401.10
RO	9. Ensure NR-45 is selected to appropriate operable channels.	AOP-401.10
RO	10. Within one hour, verify that the following permissive status lights are in the required state for the existing plant condition. • P-7. • P-8. • P-9. • P-10.	AOP-401.10

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 2 Page: 17 of 61
 Event Description: N-44 fails low.

Time/ Position	Applicant's Actions or Behavior											
US	11. Remove the following IPCS points for the AFFECTED Instrument from processing. REFER TO OAP-107.1, CONTROL OF IPCS FUNCTIONS. <table><tr><th>INSTRUMENT</th><th>IPCS POINT</th></tr><tr><td>N-41</td><td>N0041A N0042A N0049A</td></tr><tr><td>N-42</td><td>N0043A N0044A N0050A</td></tr><tr><td>N-43</td><td>N0045A N0046A N0051A</td></tr><tr><td>N-44</td><td>N0047A N0048A N0052A</td></tr></table>	INSTRUMENT	IPCS POINT	N-41	N0041A N0042A N0049A	N-42	N0043A N0044A N0050A	N-43	N0045A N0046A N0051A	N-44	N0047A N0048A N0052A	AOP-401.10
INSTRUMENT	IPCS POINT											
N-41	N0041A N0042A N0049A											
N-42	N0043A N0044A N0050A											
N-43	N0045A N0046A N0051A											
N-44	N0047A N0048A N0052A											
BOOTH OPERATOR:	If IPCS Points are removed from service, ensure they are put back in service after the conclusion of the scenario.											
RO	12. Check if Reactor Power is LESS THAN 75%.	AOP-401.10										
RO	12. ALTERNATIVE ACTION Initiate GTP-702, Attachment IV.F.	AOP-401.10										
RO	13. Check if Reactor Power is LESS THAN 50%.	AOP-401.10										
RO	13. ALTERNATIVE ACTION Initiate GTP-702, Attachment IV.D.	AOP-401.10										
	NOTE – Step 14 Compliance with T.S. requires tripping failed instrument channel bistables within 72 hours of the channel failure. Time should be allowed for troubleshooting of the failed channel prior to tripping the bistables.	AOP-401.10										
US	14. Place the failed channel protection bistables in a tripped condition within 72 hours of the channel failure: a. Write an R&R for the failed channel. b. Select the attachment for the failed channel from the back of this procedure. c. Record the R&R number on the attachment. d. Determine the cause of the channel failure.	AOP-401.10										

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 2 Page: 18 of 61
Event Description: N-44 fails low.

Time/ Position Applicant's Actions or Behavior

AOP-401.10
ATTACHMENT 4
PAGE 1 of 1
REVISION 4

AOP-401.10

POWER RANGE NUCLEAR INSTRUMENTATION N-44

TRIPPED BISTABLE STATUS

INSTRUMENT	ASSOCIATED BISTABLE	BISTABLE LOCATION	TRIP STATUS LIGHT
N-44	NC-44P	NIS RACK	CHAN IV PR FLUX LO SET PT
	NC-44R	NIS RACK	CHAN IV PR FLUX HI SET PT
	NC-44U(+)	NIS RACK	CHAN IV PR FLUX RATE HI

R&R# _____

TRIP

APPLICABLE STPS	STP # USED TO TRIP BISTABLE	TRIP STATUS LIGHT ON	TRIPPED BY	VERIFIED BY
302.041				
310.008				

RESTORATION

APPLICABLE STP(S) COMPLETED	STP # USED TO RESTORE BISTABLE	TRIP STATUS LIGHT OFF	RESTORED BY	VERIFIED BY

REVIEWED BY: _____ / _____
SHIFT MANAGER DATE

TECH SPECS

TABLE 3.3-1 ITEMS 2, 3, 19

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 2 Page: 19 of 61
Event Description: N-44 fails low.

Time/ Position	Applicant's Actions or Behavior	
US	Enters Tech Spec Spec 3.3.1 Reactor Trip System Instrumentation Table 3.3-1, Function 2, Power Range, Neutron Flux High and Low Setpoint – Action 2. POWER OPERATION may proceed provided the following conditions are satisfied: a. The inoperable channel is placed in the tripped condition within 72 hours. b. The Minimum Channel OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels per Specification 4.3.1.1. c. Either, THERMAL POWER is restricted to less than or equal to 75% of RATED THERMAL POWER and the Power Range Neutron Flux trip setpoint is reduced to less than or equal to 85% of RATED THERMAL POWER within 4 hours; or, the QUADRANT POWER TILT RATIO is monitored at least once per 12 hours per Specification 4.2.4.2.	AOP-401.10
US	Enters Tech Spec Spec 3.3.1 Reactor Trip System Instrumentation Table 3.3-1, Function 3, Power Range, Neutron Flux High and Low Setpoint – Action 2. SAME ACTION AS ABOVE.	AOP-401.10
US	Enters Tech Spec Spec 3.3.1 Reactor Trip System Instrumentation Table 3.3-1, Function 19, Reactor Trip System Interlocks – Action 7. With less than the Minimum Number of Channels OPERABLE, within one hour determine by observation of the associated permissive annunciator window(s) that the interlock is in its required state for the existing plant condition, or apply Specification 3.0.3.	AOP-401.10
EVALUATOR NOTE:	The next event will be initiated at the discretion of the Lead Examiner.	

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 3 Event # 3		Page: 20 of 61
Event Description: The running Charging Pump shaft shears.				
Time/ Position		Applicant's Actions or Behavior		
EVALUATOR NOTE:		On cue from the Examiner the running Charging Pump "A" shaft will shear. This will cause a loss of charging flow and a lowering Pressurizer level. The crew will respond using AOP-102.2, LOSS OF CHARGING. Letdown will be isolated and either the "B" or "C" Charging pump will be started in accordance with SOP 102, Chemical and Volume Control System. The RO will maintain RCS inventory using the charging system.		
BOOTH OPERATOR:		When directed – initiate Event 3 (TRIGGER 3).		
Symptoms/ Cues:		• XCP-617(618)(619) 2-2, RCP A(B)(C) #1 SL INJ FLO LO. • XCP-614 2-1, ALT SL INJ PUMP RUN. • XCP-614 2-2, ALT SL INJ DSL GEN RUN. • XCP-614 5-1, CHG LINE FLO HI/LO. • XCP-613 1-4, REGEN HX LTDN OUT TEMP HI Abnormal indication on the following: • FI-122A, CHG FLOW GPM. • FI-122C, CHARGING FLOW GPM. • PI-121, CHG PRESS PSIG. • LT-112A (115), % LEVEL. • LR-459, PZR % LEVEL & LEVEL SP.		
RO		Enters XCP-614 5-1, CHG LINE FLO HI/LO.		XCP 614, 5-1
RO		CORRECTIVE ACTIONS: 1. If the running Charging Pump suction flowpath has become isolated, secure the Charging Pump and go to AOP-102.2, LOSS OF CHARGING. (NO) 2. If the PUMP A(B) or PUMP C TRAIN A(B) ammeter indication is abnormal for the running Charging Pump and the pump must be tripped, go to AOP-102.2, LOSS OF CHARGING.		XCP 614, 5-1

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 3	Event # 3	Page: 21 of 61
Event Description: The running Charging Pump shaft shears.				
Time/ Position		Applicant's Actions or Behavior		
BOOTH OPERATOR:		If contacted to investigate the Charging pumps report: • If crew hasn't opened breaker, wait 1 minute and report "The "A" Pump motor is running with no pump discharge pressure." • If crew has opened breaker, wait 1 minute and report "The "A" pump shaft appears to be sheared." • If contacted to check breaker for "A" Charging pump, wait 1 minute and report "No evidence of breaker failure." • If contacted to rack "C" Charging Pump breaker to "A" bus, wait 2 minutes and report "Ready to Rack "C" pump to "A" bus." Use TRIGGER 12 to rack the "C" breaker to "A" bus and report "The "C" Charging pump breaker is racked up". • If contacted to rack "A" Charging Pump breaker down, wait 2 minutes and report "Ready to Rack down "A" pump breaker." Use TRIGGER 13 to rack the "A" breaker down and report "The "A" Charging pump breaker is racked down".		
US		Enters AOP-102.2, LOSS OF CHARGING		
		CAUTION Seal water injection should be maintained any time the RCS is pressurized.		
		NOTE The Alternate Seal Injection System should deliver 20 gpm of borated water from the RWST to the RCS.		
RO		1. Check if Charging Pump flow is normal: (NO) • FI-122A, CHG FLOW GPM, between 30 gpm and 115 gpm. • Pump amps between 30 amps and 50 amps. • PI-121, CHG PRESS PSIG, between 2650 psig and 2850 psig.		

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 3 Page: 22 of 61
Event Description: The running Charging Pump shaft shears.

Time/ Position	Applicant's Actions or Behavior

RO

1. ALTERNATIVE ACTION

Perform the following:

- a) Ensure the Charging Pump is secured.
- b) Close all Letdown Isolation Valves:
 - 1) PVT-8149A(B)(C), LTDN ORIFICE A(B)(C) ISOL
 - 2) PVT-8152, LTDN LINE ISOL.
 - 3) LCV-459, LTDN LINE ISOL.
 - 4) LCV-460, LTDN LINE ISOL.
- c) Close FCV-122, CHG FLOW.
- d) Verify CCW flow to the RCP Thermal Barriers is GREATER THAN 110 gpm on FI-7273A(B), THERM BARR FLOW GPM.
- e) Display Dedicated Display ZZRCPBRG on the IPCS to monitor RCP temperatures.
- f) Verify the Alternate Seal Injection System is in service as indicated by either of the following:
 - BOTH the following annunciators are lit:
 - 1) XCP-614 2-1 (ALT SL INJ PUMP RUN).
 - 2) XCP-614 2-2 (ALT SL INJ DSL GEN RUN).
 - OR
 - Seal Injection flow indicated on the following:
 - FT-130, SL INJ FLO on IUR01156.
 - FT-127, SL INJ FLO on IUR01155.
 - FT-124, SL INJ FLO on IUR01154.
- g) Contact Electrical and Mechanical Maintenance to investigate.
- h) GO TO Step 3.

AOP-102.2

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 3 Page: 23 of 61
 Event Description: The running Charging Pump shaft shears.

Time/ Position	Applicant's Actions or Behavior

RO

3. Verify Charging System valve lineup:

- a. IF Charging Pump suction is aligned to the VCT, THEN ensure both LCV-115C(E), VCT OUTLET ISOL are open.
- b. Ensure the following valves are open:
 - 1) MVG-8106, CHG PP.
 - 2) MVT-8109A(B)(C), CHG PP A(B)(C).
 - 3) MVG-8130A(B), LP A SUCT TO CHG PP C.
 - 4) MVG-8131A(B), LP B SUCT TO CHG PP C.
 - 5) MVG-8132A(B), CHG PP C TO LP A DISCH.
 - 6) MVG-8133A(B), CHG PP C TO LP B DISCH

AOP-102.2

RO

c. Check the Charging Header valve lineup as follows:

- 1) Ensure MVG-8107, CHG LINE ISOL, is open.
- 2) Ensure MVG-8108, CHG LINE ISOL, is open.
- 3) Ensure FCV-122, CHG FLOW, is in MAN and CLOSE.
- 4) Ensure one of the following valves is open:
 - PVT-8146, NORM CHG TO RCS LP B.
 OR
 - PVT-8147, ALT CHG TO RCS LP A.
- 5) Verify VCT level is GREATER THAN 20%.
- 6) Locally verify Charging Pump suction pressure meets the requirements in the table below as indicated on the following (AB-388):
 - PI-151A, SUCTION PRESS, for Charging Pump A
 - PI-152A, SUCTION PRESS, for Charging Pump B
 - PI-153A, SUCTION PRESS, for Charging Pump C

AOP-102.2

SUCTION SOURCE	PRESSURE
RWST	Between 15 and 100 PSIG
VCT	Between 30 and 100 PSIG

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 3	Event # 3	Page: 24 of 61
Event Description: The running Charging Pump shaft shears.				
Time/ Position	Applicant's Actions or Behavior			
BOOTH OPERATOR:	If directed to locally verify Charging suction pressure, and "C" OR "B" pump ready for start, wait 1 minute and report "Suction pressure on all gauges is approximately 57 psig and "C" OR "B" Charging pump is ready for start."			
BOOTH OPERATOR:	The US may assume authority for making the decision to start a Charging Pump. If the US calls the Shift Manager for permission to start the pump as stated in the procedure, grant permission.			
US/ RO	4. With Shift Manager's permission, start a Charging Pump, while monitoring RCP temperatures. REFER TO SOP-102, CHEMICAL AND VOLUME CONTROL SYSTEM.			
EVALUATOR NOTE:	The Operator will ensure the following as per SOP-102, CHEMICAL AND VOLUME CONTROL SYSTEM: • Breaker Racked Up. • Aux Oil Pump Running. • CCW Operating. • Chill water is Operating. • Suction Pressure > 30 psig (Local). • Miniflow isol open.			
RO	5. WHEN a Charging Pump is operating, THEN perform the following. REFER TO SOP-102, CHEMICAL AND VOLUME CONTROL SYSTEM. a. Place Charging and Normal Letdown in service. b. Secure Alternate Seal Injection.			
BOOTH OPERATOR:	When called to secure ASI System, wait 2 minutes and insert TRIGGER 16. If asked to place AI System back in AUTO, wait 2 minutes and insert TRIGGER 22.			
EVALUATOR NOTE:	The following steps for reestablishing Letdown are from SOP-102.			

AOP-102.2

AOP-102.2

AOP-102.2

AOP-102.2

AOP-102.2

AOP-102.2

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 3 Event # 3		Page: 25 of 61
Event Description: The running Charging Pump shaft shears.				
Time/ Position		Applicant's Actions or Behavior		
RO	2.1 Place FCV-122, CHG FLOW, in MAN and close. 2.2 Place PCV-145, LO PRESS LTDN, in MAN and open to 70%. (PEER ✓) 2.3 Place TCV-144, CC TO LTDN HX, in MAN and open to 100%. 2.4 Place TCV-143, LTDN TO VCT OR DEMIN, in VCT. 2.5 Open PVT-8152, LTDN LINE ISOL. 2.6 Open the following: a. LCV-459, LTDN LINE ISOL. b. LCV-460, LTDN LINE ISOL. 2.7 Ensure the following Charging Line Isolation Valves are open: a. MVG-8107, CHG LINE ISOL. b. MVG-8108, CHG LINE ISOL.			
RO	2.8 Slowly open FCV-122, CHG FLOW, to establish 60 gpm flow as indicated on FI-122A, CHG FLOW GPM.			
RO	2.9 Open Orifice Isolation Valves to obtain the desired Letdown flow rate (60 gpm to 120 gpm): a. PVT-8149A, LTDN ORIFICE A ISOL (45 gpm). b. PVT-8149B, LTDN ORIFICE B ISOL (60 gpm). c. PVT-8149C, LTDN ORIFICE C ISOL (60 gpm).			
RO	2.10 Adjust FCV-122, CHG FLOW, as required to maintain TI-140, REGEN HXOUT TEMP °F, between 250°F and 350°F while maintaining Pressurizer level. 2.11 Adjust PCV-145, LO PRESS LTDN, to maintain PI-145, LO PRESS LTDN PRESS PSIG, between 300 psig and 400 psig. 2.12 Place PCV-145, LO PRESS LTDN, in AUTO.			
RO	2.13 Adjust TCV-144, CC TO LTDN HX, potentiometer as necessary to maintain the desired VCT temperature. Refer to VCS Curve Book, Figure VII.15 2.14 Place TCV-144, CC TO LTDN HX, in AUTO.			

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 3 Page: 26 of 61
 Event Description: The running Charging Pump shaft shears.

Time/ Position	Applicant's Actions or Behavior
RO	2.15 When Pressurizer level is within 1% of and trending to programmed level, place the PZR LEVEL MASTER CONTROL in MAN. 2.16 Establish automatic FCV-122, CHG FLOW, control as follows: - Determine the correct PZR LEVEL MASTER CONTROL setpoint by dividing the current Charging flow by 1.5. - Manually adjust the PZR LEVEL MASTER CONTROL to this setpoint. - Place FCV-122, CHG FLOW, in AUTO. (PEER ✓) 2.17 Adjust PZR LEVEL MASTER CONTROL in MAN, as necessary, to maintain Pressurizer level at or near programmed level. 2.18 When Pressurizer level is within 1% of and trending to programmed level, place PZR LEVEL MASTER CONTROL in AUTO. (PEER ✓) 2.19 Monitor LR-459, PZR % LEVEL & LEVEL SP, recorder to verify that Charging flow is maintaining actual Pressurizer level at or near the programmed setpoint. 2.20 After the Letdown temperatures have stabilized, place TCV-143, LTDN TO VCT OR DEMIN, in DEMIN/AUTO.
US	Enters T.S. 3.5.2, EMERGENCY CORE COOLING SYSTEMS, ECCS SUBSYSTEMS – TAVG => 350°F. T.S. 3.5.2 action a. applied during the time NO charging pump was operable on Train A. The action will be exited once the "C" Charging Pump aligned to the "A" header and "A" Pump Breaker is racked down. ACTION: With one ECCS subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.
EVALUATOR NOTE:	If at any point PZR Pressure < 2206 psig, the crew will meet conditions for T.S. 3.2.5, DNB PARAMETERS, with an action to "restore parameters within its limit within 2 hours or reduce THERMAL POWER to less than 5% of RATED THERMAL POWER within the next 4 hours."
EVALUATOR NOTE:	The next event may be inserted after normal charging and letdown is restored and Technical Specifications have been addressed, or at the discretion of the Lead Examiner. PZR level control does not have to be restored to Automatic per the discretion of the Lead Examiner.

SOP-102

T.S. 3.5.2

T.S. 3.2.5

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 4 Page: 27 of 61
 Event Description: "A" Condensate Pump Trip.

Time/ Position	Applicant's Actions or Behavior	
EVALUATOR NOTE:	On cue from the Examiner, the "A" Condensate Pump will trip. The crew will enter AOP-208.1, Condensate Pump Trip/Loss of Condensate Flow. The BOP will start the "C" Condensate pump and open XVB-614C, C DISCH ISOL to restore normal condensate flow for the current conditions.	
BOOTH OPERATOR:	When directed – initiate Event 4 (TRIGGER 4).	
Symptoms/ Cues:	• XCP-627 3-1, CO PP A/B/C/ TRIP • LI-3135, DEAER STOR TK WR LVL FEET • LI-3136, DEAER STOR TK NR LVL FEET	
US	Enters AOP-208.1, CONDENSATE PUMP TRIP/LOSS OF CONDENSATE FLOW	AOP-208.1
BOP (IOA)	1. Check if a Condensate Pump trip has occurred.	AOP-208.1
BOP	*2. Check if at least <u>one</u> Condensate Pump running.	AOP-208.1
BOP	3. Verify window XCP-627 (4-1), DEAER STOR TK LVL HI/HI-HI, is <u>NOT</u> lit.	AOP-208.1
BOP	4. Start an idle Condensate Pump.	AOP-208.1
	<u>NOTE – Step 5</u> Nominal stroke time for XVB00614A(B)(C), A(B)(C) DISCH ISOL, is 30 seconds.	AOP-208.1
BOP	5. Open XVB00614A(B)(C), A(B)(C) DISCH ISOL for the Condensate Pump started in Step 3 or Step 4.	AOP-208.1
US	GO TO Step 8.	AOP-208.1
BOP	*8. Verify Deaerator Storage Tank level is stable or increasing.	AOP-208.1
BOP	*9. Verify XCP-627 4-2, DEAER STOR TK VLV LO, is <u>NOT</u> lit.	AOP-208.1
BOP	10. Adjust IFK-3136, FLOW TO DEAERTOR, to maintain Deaerator Storage Tank level between 2.5 ft and 5 ft Narrow Range.	AOP-208.1

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 4 Page: 28 of 61
Event Description: "A" Condensate Pump Trip.

Time/ Position	Applicant's Actions or Behavior	
BOP	11. Verify Condensate flow is indicated on FI-3120, CO FLOW TO DEAER GPM X 10 ³ .	AOP-208.1
BOP	12. When plant conditions allow, place IFK-3136, FLOW TO DEAERATOR, in AUTO.	AOP-208.1
BOP	13. Ensure that <u>both</u> Exhaust Hood Spray Pumps are secured. • XPP-0075A, EXH HOOD SPRAY PUMP A. • XPP-0075B, EXH HOOD SPRAY PUMP B.	AOP-208.1
BOP	14. <u>WHEN</u> hotwell level has returned to normal, <u>THEN</u> locally ensure that XVB-00632-CO, COND REJECT TO COND STG TK VONT VLVL OUT is open (TB-412).	AOP-208.1
US	15. RETURN TO the Procedure and Step in effect.	AOP-208.1
BOOTH OPERATOR:	When asked to investigate the "A" Condensate Pump and breaker, wait 2 minutes and report there is nothing obviously wrong with the pump or breaker.	AOP-208.1
EVALUATOR NOTE:	Once "C" Condensate pump has been started and DA level has stabilized, the next event may be inserted or at the discretion of the Lead Examiner.	

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 5 Page: 29 of 61
Event Description: PT-508, FW PP DISCH HDR PRESS PSIG, fails low

Time/ Position	Applicant's Actions or Behavior
EVALUATOR NOTE:	On cue from the Examiner, PT-508 will fail low, causing main feedwater pumps to speed up. The BOP will take manual control of the Main Feedwater Pump Master Controller and raise main feedwater pump speed. The crew will enter AOP-210.3, Feedwater Pump Malfunction. They will restore main feedwater pump D/P to the proper program band in manual.
BOOTH OPERATOR:	When directed – initiate Event 5 (TRIGGER 5).
Symptoms/ Cues:	• All MFW Pump Speeds increasing. • All SG Levels rising. Potential Annunciators: • XCP-624 1-5/2-5/3-5, SG A/B/C LVL DEV • XCP-624 6-4, SG C FWF>STF MISMATCH
US	ENTERS AOP-210.3, FEEDWATER PUMP MALFUNCTION.

AOP-210.3

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 3 Event # 5		Page: 30 of 61	
Event Description: PT-508, FW PP DISCH HDR PRESS PSIG, fails low					
Time/ Position		Applicant's Actions or Behavior			
		REFERENCE PAGE FOR AOP-210.3 1 <u>MAIN FEEDWATER REGULATING VALVE MANUAL CONTROL</u> Manual Control of Main Feedwater Regulating Valves is permissible at <u>any</u> time as deemed necessary during the performance of this procedure. If a Main Feedwater Regulating Valve has been placed in Manual it should be returned to Automatic as soon as possible. 2 <u>LOSS OF MAIN FEEDWATER FLOW</u> <u>IF</u> Feedwater flow is lost while Reactor Power is GREATER THAN 10%, and cannot be quickly restored from the MCB, <u>THEN</u> Trip the reactor and GO TO EOP-1.0, E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1. 3 <u>STEAM GENERATOR LEVEL CONTROL</u> a. <u>IF</u> Narrow Range Steam Generator Level decreases to LESS THAN 40% in <u>any</u> SG, <u>THEN</u> Trip the reactor and GO TO EOP-1.0, E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1. b. <u>IF</u> Reactor Power is GREATER THAN 15% and Narrow Range Steam Generator Level exceeds 75% in <u>any</u> SG, <u>THEN</u> Trip the reactor and GO TO EOP-1.0, E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1. 4 <u>MAIN FEED PUMP SPEED CONTROL</u> <u>IF</u> IPT00464 has failed high with the Steam Dumps in Steam Pressure Mode, <u>THEN</u> Trip the reactor and GO TO EOP-1.0, E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1.			AOP-210.3
BOP (IOA)		1. Verify at least <u>one</u> Feedwater Pump is running.			AOP-210.3
BOP (IOA)		2. Check if a Feedwater Pump trip has occurred.			AOP-210.3

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 3	Event # 5	Page: 31 of 61
Event Description: PT-508, FW PP DISCH HDR PRESS PSIG, fails low				
Time/ Position		Applicant's Actions or Behavior		
BOP (IOA)	2. ALTERNATIVE ACTION Place the MCB MASTER SPEED CNTRL in MAN and adjust to 50%, <u>THEN</u> adjust as needed to control Feedwater Flow. GO TO Step 4.			
	<u>NOTE – Step 4</u> DCS Graphic 310, FWP OVERVIEW displays the Main Feedwater Pump Recirculation Valve position and can be used to determine if adjustment is needed.			
BOP	4. Adjust Main Feedwater Pump speeds to maintain the following for <u>each</u> Steam Generator: • Main Feedwater flow within ± 0.5 MPPH of Steam Flow. • Narrow Range SG level at or trending to 60%.			
BOP	5. Verify the following: • <u>All</u> Main Feedwater Pump Speeds are within 120 RPM of <u>each</u> other. • On DCS Graphic 310, FWP OVERVIEW, <u>all</u> Main Feedwater Pump speeds are stable.			
	<u>NOTE – Step 6</u> The term stable is intended to mean operating slowly enough that the Main Feedwater Regulating Valves can accommodate flow changes caused by Main Feedwater Pump Recirculation Valve operation. Until this occurs, adjustment of Main Feedwater Pump speed is the preferred means of feed flow control.			
BOP	6. On DCS Graphic 310, FWP OVERVIEW, verify that Main Feedwater Pump Recirculation Valve positions are stable.			
BOP	7. Verify Main Feedwater pressure is AT LEAST 85 psig GREATER THAN Main Steam Pressure.			
BOP	*8. Maintain Narrow Range Steam Generator Level between 60% and 65%.			
BOP	9. If necessary, place Main Feed Regulating valves in AUTO.			

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 5 Page: 32 of 61
 Event Description: PT-508, FW PP DISCH HDR PRESS PSIG, fails low

Time/ Position	Applicant's Actions or Behavior	
	<u>NOTE – Step 10</u> Main Feedwater Program ΔP should be established using the following as available: • PI-508, FW PP DISCH HDR PRESS PSIG. • <u>Any</u> operating Main Feedwater Pump Discharge Pressure • PI-464C, MS HDR PRESS PSIG. • <u>Any</u> available MCB Main Steam Header Pressure. • IPCS (ZZMENU S/G SU Trend or FW Start)	AOP-210.3
BOP	10. Restore Feedwater Pump D/P to program as follows: a. Slowly adjust Main Feedwater Pump speeds to maintain Feedwater Pump discharge header pressure to within the limits of ATTACHMENT 1, FEEDWATER PUMP D/P LIMITS. b. Adjust the AFFECTED PUMP A(B)(C) SPEED CNTRL (MCB M/A Stations) as necessary to balance <u>all</u> operating Feedwater Pumps speed to within 120 rpm of each other.	AOP-210.3
BOP	11. <u>IF</u> plant conditions allow, <u>THEN</u> place the MCB MASTER SPEED CONTROL in AUTO.	AOP-210.3
CREW	12. Determine and correct the cause of the Feedwater Pump speed control malfunction.	AOP-210.3
BOOTH OPERATOR:	If called as I&C to investigate the failure, acknowledge the request.	
EVALUATOR NOTE:	Once main feedwater pump D/P has been restored to the proper program band or at the Lead Examiners discretion, the next event may be inserted.	

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 33 of 61
 Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior
EVALUATOR NOTE:	On cue from the Examiner, the "B" SG will become ruptured. This will lead to a reactor trip and entry into EOP-1.0. When the reactor trips, the "B" SG PORV will open. Control Room Emergency Ventilation will fail to start automatically but can be started manually using Attachment 3 of EOP-1.0. The crew will transition to EOP-4.0 where they will isolate the "B" SG, cooldown, depressurize and get off Safety Injection.
BOOTH OPERATOR:	When directed – initiate Event 6 (TRIGGER 6).
Symptoms/Cues:	- Lowering PZR Level. - Lowering RCS Pressure. - XCP-646 2-1, MN STM LINE RM-G19 HI RAD. - XCP-646 2-2, MN STM LINE RM-G19B TRBL.
US	Enters AOP-112.2, ARG-3, STEAM GENERATOR TUBE LEAK NOT REQUIRING SI.
	<u>CAUTION</u> IF the associated running vacuum pump flow meters are not working, THEN RMA-9 alarm and/or indication is not a reliable entry condition into this procedure. Entry should be based on grab sample analysis in this case.
	<u>NOTE</u> - Conditions for implementing Emergency Plan Procedures should be evaluated using VCS-EPP-001, CLASSIFICATION OF EMERGENCIES. - Due to N-16 gamma radiation effects, RM-G19A(B)(C), STMLN HI RNG GAMMA, will display elevated readings and should not be used for classification of EAL while the Reactor is critical.
RO	*1. Check if PZR level can be maintained: a. Fully open FCV-122, CHG FLOW. b. Verify PZR level is STABLE <u>OR</u> INCREASING.

AOP-112.2

AOP-112.2

AOP-112.2

AOP-112.2

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 34 of 61
 Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior	
RO	*1. ALTERNATIVE ACTION b. Perform the following: 1) Isolate Letdown as follows: a) Close PVT-8149A(B)(C), LTDN ORIFICE A(B)(C) ISOL. 2) <u>IF</u> PZR level continues to decrease, <u>THEN</u> perform the following: a) Start a second CCW pump. b) Start a second Charging Pump.	AOP-112.2
RO	*1. c. Control FCV-122, CHG FLOW, as necessary to maintain PZR level.	AOP-112.2
RO	*2. Check if SI is required: a. Check if <u>any</u> of the following criteria are met: • PZR level is decreasing with Charging maximized and Letdown isolated. <u>OR</u> • PZR level is approaching 8%. <u>OR</u> • PZR pressure is approaching 1870 psig. b. Perform the following: 1) Trip the Reactor. 2) GO TO EOP-1.0, E-0, REACTOR TRIP OR SAFETY INJECTION. <u>WHEN</u> EOP-1.0, E-0, REACTOR TRIP OR SAFETY INJECTION Immediate Actions are complete, <u>THEN</u> actuate SI.	AOP-112.2
EVALUATOR NOTE:	The crew will meet Reactor Trip and SI criteria.	
US	Enters EOP-1.0, E-0 REACTOR TRIP OR SAFETY INJECTION.	EOP-1.0
RO (IOA)	1. Verify Reactor Trip: • Trip the Reactor using either Reactor Trip Switch. • Verify all Reactor Trip and Bypass Breakers are open. • Verify all Rod Bottom Lights are lit. • Verify Reactor Power level is decreasing.	EOP-1.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 35 of 61
Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior	
RO (IOA)	2. Verify Turbine/Generator Trip: a. Verify all Turbine STM STOP VLVs are closed. b. Ensure Generator Trip (after 30 second delay): 1. Ensure the GEN BKR is open. 2. Ensure the GEN FIELD BKR is open. 3. Ensure the EXC FIELD CNTRL is tripped.	EOP-1.0
RO (IOA)	3. Verify both ESF buses are energized.	EOP-1.0
RO (IOA)	4. Check if SI is actuated: a. Check if either: • SI ACT status light is bright on XCP-6107 1-1. OR • Any red first-out SI annunciator is lit on XCP-626 top row. b. Actuate SI using <u>either</u> SI ACTUATION Switch. c. GO TO Step 6.	EOP-1.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 36 of 61
Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior

REFERENCE PAGE FOR EOP-1.0

1 RCP TRIP CRITERIA

- a. IF Phase B Containment Isolation has actuated (XCP-612 4-2), THEN trip all RCPs.
- b. IF both of the following conditions occur, THEN trip all RCPs:
 - SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM.
 - AND
 - RCS Wide Range pressure is LESS THAN 1418 psig.

2 REDUCING CONTROL ROOM EMERGENCY VENTILATION

Reduce Control Room Emergency Ventilation to one train in operation within 30 minutes of actuation. REFER TO SOP-505, CONTROL BUILDING VENTILATION SYSTEM.

3 MONITOR SPENT FUEL COOLING

Periodically check status of Spent Fuel Cooling by monitoring the following throughout event recovery:

- Spent Fuel Pool level.
- Spent Fuel Pool temperature.

4 RUPTURED STEAM GENERATOR

IF a RUPTURED Steam Generator has been positively identified, THEN throttle EFW to the RUPTURED Steam Generator WHEN its Narrow Range Level is GREATER THAN 26%[41%].

5 FAULTED STEAM GENERATOR

- IF a FAULTED Steam Generator has been positively identified, THEN isolate EFW to the faulted Steam Generator as soon as possible UNLESS all three Steam Generators are FAULTED.
- IF all three Steam Generators are FAULTED, THEN throttle EFW flow to all three Steam Generators to 50 gpm.

EOP-1.0

**EVALUATOR
NOTE:**

Attachment 3, SI Equipment Verification, is included for reference on Page 51 of 61.

EOP-1.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 37 of 61
 Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior	
EVALUATOR NOTE:	On the reactor trip and safety injection, "B" SG PORV will fail partially open. The crew can isolate the SG PORV using any of the following methods: • EOP-1.0, Attachment 6. (Page 54 of 61) • OP-AA-100 Guidance for a failed controller. • SOP-202 Section IV.A, STEAMLINE POWER RELIEF VALVE OPERATION. (Page 60 of 61) • EOP-4.0 Attachment 1B. (Page 56 of 61) • EOP-3.0. (Page 57 of 61) If the crew transitions to EOP-3.0 to isolate "B" SG PORV, they will transition to EOP-4.0 from EOP-3.0. Critical Task is to isolate Steam flow from Ruptured SG before S/G pressure lowers to 460 psig.	EOP-1.0
EVALUATOR NOTE:	On the safety injection, the Control Room Emergency Ventilation will fail to start automatically but can be started manually using Attachment 3 of EOP-1.0.	EOP-1.0
BOP	6. Initiate ATTACHMENT 3, SI EQUIPMENT VERIFICATION.	EOP-1.0
CREW	7. Announce plant conditions over the page system.	EOP-1.0
RO	*8. Verify RB pressure has remained LESS THAN 12 psig on PR951, RB PSIG (P-951), red pen.	EOP-1.0
RO	*9. Check RCS temperature: • With any RCP running, RCS Tavg is stable at OR trending to 557°F. (NO) OR • With no RCP running, RCS Tcold is stable at OR trending to 557°F.	EOP-1.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 38 of 61
 Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior
RO	*9. ALTERNATIVE ACTION IF RCS temperature is LESS THAN 557°F AND decreasing, THEN stabilize temperature by performing the following as required: a) Close IPV-2231, MS/PEGGING STM TO DEAERATOR. b) Perform one of the following: • IF Narrow Range SG level is LESS THAN 26% [41%] in all SGs, THEN reduce EFW flow as necessary to stop cooldown, while maintaining total EFW flow GREATER THAN 450 gpm. OR • WHEN Narrow Range SG level is GREATER THAN 26% [41%] in at least one SG, THEN control EFW flow as necessary to stabilize RCS temperature at 557°F. c) Initiate ATTACHMENT 6, STEAM VALVE ISOLATION, while continuing with this procedure. d) IF RCS cooldown continues, THEN close: • MS Isolation Valves, PVM-2801A(B)(C). - MS Isolation Bypass Valves, PVM-2869A(B)(C).
RO	10. Check PZR PORVs and Spray Valves: a. PZR PORVs are closed. b. PZR Spray Valves are closed. c. Verify power is available to at least one PZR PORV Block Valve: • MVG-8000A, RELIEF 445 A ISOL. • MVG-8000B, RELIEF 444 B ISOL. • MVG-8000C, RELIEF 445 B ISOL. d. Ensure one of the following Block Valves is open unless it was closed to isolate an open PZR PORV: • MVG-8000A, RELIEF 445 A ISOL. • MVG-8000B, RELIEF 444 B ISOL.

EOP-1.0

EOP-1.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 39 of 61
 Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior	
RO	<u>NOTE – Step 11</u> Seal Injection flow should be maintained to all RCPs. 11. Check if RCPs should be stopped: a. Check if either of the following criteria is met: - Annunciator XCP-612 4-2 is lit (PHASE B ISOL). OR - RCS pressure is LESS THAN 1418 psig AND SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. b. Stop all RCPs	EOP-1.0
RO/ BOP	12. Verify no SG is FAULTED: - No SG pressure is decreasing in an uncontrolled manner. - No SG is completely depressurized.	EOP-1.0
BOP	13. Verify Secondary radiation levels indicate SG tubes are NOT RUPTURED: - RM-G19A(B)(C), STMLN HI RNG GAMMA. - RM-A9, CNDSR EXHAUST GAS ATMOS MONITOR. - RM-L3, STEAM GENERATOR BLOWDOWN LIQUID MONITOR. - RM-L10, SG BLOWDOWN CW DISCHARGE LIQUID MONITOR.	EOP-1.0
US	13. ALTERNATIVE ACTION GO TO EOP-4.0, E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.	EOP-1.0
EVALUATOR NOTE:	The crew will transition to EOP-4.0, E-3, STEAM GENERATOR TUBE RUPTURE.	
US	Enters EOP-4.0, E-3, STEAM GENERATOR TUBE RUPTURE.	EOP-4.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 40 of 61
Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior	
	REFERENCE PAGE FOR EOP-4.0 1 SI REINITIATION CRITERIA <u>IF either</u> of the following conditions occurs, <u>THEN</u> start Charging Pumps and operate valves as necessary: - RCS subcooling on TI-499A(B), A(B) TEMP °F, can <u>NOT</u> be maintained GREATER THAN 52.5°F [67.5°F]. <u>OR</u> - PZR level can <u>NOT</u> be maintained GREATER THAN 10% [28%]. <u>IF</u> SI Reinitiation occurs after procedure Step 28, <u>THEN</u> GO TO EOP-4.2, ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED, Step 1. 2 SECONDARY INTEGRITY TRANSITION CRITERIA <u>IF any</u> unisolated SG pressure is decreasing in an uncontrolled manner <u>OR</u> is completely depressurized, <u>THEN</u> GO TO EOP-3.0, E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1, unless it is needed for RCS cooldown. 3 COLD LEG RECIRCULATION TRANSITION CRITERION <u>IF</u> RWST level decreases to LESS THAN 18%, <u>THEN</u> GO TO EOP-2.2, ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, Step 1. 4 MULTIPLE TUBE RUPTURE CRITERIA <u>IF any</u> INTACT SG level increases in an uncontrolled manner <u>OR any</u> INTACT SG has abnormal radiation, <u>THEN</u> stop <u>any</u> cooldown or depressurization in progress and RETURN TO EOP-4.0, E-3, STEAM GENERATOR TUBE RUPTURE, Step 1. 5 REDUCING CONTROL ROOM EMERGENCY VENTILATION Reduce Control Room Emergency Ventilation to <u>one</u> train in operation within 30 minutes of actuation. REFER TO SOP-505, CONTROL BUILDING VENTILATION SYSTEM.	EOP-4.0
	<u>NOTE</u> Seal Injection flow should be maintained to <u>all</u> RCPs.	EOP-4.0
RO	*1. Check if RCPs should be stopped: a. Check if either of the following criteria is met: - Annunciator XCP-612 4-2 is lit (PHASE B ISOL). <u>OR</u> - RCS pressure is LESS THAN 1418 psig AND SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. (NO)	EOP-4.0
US	*1. ALTERNATIVE ACTION a. GO TO Step 2. Observe the NOTE prior to Step 2.	EOP-4.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 41 of 61
 Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior	
	<u>NOTE – Step 2</u> Cycling of multiple PZR PORVs should be minimized to conserve operating air.	EOP-4.0
RO	2. Perform the following: a. Check if both of the following are available: • PCV-445A, PWR RELIEF. • PCV-444B, PWR RELIEF. b. Close one of the following: • PCV-445A, PWR RELIEF. • PCV-444B, PWR RELIEF.	EOP-4.0
RO	<u>CAUTION - Step 3</u> Radiation levels may have increased in steamlines. Proper radiological precautions must be taken when obtaining samples to minimize personnel exposure.	EOP-4.0
BOP	3. Identify the RUPTURED SG(s): • Narrow Range level in any SG increasing in an uncontrolled manner. OR • High Radiation on any of the following: a. RM-G19A(B)(C), STMLN HI RNG GAMMA. b. Local hand held radiation monitor readings taken by Health Physics on the blowdown lines at the following penetrations: • XRP0326, SG A Blowdown Line (AB-412 West Pen). • XRP0224, SG B Blowdown Line (IB-412 East Pen). • XRP0219, SG C Blowdown Line (IB-412 East Pen). OR • As determined by Chemistry sample analysis for abnormal activity using a frisker.	EOP-4.0
BOP	4. For each RUPTURED SG, initiate the appropriate isolation attachment: • ATTACHMENT 1B, ISOLATION OF B STEAM GENERATOR	EOP-4.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 42 of 61
 Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior	
EVALUATOR NOTE:	EOP-4.0, ATTACHMENT 1B is included for reference on Page 56 of 61. Critical Task is to isolate steam flow from Ruptured SG before S/G pressure lowers to 460 psig.	EOP-4.0
US	5. Locally, start XAC0014, Diesel Driven Air Compressor. REFER TO SOP-220, STATION AND BACKUP INSTRUMENT AIR SYSTEMS (YD-436).	EOP-4.0
BOOTH OPERATOR:	When requested to locally start the Diesel Driven Air Compressor, Wait 2 minutes, insert TRIGGER 20 and report back that the Diesel Driven Air Compressor is running.	EOP-4.0
	<u>CAUTION – Step 6</u> If the TD EFW Pump is the only available source of feed flow, the steam supply to the TD EFW Pump must be maintained from at least one SG, to maintain a secondary heat sink.	EOP-4.0
	<u>NOTE – Step 6</u> If the TD EFW Pump is tripped, it should be reset as time permits.	EOP-4.0
US	6. IF SG B OR SG C is RUPTURED, THEN perform the following: a. IF at least one MD EFW Pump is running, THEN isolate the TD EFW Pump by placing PVG-2030, STM SPLY TO TD EFP TRN A(B), to CLOSE. b. Notify local Operators to perform Alternative Action Step 6, while continuing with this procedure.	EOP-4.0
BOOTH OPERATOR:	If called as AO to reset the TDEFW PP, when the RPMs indicate 0, reset the pump using the LOA RESETS page.	

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 3	Event # 6	Page: 43 of 61
Event Description: "B" SGTR.				
Time/ Position		Applicant's Actions or Behavior		
US	6. ALTERNATIVE ACTION IF SG B <u>OR</u> SG C is RUPTURED, <u>THEN</u> locally deenergize and close the appropriate valve: • For SG B: 1) Open XMC1DA2X 05EH, EF PUMP MAIN STEAM BLOCK VLV XVG2802A-MS (IB-463). 2) Close XVG2802A-MS, MS HEADER B EF PUMP TURBINE SUPPLY VLV (IB-436 East Pen). • For SG C: 1) Open XMC1DB2Y 05EH, EMERG FEEDWATER PUMP MAIN STEAM BLOCK XVG2802B-MS (AB-436). 2) Close XVG2802B-MS, MS HEADER C EF PUMP TURBINE SUPPLY VLV (IB-436 East Pen).			
BOOTH OPERATOR:	When called to perform Step 6.AA, wait 2 minutes and use the LOA RESETS Page to perform actions.			
	CAUTION – Step 7 If any RUPTURED SG is FAULTED, feed flow to that SG should remain isolated during subsequent recovery actions unless needed for RCS cooldown, to prevent excessive cooldown due to the FAULT.			
BOP	*7. Check level in each RUPTURED SG: a. Verify Narrow Range level in each RUPTURED SG is GREATER THAN 26%[41%]. b. Stop EFW flow to each RUPTURED SG: 1. Close FCV-3531(3541)(3551), MD EFP TO SG A(B)(C). 2. Close FCV-3536(3546)(3556), TD EFP TO SG A(B)(C). 3. Maintain Narrow Range level in each RUPTURED SG GREATER THAN 26%[41%].			
	CAUTION – Step 8 The major flowpaths from each RUPTURED SG (MSIV, TD EFW Pump, and PORV) must be isolated before performing Step 8, to minimize radiological releases and ensure RCS subcooling is maintained.			
BOP	8. Verify each RUPTURED SG pressure is GREATER THAN 460 psig.			

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC

Scenario # 3 Event # 6

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Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior

US

9. Determine the required core exit TC temperature for RCS cooldown from the table below:

LOWEST RUPTURED SG PRESS (PSIG)	CORE EXIT TC TEMP (°F)	CONTROLLER SETPOINT
1101-1200	494 [478]	4.9
1001-1100	482 [466]	4.4
901-1000	469 [453]	3.8
801-900	455 [439]	3.4
701-800	439 [423]	2.8
601-700	421 [405]	2.3
460-600	392 [376]	1.6

EOP-4.0

RO

10. Check if any RCP is running.

EOP-4.0

NOTE – Step 11

Before the Low Steamline Pressure SI signal is blocked, Main Steam Isolation will occur if the Low Steam Pressure rate setpoint is exceeded.

EOP-4.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 45 of 61
 Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior
BOP	11. Dump steam from each INTACT SG: a. WHEN RCS Tavg is LESS THAN P-12 (552°F), THEN: - Place both STM DUMP INTERLOCK Switches to BYP INTLK. - Place both STMLN SI TRAIN A(B) Switches to BLOCK. b. Dump steam from each INTACT SG to the Condenser: - Verify PERMISV C-9 status light is bright on XCP-6114 1-3. - Perform the following: - Verify the MS Isolation Valves, PVM-2801A(B)(C), are open for the INTACT SGs. OR - IF the RUPTURED SG(s) MSIV is closed, THEN open MS Isolation Bypass Valves : - Depress both MAIN STEAM ISOL VALVES RESET TRAIN A(B). - Open MS Isolation Bypass Valves, PVM-2869A(B)(C), for only the INTACT SGs. - Place the STM DUMP CNTRL Controller in MAN and closed. - Place the STM DUMP MODESELECT Switch in STM PRESS. - Adjust the STM DUMP CNTRL Controller to fully open the Bank 1 Steam Dump Valves, (Approximately 14% Demand).
	<u>NOTE – Step 12</u> Steps 14 through 20 should be performed as time permits, while the cooldown is in progress.
BOP	12. Verify core exit TC temperature is LESS THAN the value determined in Step 9.
BOP	12. ALTERNATIVE ACTION WHEN core exit TC temperature is LESS THAN the value determined in Step 9, THEN COMPLETE Step 13. Observe the NOTE prior to Step 13. CONTINUE WITH Step 14.

EOP-4.0

EOP-4.0

EOP-4.0

EOP-4.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 46 of 61
 Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior	
EVALUATOR NOTE:	Step 13 is a Continuous Action step to stop the RCS cooldown when the required CETC Temperature is reached. If that temperature is reached prior to getting to Step 20, then Step 13 will be performed. It is included below for Reference.	EOP-4.0
	<u>NOTE – Step 13</u> With <u>no</u> RCPs running, it may be necessary to manually open steam dumps or Steamline PORVs to maintain desired TC temperature.	EOP-4.0
BOP	13. Stop the RCS cooldown to the Condenser: - Adjust the STM DUMP CNTRL Controller to closed. - Adjust the setpoint to maintain core exit TC temperature LESS THAN the required temperature per Step 9. - Place the STM DUMP CNTRL Controller in AUTO.	EOP-4.0
BOP	14. Check INTACT SG levels: - Verify Narrow Range level in INTACT SGs is GREATER THAN 26% [41%]. - Control EFW flow to maintain Narrow Range level in INTACT SGs between 40% and 60%.	EOP-4.0
RO	15. Check PZR PORVs and Block Valves: - Verify power is available to the PZR PORV Block Valves: - MVG-8000A, RELIEF 445 A ISOL. - MVG-8000B, RELIEF 444 B ISOL. - MVG-8000C, RELIEF 445 B ISOL.	EOP-4.0
	<u>CAUTION – Step 15.b</u> If any PZR PORV opens because of high PZR pressure, Step 15.b should be repeated after pressure decreases to LESS THAN 2330 psig, to ensure the PORV recloses.	EOP-4.0
EVALUATOR NOTE:	The crew may have closed PCV-445A or PCV-444B at Step 2. Either is appropriate. The entirety of Step 15 is included for whichever valve they closed.	

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 47 of 61
Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior	
RO	15. b. Verify all PZR PORVs are closed. c. Check if PCV-445A, PWR RELIEF switch is in close. d. Ensure MVG-8000A, RELIEF 445 A ISOL, is Open e. GO TO Step 16. f. Check if PCV-444B, PWR RELIEF, switch is in close. g. Ensure MVG-8000B, RELIEF 444 B ISOL, is open. h. GO TO Step 16.	EOP-4.0
RO	16. Reset both SI RESET TRAIN A(B) Switches.	EOP-4.0
RO	17. Reset Containment Isolation: • RESET PHASE A - TRAIN A(B) CNTMT ISOL. • RESET PHASE B - TRAIN A(B) CNTMT ISOL.	EOP-4.0
RO	18. Establish Instrument Air to the RB: a. Open PVA-2659, INST AIR TO RB AIR SERV. b. Open PVT-2660, AIR SPLY TO RB.	EOP-4.0
	<u>CAUTION – Step 19</u> RCS pressure should be monitored. If RCS pressure decreases in an uncontrolled manner to LESS THAN 325 psig, the RHR Pumps must be manually restarted to supply water to the RCS.	EOP-4.0
RO	19. Check if RHR Pumps should be stopped: a. Check if any RHR Pump is running with suction aligned to the RWST. b. Verify RCS pressure is GREATER THAN 325 psig. c. Stop any RHR Pump which is running with suction aligned to the RWST and place in Standby.	EOP-4.0
BOP	20. Verify core exit TC temperature is LESS THAN the value determined in Step 9.	EOP-4.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 48 of 61
 Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior	
BOP	21. Stop the RCS cooldown: a. Stop the RCS cooldown to the Condenser: 1) Adjust the STM DUMP CNTRL Controller to closed. 2) Adjust the setpoint to maintain core exit TC temperature LESS THAN the required temperature per Step 9. 3) Place the STM DUMP CNTRL Controller in AUTO.	EOP-4.0
	<u>NOTE – Step 21.b</u> With no RCPs running, it may be necessary to manually open steam dumps or Steamline PORVs to maintain desired TC temperature.	EOP-4.0
BOP Critical Task	21.b. Adjust controller setpoints as necessary to maintain core exit TC temperatures LESS THAN the required temperature per Step 9.	EOP-4.0
EVALUATOR NOTE:	Critical Task is to control initial RCS cooldown in EOP-4.0 such that no RCS Cold Leg Temperature goes $\leq 250^{\circ}\text{F}$.	
BOP	22. Verify each RUPTURED SG pressure is stable OR increasing.	EOP-4.0
	<u>NOTE – Step 23</u> Subcooling may have been temporarily lost during the RCS cooldown, but should quickly increase when the cooldown is complete. If subcooling increases sufficiently after stopping the cooldown, the transition to EOP-4.2, ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED, is NOT required.	EOP-4.0
RO	23. Verify RCS subcooling on TI-499A(B), A(B) TEMP °F, is GREATER THAN 72.5°F [87.5°F].	EOP-4.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 49 of 61
 Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior
RO	24. Depressurize the RCS using Normal PZR Spray at the maximum rate: a. Establish Normal PZR Spray: - Using RCP A: - Open PCV-444D, PZR SPRAY. - Close PCV-444C, PZR SPRAY, if RCP C is <u>NOT</u> running. - Using RCPs B and C: - Open PCV-444C, PZR SPRAY. - Close PCV-444D, PZR SPRAY, if RCP A is <u>NOT</u> running. b. Use maximum available spray until <u>any one</u> of the following criteria met: - RCS pressure is LESS THAN RUPTURED SG(s) pressure <u>AND</u> PZR levels is GREATER THAN 10% [28%]. <u>OR</u> - RCS pressure is WITHIN 300 psig of RUPTURED SG(s) pressure <u>AND</u> PZR level is GREATER THAN 40% [50%]. <u>OR</u> - PZR level is GREATER THAN 76% [69%]. <u>OR</u> - RCS subcooling on TI-499A(B), A(B) TEMP °F, is LESS THAN 52.5°F [67.5°F]. c. Stop RCS depressurization: - Close <u>both</u> PCV-444C(D), PZR SPRAY. - Close PVT-8145, PZR SPRAY FR CVCS. d. GO TO Step 27. Observe the CAUTION prior to Step 27.
	<u>CAUTION – Step 27</u> When SI termination criteria are met, SI must be terminated to prevent overfilling the RUPTURED SG(s).

EOP-4.0

EOP-4.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 50 of 61
Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior	
RO/BOP	27. Check if SI flow should be terminated: a. RCS Subcooling on TI-499A(B), A(B) TEMP °F, is GREATER THAN 52.5°F [67.5°F]. b. Secondary Heat Sink is adequate: • Total EFW flow available to INTACT SGs is GREATER THAN 450 gpm. <u>OR</u> • Narrow Range SG level is GREATER THAN 26% [41%] in at least <u>one</u> INTACT SG. c. RCS pressure is stable <u>OR</u> increasing. d. PZR level is GREATER THAN 10% [28%].	EOP-4.0
RO	28. Stop all but <u>one</u> Charging Pump and place in Standby.	EOP-4.0
EVALUATOR NOTE:	The scenario may be terminated when the crew has stopped the first charging pump after the depressurization in EOP-4.0 or at the discretion of the Lead Examiner.	

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 51 of 61
 Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior

EVALUTOR NOTE:	THESE ARE THE STEPS OF EOP-1.0, ATTACHMENT 3	
BOP	1. Ensure EFW Pumps are running: a. Ensure both MD EFW Pumps are running. b. Verify the TD EFW Pump is running if necessary to maintain SG levels.	EOP-1.0 Attachment 3
BOP	2. Ensure the following EFW valves are open: • FCV-3531(3541)(3551), MD EFP TO SG A(B)(C). • FCV-3536(3546)(3556), TD EFP TO SG A(B)(C). • MVG-2802A(B), MS LOOP B(C) TO TD EFP.	Attachment 3
BOP	3. Verify total EFW flow is GREATER THAN 450 gpm.	Attachment 3
BOP	4. Ensure FW Isolation: a. Ensure the following are closed: • FW Flow Control, FCV-478(488)(498). • FW Isolation, PVG-1611A(B)(C). • FW Flow Control Bypass, FCV-3321(3331)(3341). • SG Blowdown, PVG-503A(B)(C). • SG Sample, SVX-9398A(B)(C). b. Ensure all Main FW Pumps are tripped.	Attachment 3
BOP	5. Ensure SI Pumps are running: • Two Charging Pumps are running. • Both RHR Pumps are running.	Attachment 3
BOP	6. Ensure two RBCU Fans are running in slow speed (one per train).	Attachment 3
BOP	7. Verify Service Water flow to RBCUs: a. Ensure Service Water Pump A is running. b. Check if Service Water Booster Pump A is running. c. GO TO Step 7.f.	Attachment 3
BOP	7.f. Ensure Service Water Pump B is running. g. Check if Service Water Booster Pump B is running. h. GO TO Step 7.k.	Attachment 3

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 52 of 61
 Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior	
BOP	7.k. Verify GREATER THAN 2000 gpm flow for <u>each</u> train on: • FI-4466, SWBP A DISCH FLOW GPM. • FI-4496, SWBP B DISCH FLOW GPM.	Attachment 3
BOP	8. Ensure one CCW pump per train is running.	Attachment 3
BOP	9. Ensure two Chilled Water Pumps and Chillers are running.	Attachment 3
BOP	10. Verify both trains of Control Room Ventilation are running in Emergency Mode.	Attachment 3
BOP	10. ALTERNATIVE ACTION Start <u>both</u> trains of Control Room Emergency Ventilation as follows: a) For Train A: 1) Place XFN-32A, SPLY FAN A in STOP. 2) Start XFN-32A, SPLY FAN A. 3) Start XFN-30A, EMERG FLTR FAN A. b) For Train B: 1) Place XFN-32B, SPLY FAN B in STOP. 2) Start XFN-32B, SPLY FAN B. 3) Start XFN-30B, EMERG FLTR FAN B.	
BOP	11. Check if Main Steamlines should be isolated: a. Check if any of the following conditions are met: • RB pressure GREATER THAN 6.35 psig. OR • Steamline pressure LESS THAN 675 psig. OR • Steamline flow GREATER THAN 1.6 MPPH AND Tavg LESS THAN 552°F. b. Ensure all the following are closed: • MS Isolation Valves, PVM-2801A(B)(C). • MS Isolation Bypass Valves, PVM-2869A(B)(C).	Attachment 3

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 53 of 61
Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior
BOP	12. Ensure Excess Letdown Isolation Valves are closed: • PVT-8153, XS LTDN ISOL. • PVT-8154, XS LTDN ISOL.
BOP	13. Verify ESF monitor lights indicate Phase A AND Containment Ventilation Isolation on XCP-6103, 6104, and 6106. REFER TO ATTACHMENT 4, CONTAINMENT ISOLATION VALVE MCB STATUS LIGHT LOCATIONS, as needed.
BOP	14. Verify proper SI alignment: a. Verify SI valve alignment by verifying SAFETY INJECTION/PHASE A ISOL monitor lights are bright on XCP-6104. b. Verify <u>all</u> SAFETY INJECTION monitor lights are dim on XCP-6106. c. Verify SI flow on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. d. Check if RCS pressure is LESS THAN 325 psig.
BOP	14.d. ALTERNATIVE ACTION Notify the US that ATTACHMENT 3, SI EQUIPMENT VERIFICATION, is complete.

Attachment 3

Attachment 3

Attachment 3

Attachment 3

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 54 of 61
 Event Description: "B" SGTR.

Time/ Position Applicant's Actions or Behavior

EVALUTOR NOTE:	THESE ARE THE STEPS OF EOP-1.0, ATTACHMENT 6	
BOP	1. Close Feedwater Pump TURB DRN VLVs: • MOV-1-5A. • MOV-1-5B. • MOV-1-5C.	EOP-1.0 Attachment 6
BOP	2. Close the following turbine drain valves: • MVG-2896A, SV-1 BSD. • MVG-2896B, SV-2 BSD. • MVG-2896C, SV-3 BSD. • MVG-2896C, SV-4 BSD.	Attachment 6
BOP	3. Ensure the following drain valves are in AUTO: • PVT-2851A,B,C,D, MS LINES TO TURB DRN. • PVT-2713A,B,C,D, STM DUMP DRN BYP. • PVT-2870, TO MSR A & B DRN. • PVT-2875, TO MSR A & B DRN. • PVT-2845A,B,C PVT-2824, PVT-2879A,B, LINE DRN. • PVT-2838A,B, HDR DRNS.	Attachment 6
BOP	4. Place the STM DUMP CNTRL Controller in MAN and CLOSED.	Attachment 6
BOP	5. Place the STM DUMP MODE SELECT Switch in STM PRESS.	Attachment 6
BOP	6. Place the STM DUMP CNTRL Controller in AUTO.	Attachment 6
BOP	*7. <u>WHEN</u> the Condenser is <u>NOT</u> available, <u>THEN</u> perform the following: a. Place the Steamline Power Relief A(B)(C) Mode Switches in PWR RLF. b. Adjust the PWR RELIEF A(B)(C) SETPT Controllers as necessary to control RCS temperature.	Attachment 6
BOP	8. Verify proper response of <u>all</u> Steamline PORVs and Condenser Steam Dumps for existing plant conditions.	Attachment 6

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 55 of 61
Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior

BOP	9. Ensure SG Blowdown Valves, PVG-503A(B)(C), are closed.

Attachment 6

BOP	10. If desired, drain valves may be aligned per Shift Manager discretion based on current and expected plant status.

Attachment 6

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 56 of 61
 Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior

EVALUTOR NOTE:	THESE ARE THE STEPS OF EOP-4.0, ATTACHMENT 1B
	<u>CAUTION – Step 1</u> At least <u>one</u> SG must be maintained available for RCS cooldown.
BOP Critical Task	1. Isolate flow from <u>each</u> RUPTURED SG: - Place the PWR RELIEF B SETPT Controller in MAN and closed. - Adjust the PWR RELIEF B SETPT Controller to 8.85 (1150 psig). - Place the B Steamline Power Relief Mode Switch in PWR RLF. - Place the PWR B RELIEF B SETPT Controller in AUTO. <u>WHEN</u> RCS Tav_g is LESS THAN P-12 (552°F), <u>THEN</u> place <u>both</u> STM DUMP INTERLOCK Switches in BYP INTLK. - Verify the B Steamline PORV closed. - Close the following for <u>each</u> RUPTURED SG: - SG Blowdown, PVG-503B, B ISOL. - MS Drain Isolation, PVT-2843B, B DRN ISOL. - Close the following for <u>each</u> RUPTURED SG: - MS Isolation Valve, PVM-2801B, B ISOL VLV. - MS Isolation Bypass Valve, PVM-2869B, B BYP VLV.

EOP-4.0
Attachment 1B

Attachment 1B

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 57 of 61
 Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior

EVALUTOR NOTE:	THESE ARE THE STEPS OF EOP-3.0, E-2, FAULTED STEAM GENERATOR ISOLATION.	
	<u>CAUTION</u> - At least <u>one</u> SG must be maintained available for RCS cooldown. <u>Any</u> FAULTED SG or secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown, to prevent reinitiating the break.	EOP-3.0
BOP	1. Ensure <u>all</u> the following are closed: - MS Isolation Valves, PVM-2801A(B)(C). - MS Isolation Bypass Valves, PVM-2869A(B)(C).	EOP-3.0
BOP	2. Check if <u>any</u> SG is NON-FAULTED: - Pressure in <u>any</u> SG is stable <u>OR</u> increasing. <u>Any</u> SG is <u>NOT</u> completely depressurized.	EOP-3.0
BOP	3. Identify <u>any</u> FAULTED SG(s): <u>Any</u> SG pressure decreasing in an uncontrolled manner. <u>OR</u> <u>Any</u> SG completely depressurized.	EOP-3.0
BOP	4. Close the following for <u>each</u> FAULTED SG: - FW Flow Control, FCV-478(488)(498). - FW Isolation, PVG-1611A(B)(C). - SG Blowdown, PVG-503A(B)(C). - FW Flow Control Bypass, FCV-3321(3331)(3341).	EOP-3.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC		Scenario # 3	Event # 6	Page: 58 of 61
Event Description: "B" SGTR.				
Time/ Position		Applicant's Actions or Behavior		
BOP	5. Complete the isolation of <u>each</u> FAULTED SG: a. Close SG Chemical Feed Isolation, MVK-1633A(B)(C). b. Close MS Drain Isolation, PVT-2843A(B)(C). c. Close MS Drain Isolation, PVT-2877A for SG A. PVT-2877B for SG C. d. Place the Steamline PWR RELIEF A(B)(C) SETPT Controller(s) in MAN and closed. e. Place the Steamline Power Relief A(B)(C) Mode Switch(s) in PWR RLF. f. Close FCV-3531(3541)(3551), MD EFP TO SG A(B)(C). g. Close FCV-3536(3546)(3556), TD EFP TO SG A(B)(C). h. Locally unlock and close XVG01017A(B)(C) – EF, SG A(B)(C) MTR DR EF PUMP SUPPLY HEADER VALVE (IB-423). i. Locally unlock and close XVG01018A(B)(C) – EF, SG A(B)(C) TURB DR EF PUMP SUPPLY HDR VALVE (IB-423).			EOP-3.0
BOOTH OPERATOR:	When called to locally close XVG-1017B and XVG-1018B, insert TRIGGER 21.			EOP-3.0
	<u>CAUTION – Step 5.i</u> If the TD EFW Pump is the only available source of feed flow, the steam supply to the TD EFW Pump must be maintained from at least one SG, to maintain a secondary heat sink.			EOP-3.0
BOP	5. j. Close and locally deenergize the appropriate valve if SG B or SG C is FAULTED: • For SG B: 1) Close MVG-2802A, MS LOOP B TO TD EFP. 2) Open XMC1DA2X 05EH, EF PUMP MAIN STEAM BLOCK VLV XVG2802A-MS (IB-463).			EOP-3.0
BOOTH OPERATOR:	When called, use LOA Resets to take the appropriate local action(s).			EOP-3.0
BOP	6. Check if the FAULTED SG MS Isolation and MS Isolation Bypass Valves are closed.			EOP-3.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 59 of 61
Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior

	<u>NOTE – Step 7</u> Any high radiation level received on a radiation monitor that was unisolated at event initiation, may be considered a valid alarm.	EOP-3.0
BOP	7. Check if Secondary radiation levels are normal: a. Check radiation levels normal on <u>all</u> unisolated radiation monitors: • RM-G19A(B)(C), STMLN HI RNG GAMMA. • RM-L3, STEAM GENERATOR BLOWDOWN LIQUID MONITOR. • RM-L10, SG BLOWDOWN CW DISCHARGE LIQUID MONITOR. • RM-A9, CNDSR EXHAUSE GAS ATMOS MONITOR.	EOP-3.0
BOP	7. ALTERNATIVE ACTION GO TO EOP-4.0, E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.	EOP-3.0

Form 3.3-2 Required Operator Actions

Op Test No: 22-01 NRC Scenario # 3 Event # 6 Page: 60 of 61
Event Description: "B" SGTR.

Time/ Position	Applicant's Actions or Behavior

EVALUTOR NOTE:	THESE ARE THE STEPS OF SOP-202 SECTION IV.A, STEAMLINE POWER RELIEF VALVE OPERATION
	<u>CAUTION 2.1</u> If a primary to secondary leak exists in any Steam Generator, Health Physics should be notified of Steamline Power Relief Valve operation.
	<u>NOTE 2.1</u> If a Steamline Power Relief Valve cannot be closed from the MCB, Section V.B, ISOLATION OF STEAMLINE POWER RELIEF VALVES IPV02000, 2010, OR 2020, may be used.
BOP	2.1 Take manual control of valve(s) to be operated as followed: a. Transfer the applicable controller(s) to MAN and close: (PEER ✓) 1) PWR RELIEF A SETPT. 2) PWR RELIEF B SETPT. 3) PWR RELIEF C SETPT. b. Place the corresponding mode selector switch(es) to PWR RLF: (PEER ✓) 1) A SD/PWR RELIEF. 2) B SD/PWR RELIEF. 3) C SD/PWR RELIEF.

SOP-202
Section III.A

Section III.A

Section III.A

Form 3.3-2 Required Operator Actions

Op Test No: 2021 NRC

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Procedure Revisions used in this Scenario Guide			
Number	Title	Rev	Date
GOP-4A	POWER OPERATION (MODE 1 – ASCENDING)	3I	1/6/23
SOP-102	CHEMICAL AND VOLUME CONTROL SYSTEM	25E	4/24/23
SOP-106	REACTOR MAKEUP WATER SYSTEM	12B	7/11/19
SOP-214	MAIN TURBINE AND CONTROLS	22	3/8/23
XCP-614	ANNUNCIATOR RESPONSE PROCEDURE	6E	6/7/17
AOP-102.2	LOSS OF CHARGING	1	11/3/15
AOP-112.2	ARG-3, STEAM GENERATOR TUBE LEAK NOT REQUIRING SI	8	5/12/22
AOP-208.1	CONDENSATE PUMP TRIP/LOSS OF CONDENSATE FLOW	3	6/26/18
AOP-210.3	FEEDWATER PUMP MALFUNCTION	4	4/6/20
AOP-401.10	POWER RANGE CHANNEL FAILURE	4	4/26/17
EOP-1.0	E-0, REACTOR TRIP OR SAFETY INJECTION	30	11/16/18
EOP-4.0	E-3, STEAM GENERATOR TUBE RUPTURE	27	2/5/20
	V.C. SUMMER TECHNICAL SPECIFICATIONS	223	11/10/22

Form 3.3-1 Scenario Outline

Facility:	VC SUMMER	Scenario #:	#4
Scenario Source:	Bank	Op. Test #:	ILO 22-01 NRC-2023
Examiners:	_____	Operators:	US:
	_____		RO:
	_____		BOP:
Initial Conditions:	- Reactor power is 10⁻³%. "B" train work week. - XFN-0065B RBCU is OOS.		
Turnover	Increase reactor power to between 1% and 3% in accordance with GOP-3, Reactor Startup From Hot Standby to Startup (MODE 3 to MODE 2).		
Critical Tasks:	- Start the Turbine Driven EFW pump prior to requiring a transition to EOP-15.0, FR-H.1 RESPONSE TO A LOSS OF SECONDARY HEATSINK. - Establish containment isolation prior to transitioning out of EOP-2.0.		

Event No.	Malf No.	Event Type*	Event Description
1	N/A	R-RO N-BOP, US	Raise Reactor Power to 1-3%.
2	MAL-RCS014A	C-RO, US TS-US	Thermal Barrier Leak on the "A" Reactor Coolant Pump.
3	PMP-AR001T	C-BOP, US	Loss of running Condenser Vacuum Pump.
4	MAL-CVC016A	I/MC-RO, US	FCV-122 fails open in AUTO.
5#	PMP-EF002B PMP-EF002T	TS-US	"B" MDEFW pump bearing failure followed by a trip. (2019 NRC Scenario #3)

Form 3.3-1 Scenario Outline

6#	PMP-EF001T MAL-MSS017A	C/MC-BOP, US	Failure of “A” MDEFW pump. Turbine Driven EFW pump fails to autostart. (2019 NRC Scenario #3)
7	MAL-RCS020C	M-ALL	Small Break LOCA on Loop “C” hot leg.
8	PMP-SW005T VLV-SW012P		SW Booster Pump “A” trips 1 min after SI and XVB-3107A fails to close.
9	VLV-HR015P VLV-HR006P		Phase A Valves SVX-6054 and SVX-6050A fail to automatically close on Phase A. SVX-6050A can be closed from MCB.
TERMINATE: The scenario may be terminated once the crew has transitioned to EOP-2.1, ES-1.2 Post LOCA Cooldown and Depressurization or at the Lead Examiners discretion.			
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control			

Used on previous two NRC Exams.

The following notation is used in the Form 3.3-2 "Time" column:

IOA designates Immediate Operator Action steps.

***** designates Continuous Action steps.

Form 3.3-1 Scenario Outline

TURNOVER:

The crew will assume the watch having been pre-briefed on the Initial Conditions, the plan for this shift and any related operating procedures.

Train "B" RBCU, XFN-0065B is tagged out for breaker maintenance and is to be returned to service next shift.

The Unit is at 10⁻³% power MOL. A reactor and plant startup are in progress using GOP-3, Reactor Startup from Hot Standby to Startup (Mode 3 to Mode 2). The recording of Critical Data, step 3.13, has been completed and the reactor is critical in Mode 2 at 10⁻³% power. The secondary plant has been warmed with the turbine on turning gear. Sections of GOP-4A, Power Operation (Mode 1 - Ascending) have been completed to perform initial lineups and to warm the secondary plant. General Test Procedure, GTP-702 Surveillance Activity Tracking and Triggering, Attachment II G, Operational Mode Change Plant Startup - Entering Mode 1, has been completed.

Management directs that the Unit power be increased to 1% - 3% in accordance with GOP-3 step 3.14.

MTC is negative.

Current RCS Boron concentration by chemistry is 1539 ppm.

Phoenix display monitor is out of service. The Shift Engineer is tracking all necessary actions in Work Control.

An off-going operator will control temperature and EFW flow until the on-coming shift assumes the watch.

Pre-loaded Items

- OVR-AH022A
CS-AH280 RBCU FAN 65B FAST SPEED GREEN L
FINAL: OFF
- OVR-AH023A
CS-AH279 RBCU FAN 65B SLOW SPEED GREEN L
FINAL: OFF

EVENT 1: Raise power to 1-3%

The RO will increase Reactor Power by withdrawing control rods. The RO will recognize the negative reactivity feedback as the Point of Adding Heat is achieved and stabilize power between 1-3%. The BOP will adjust Emergency Feedwater flow to the Steam Generators as steam flow increases. The crew will transition to GOP-4A, Power Operation (Mode 1 - Ascending). Once power has been raised sufficiently for the chief examiner, the next event may be inserted.

EVENT 2: Thermal Barrier Leak on the “A” Reactor Coolant Pump

- **TRIGGER 2**
 - o MAL-RCS014A
RCP 1 THERMAL BARRIER LEAK
FINAL: 20 gpm
RAMP: 120 sec

On cue from the Examiner, a thermal barrier leak will begin on the “A” Reactor Coolant Pump. The crew may enter XCP-603, 1-2 or go to AOP-101.1, Loss of Reactor Coolant Not Requiring SI. MVT-9593A will need to be closed to isolate the leak.

The US will refer to Tech Spec 3.4.6.2, Reactor Coolant System Operational Leakage for Identified Leakage greater than 10 gpm, action b. They must reduce the leakage rate within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours

Once the crew has isolated the thermal barrier, the next event may be inserted.

EVENT 3: Loss of running Cond Vacuum Pump

- **TRIGGER 3**
 - o PMP-AR001T
XAC0001A MAIN CONDENSER VACUUM PMP A TRIP ON COMMAND

On cue from the Evaluator, the running Condenser Vacuum Pump will trip. The BOP will respond in accordance with an XCP-628 1-1, CVP A/B/C TRIP and align valves and start the “C” Condenser Vacuum Pump. Once the “C” Condenser Vacuum pump has been started, the next event may be inserted.

EVENT 4: FCV-122 fails OPEN in AUTO

- **TRIGGER 4**
 - o MAL-CVC016A
CHARGING FLOW CONTROL VALVE FAILURE (AUTO ONLY)
FINAL: 100

On cue from the Examiner, FCV-122 will fail open. XCP-614, 5-1, CHG LINE FLO HI/LO will alarm. The RO will take manual control of FCV-122 and maintain Regenerative Heat Exchanger temperature and Pressurizer level. Once Regenerative Heat Exchanger temperature and Pressurizer level have stabilized, the next event may be inserted.

EVENT 5 and 6: “A” and “B” MDEFW Pumps trip.

- **PRELOAD**
 - o MAL-MSS017A
PVG-2030-MS TDEFP AUTO START FAILURE
- **TRIGGER 5**
 - o PMP-EF002T
XPP0021B MOTOR DRIVEN EFW PMP B TRIP ON COMMAND
DELAY: 35 sec
 - o PMP-EF002B
XPP0021B MOTOR DRIVEN EFW PMP B BRG FAILURE
RAMP: 5 sec
FINAL: 7
- **TRIGGER 6 – Auto Trigger if necessary - x06o013a (RTB OPEN)**
 - o PMP-EF001T
XPP0021A MOTOR DRIVEN EFW PMP A TRIP ON COMMAND

At approximately 1-3% power, on cue from the Examiner, the "B" MDEFW pump bearing will fail. The "B" EFW Pump will trip after a short delay if not stopped by the BOP. The BOP may adjust EFW flow to maintain Steam Generator Water level.

The US will apply TS 3.7.1.2, EMERGENCY FEEDWATER SYSTEM Action “a”: With one emergency feedwater pump inoperable, restore the required emergency feedwater pumps to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

If the crew trips the reactor after “B” MDEFW pump trips, the “A” MDEFW pump will automatically trip requiring the crew to start the Turbine Driven EFW pump.

If the crew does not trip the reactor when “B” MDEFW pump trips, Trigger 6, “A” MDEFW pump trip, will be manually inserted after Technical Specifications are addressed for the “B” MDEFW pump trip.

The BOP will be required to start the Turbine-driven EFW Pump and adjust EFW flow to maintain Steam Generator levels. Once the BOP starts the Turbine Driven EFW pump, the Small Break LOCA will automatically be inserted.

EVENT 7-9: Small Break LOCA on LOOP C Hot Leg 500 gpm.

- **PRELOAD**
 - o VLV-HR015P
XVX06054-HR CNMT ISO VLV FOR PT8254 FAIL POSITION
FINAL: 100
 - o VLV-HR006P
XVX06050A-HR POST ACC H2&LP A IN RB FAIL POSITION
FINAL: 100
- **TRIGGER 7 – Auto Trigger – x07o351r (XVG-2030 VALVE OPEN)**
 - o MAL-RCS020C
REACTOR COOLANT SYSTEM LEAK HOT LEG (LOOP 3)
DELAY: 15 sec
FINAL: 500
- **TRIGGER 11**
 - o LOA-CCW052
CCW PUMP C MANUAL SPEED SELECTOR SWITCH
FINAL: FAST SPEED
- **TRIGGER 12**
 - o LOA-CCW050
CW PUMP A MANUAL SPEED SELECTOR SWITCH
FINAL: FAST SPEED
- **AUTO-TRIGGER 21 Ipplsi (SI ACTUATED)**
 - o PMP-SW005T
XPP0045A SW BOOSTER PMP A TRIP ON COMMAND
DELAY: 60 sec
 - o VLV-SW012P
XVB03107A-SW SW R BLDG OTLT A FAIL POSITION
DELAY: 60 sec
FINAL: 100
- **AUTO-TRIGGER 22, x02i410d (SVX-6050A SWITCH TO CLOSE)**
 - o VLV-HR006P
XVX06050A-HR POST ACC H2&LP A IN RB FAIL POSITION
FINAL: 0
DELETE IN: 1 sec

Form 3.3-1 Scenario Outline

Once the crew starts the Turbine Driven EFW pump, a Small Break LOCA will automatically be inserted. They will enter EOP-1.0, E-0 Reactor Trip or Safety Injection. SI SVX-6054 and SVX-6050A Containment isolation valves will fail to close. SVX-6050A can be closed from the MCB. SW Booster pump A will trip and XVB-3107A will fail to close requiring operators to isolate RBCU 64A/65A. The crew will transition from EOP-1.0 to EOP-2.0, E-1 Loss of Reactor or Secondary Coolant to EOP-2.1, ES-1.2 Post LOCA Cooldown, and initiate a cooldown.

CRITICAL TASKS:

- Start the Turbine Driven EFW pump prior to requiring a transition to EOP-15.0, FR-H.1 RESPONSE TO A LOSS OF SECONDARY HEATSINK.
- Establish containment isolation prior to transitioning out of EOP-2.0.

TERMINATION:

The scenario may be terminated once the crew has transitioned to EOP-2.1, ES-1.2 Post LOCA Cooldown and Depressurization or at the Lead Examiners discretion.

Form 3.3-1 Scenario Outline

2023 NRC #4

Scenario Attributes		Events
Events after EOP entry (1-2)	2	- SW Booster Pump "A" trips 1 min after SI and XVB-3107A fails to close. - Phase A Valves SVX-6054 and SVX-6050A fail to automatically close on Phase A. SVX-6050A can be closed from MCB.
Abnormal Events (2-4)	4	- Thermal Barrier Leak on the "A" Reactor Coolant Pump. - Loss of running Condenser Vacuum Pump. - FCV-122 fails open in AUTO. "B" MDEFW Pump bearing failure leading to a trip. "A" MDEFW pump trips and TDEFW pump fails to auto start.
Major Transients (1-2)	1	SBLOCA on Loop "C" Hot leg.
EOPs Entered (1-2)	1	EOP-2.0, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.
EOP Contingencies (0-2)	0	N/A
Preidentified CTs (≥ 2)	2	- Start the Turbine Driven EFW pump prior to requiring a transition to EOP-15.0, FR-H.1 RESPONSE TO A LOSS OF SECONDARY HEATSINK. - Establish containment isolation prior to transitioning out of EOP-2.0.

Form 3.3-1 Scenario Outline

SIMULATOR SCENARIO SETUP

INITIAL CONDITIONS:

- IC Set 259
- $10^{-3}\%$ Power, MOL
- Burnup = 10,000 MWD/MTU
- Current Core Cycle = 28
- RCS Boron Concentration = 1539 ppm
- FCV-113 Pot Setting = 6.60
- Rod Position: Group D = 100 steps
- Tavg = 558.3°F

PRE-EXERCISE:

- Ensure simulator has been checked for hardware problems (DORT, burnt out light bulbs, switch malfunctions, chart recorders, etc.).
- Complete VCS-TQP-0807 Attachment I-A, Unit 1 Booth Instructor Checklist.
- Verify plant aligned for "B1" work week IAW PTP-101.004, Safety Related Train Swap Checklist.
- Verify red Placard on "A" CCW Pump and "B" Charging Pump.
- Verify the Hard Card for Turbine operation is in its proper storage location and cleaned.
- Verify the Hard Card for borating via MVT-8104 is in its proper storage location and cleaned.
- Set RO SIPCS station to ZZREAC.
- Verify Rod Bank Update set correctly: 100 steps on Control Bank D and 226 steps on all other Banks.
- Verify NR-45 is set to One Intermediate Range and One Power Range channel and is set to fast speed.
- Reset Digital Reactivity on SIPCS (disable calc, select N35 and N36, re-enable and calculate)
- Ensure no NI's are removed from service, on SIPCS type in "add/omit" to verify.
- Place HOLD Tag on RBCU 65B NORM and SLOW Speed Switches.
- Ensure 115kV & 230kV setpoints are set to appropriate values for the shutdown condition IAW SOP-304, Enclosure B.
- Ensure you have the following pre-marked up procedures:
 - o GOP-3, Reactor Startup From Hot Standby To Startup (Mode 3 To Mode 2)
 - o GOP-4A, Power Operation (Mode 1 - Ascending)
- Ensure Phoenix computer screen is turned off.

Form 3.3-1 Scenario Outline

- Have two copies of SOP-118 Attachment VIIA available upon request.
- Have two copies of SOP-118 Attachment VIIIA available upon request.
- Ensure XCP-620 2-5, CMPTR ROD DEV, is **not** lit. If it is lit:
 - Enter RBU into IPCS and verify the information matches current rod height.
 - If rod height in RBU doesn't match current rod height, update the information and save it. This should clear XCP-620 2-5.
- Ensure you have a turnover sheet for each position.
- Conduct two-minute drill.

Op Test No: 2023 NRC		Scenario # 4	Event # 1	Page: 11 of 47
Event Description: Raise Reactor Power to 1-3%				
Time/ Position	Applicant's Actions or Behavior			
EVALUATOR NOTE:	The crew will increase reactor power to between 1% and 3% in accordance with GOP-3 REACTOR STARTUP FROM HOT STANDBY TO STARTUP (MODE 3 TO MODE 2).			
BOOTH OPERATOR:	No TRIGGER.			
	<u>CAUTION 3.14</u> While operating with a positive Moderator Temperature Coefficient: a. All reactivity additions should be slow and controlled. b. A stable Startup Rate of 0.3 decade per minute should not be exceeded. c. Rods should be moved in 1/2 step increments until the effect of rod motion has been evaluated.			GOP-3
	<u>NOTE 3.14</u> Ensure sufficient Emergency Feedwater Flow exists prior to raising power.			GOP-3
RO	3.14. Increase Reactor Power to between 1% and 3%.			GOP-3
RO	3.15. At the Point of Adding Heat, if NR-45, NIS RECORDER, had previously been selected to HI speed place the recorder in LO speed.			GOP-3
	<u>CAUTION 3.16</u> a. Adjustment of Tavg with the Rod Control System must not be attempted with the ROD CNTRL BANK SEL Switch in any position other than MAN. b. Manual rod control is required to establish equilibrium conditions, since C-5 blocks automatic rod withdrawal.			GOP-3
RO	3.16. Maintain Tavg between 555°F and 559°F.			GOP-3
	<u>NOTE 3.17</u> Emergency Feedwater Flow and Steam Generator Blowdown Flows should be adjusted simultaneously to ensure sufficient Emergency Feedwater Flow exist.			GOP-3

Op Test No: 2023 NRC Scenario # 4 Event # 1 Page: 12 of 47

Event Description: Raise Reactor Power to 1-3%

Time/ Position	Applicant's Actions or Behavior	
BOP	3.17. Adjust Steam Generator Blowdown flow between 45 GPM and 50 GPM on each Steam Generator while maintaining Narrow Range Steam Generator levels between 60% and 65% with chemistry within specification using the following: a. Blowdown per SOP-212, Steam Generator Blowdown. b. Emergency Feedwater per SOP-211, Emergency Feedwater System.	GOP-3
US	3.18. Complete Attachment II.G, Operational Mode Change Plant Startup - Entering Mode 1, of GTP-702.	GOP-3
US	3.19. Proceed to GOP-4A, Power Operation (Mode 1 - Ascending).	GOP-3
BOOTH OPERATOR:	If called at any time to look at feedwater heaters because of the feedwater heater dump valve not being closed, wait 2 minutes and report back "no issues, everything is operating correctly".	
EVALUATOR NOTE:	The next event may be inserted following completion of the power ascension and prior to beginning Step 3.17, or at the discretion of the Lead Examiner.	

Appendix D		Required Operator Actions	Form ES-D-2
Op Test No: 2023 NRC		Scenario # 4 Event # 2	Page: 13 of 47
Event Description: Thermal Barrier Leak on the “A” Reactor Coolant Pump			
Time/ Position		Applicant's Actions or Behavior	
EVALUATOR NOTE:	Thermal Barrier Leak on the “A” Reactor Coolant Pump		
BOOTH OPERATOR:	When directed – initiate Event 2 (TRIGGER 2).		
Symptoms/ Cues	• XCP-603, 1-2 RCP A THERM BAR FLO HI. • XCP-643, 3-6 CC SRG TK VENT 7096 CLSD HI RAD. • XCP-644, 1-3 CC LOOP A RM-L2A HI RAD. • XCP-644, 1-4 CC LOOP A RM-L2A TRBL. • CCW Surge Tank Level.		
EVALUATOR NOTE:	May enter XCP-603, 1-2, XCP-644, 1-3 <u>OR</u> AOP-101.1, LOSS OF REACTOR COOLANT NOT REQUIRING SI.		
CREW	1. Monitor RML-2A and RML-2B for radiation level increase.		
RO	2. If due to thermal barrier leakage, close MVT-9593A, FROM RCP A THERM BARR.		
RO	3. Verify seal injection flow available to Reactor Coolant Pump A.		
US	US Enters XCP-644, 1-3, CC LOOP A RM-L2A HI RAD		
CREW	Corrective Actions: 1. Verify the Automatic Action has occurred. 2. Verify the alarm is valid by observing RM-L2A and R/R-5 for increasing radiation. 3. Notify Health Physics and request a radiological survey. 4. Notify Chemistry and request a sample of the Component Cooling System. 5. Monitor Component Cooling System flows, temperatures and annunciators for any indications of equipment failure.		
BOOTH OPERATOR:	When called to sample the CCW system, wait 5 minutes and report back that the CCW system has elevated activity levels.		

Appendix D		Required Operator Actions	Form ES-D-2
Op Test No: 2023 NRC		Scenario # 4 Event # 2	Page: 14 of 47
Event Description: Thermal Barrier Leak on the "A" Reactor Coolant Pump			
Time/ Position	Applicant's Actions or Behavior		
RO	Supplemental Actions: 1. Isolate the source of inleakage when confirmed by sample analysis or a radiological survey. 2. If leakage is from a Reactor Coolant Pump Thermal Barrier, verify adequate seal injection flow and close the associated following valve for the affected pump: a. MVG-9593A, FROM RCP A THERM BARR. b. MVG-9593B, FROM RCP B THERM BARR. c. MVG-9593C, FROM RCP C THERM BARR. d. Refer to SOP-101 for Reactor Coolant Pump operating parameters.		
EVALUATOR NOTE:	Until the leak is identified, the leakage is considered unidentified and is subject to the T.S. 3.4.6.2 - 1 GPM limit. After identification, the leakage limit is increased to 10 GPM limit. Quantification of the leak can be made by the increase in charging or by the rise seen on the CCW Surge Tank, which would require reference to the Curve Book and a calculation based on time.		
US	Enters T.S. 3.4.6.2, Reactor Coolant System Operational Leakage and applies Action b: 10 GPM IDENTIFIED LEAKAGE from the Reactor Coolant System With any operational Reactor Coolant System leakage greater than any one of the above limits, excluding PRESSURE BOUNDARY LEAKAGE, primary-to-secondary leakage, and leakage from Reactor Coolant System Pressure Isolation Valves, reduce the leakage rate to within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.		
EVALUATOR NOTE:	If the crew doesn't use the Alarm Response Procedures above to mitigate the RCP Thermal Barrier leak, the steps for AOP-101.1 are below. If the crew does use the Alarm Response Procedures above to mitigate the RCP Thermal Barrier leak, the next event may be inserted following the US assessment of Tech Specs, after they have closed 9593A, or at any time per the discretion of the Lead Examiner.		

XCP-644, 1-3

TS 3.4.6.2

Op Test No: 2023 NRC Scenario # 4 Event # 2 Page: 15 of 47
 Event Description: Thermal Barrier Leak on the "A" Reactor Coolant Pump

Time/ Position	Applicant's Actions or Behavior	
	<u>NOTE</u> - If a Reactor Trip occurs AND SI is NOT required, this procedure should be continued after the actions of EOP-1.1, ES-0.1 REACTOR TRIP RESPONSE, are completed. - As valves are isolated, it may be necessary to monitor RCS pressure for a period of time to determine if the leak is isolated.	AOP-101.1
RO	*1. Verify PZR level is at or trending to program level. (NO)	AOP-101.1
RO	ALTERNATIVE ACTION 1. IF PZR level is decreasing, THEN perform the following: - Open FCV-122, CHG FLOW, as necessary to maintain PZR level. - IF PZR level continues to decrease, THEN reduce Letdown to one 45 gpm orifice: - Set PCV-145, LO PRESS LTDN, to 70%. - Ensure PVT-8149A, LTDN ORIFICE A ISOL, is open. - Close both PVT-8149B(C), LTDN ORIFICE B(C) ISOL. - Adjust PCV-145, LO PRESS LTDN, to maintain PI-145, LO PRESS LTDN PRESS PSIG, between 300 psig and 400 psig. - Place PCV-145, LO PRESS LTDN, in AUTO.	AOP-101.1
RO	*2. Check if SI is required: (NO) a. Check if any of the following criteria are met: - PZR level is decreasing with Charging maximized and Letdown minimized. - OR - PZR level is approaching 8%. - OR - PZR pressure is approaching 1870 psig. - OR - VCT level is approaching 5%.	AOP-101.1
US	ALTERNATIVE ACTION a. GO TO Step 3	AOP-101.1

Op Test No: 2023 NRC Scenario # 4 Event # 2 Page: 16 of 47
 Event Description: Thermal Barrier Leak on the "A" Reactor Coolant Pump

Time/ Position	Applicant's Actions or Behavior	
	<u>NOTE – Step 3</u> Conditions for implementing Emergency Plan Procedures should be evaluated using EPP.001, ACTIVATION AND IMPLEMENTATION OF EMERGENCY PLAN.	AOP-101.1
CREW	3. Determine RCS leak rate: a. Estimate the RCS leak rate: • REFER TO IPCS CHGNET. • REFER TO IPCS 4RW1. b. Estimate the RCS leak rate using IPCS VCT level. (14 gal/percent) c. If necessary, calculate the RCS leak rate. REFER TO STP-114.002, OPERATIONAL LEAKAGE CALCULATION.	AOP-101.1
US	4. Check if the RCS leak rate is GREATER THAN Tech Spec 3.4.6.2 limits.	AOP-101.1
US	5. Comply with the applicable Tech Spec 3.4.6.2 action statement.	AOP-101.1
RO	6. Verify RCS pressure is GREATER THAN 2210 psig.	AOP-101.1
RO	7. Close all Letdown Isolation Valves: a. PVT-8149A, LTDN ORIFICE A ISOL. b. PVT-8149B, LTDN ORIFICE B ISOL. c. PVT-8149C, LTDN ORIFICE C ISOL. d. LCV-459, LTDN LINE ISOL. e. LCV-460, LTDN LINE ISOL.	AOP-101.1

Op Test No: 2023 NRC Scenario # 4 Event # 2 Page: 17 of 47

Event Description: Thermal Barrier Leak on the "A" Reactor Coolant Pump

Time/ Position	Applicant's Actions or Behavior	
RO	8. Check if the leak has been isolated: (NO) a. Evaluate the following: • IPCS CHGNET • IPCS 4RW1 • Pressurizer level • VCT Level • Reactor Building Conditions b. If necessary, calculate the RCS leak rate. REFER TO STP-114.002, OPERATIONAL LEAKAGE CALCULATION.	AOP-101.1
RO	ALTERNATIVE ACTION 8. Perform the following: 1. Isolate Charging by closing either of the following: • MVG-8107, CHG LINE ISOL. • MVG-8108, CHG LINE ISOL. 2. GO TO Step 11.	AOP-101.1
RO	11. Check if the leak has been isolated: (NO) a. Evaluate the following: • IPCS CHGNET • IPCS 4RW1 • Pressurizer level • VCT Level • Reactor Building Conditions b. If necessary, calculate the RCS leak rate. REFER TO STP-114.002, OPERATIONAL LEAKAGE CALCULATION.	AOP-101.1

Op Test No: 2023 NRC Scenario # 4 Event # 2 Page: 18 of 47
 Event Description: Thermal Barrier Leak on the "A" Reactor Coolant Pump

Time/ Position	Applicant's Actions or Behavior	
RO	ALTERNATIVE ACTION 11. Perform the following: 1. Close FCV-122, CHG FLOW 2. Ensure both of the following are open: - MVG-8107, CHG LINE ISOL. - MVG-8108, CHG LINE ISOL. 3. Restore Normal Letdown using ATTACHMENT 2, ESTABLISHING NORMAL LETDOWN. 4. If desired, restore Automatic Charging flow control using ATTACHMENT 3, RESTORING AUTOMATIC CHARGING FLOW CONTROL. 5. GO TO Step 14.	AOP-101.1
EVALUATOR NOTE:	The following is directions contained in Attachment 2 to restore letdown.	
RO	1. Establish Normal Letdown: a. Adjust FCV-122, CHG FLOW, to obtain 70 gpm Charging flow.	AOP-101.1 ATT 2
RO	b. Set PCV-145, LO PRESS LTDN, to 70%.	AOP-101.1 ATT 2
RO	c. Open TCV-144, CC TO LTDN HX.	AOP-101.1 ATT 2
RO	d. Open PVT-8152, LTDN LINE ISOL.	AOP-101.1 ATT 2
RO	e. Place TCV-143, LTDN TO VCT OR DEMIN, in VCT position.	AOP-101.1 ATT 2
RO	f. Open both LCV-459 and LCV-460, LTDN LINE ISOL.	AOP-101.1 ATT 2
RO	g. Open desired Orifice Isolation Valve(s) to obtain 60 gpm to 120 gpm: - PVT-8149A, LTDN ORIFICE A ISOL (45 gpm). - PVT-8149B, LTDN ORIFICE B ISOL (60 gpm). - PVT-8149C, LTDN ORIFICE C ISOL (60 gpm).	AOP-101.1 ATT 2
RO	h. Adjust FCV-122, CHG FLOW, to maintain TI-140, REGEN HX OUT TEMP °F, between 250°F and 350°F while maintaining PZR level.	AOP-101.1 ATT 2

Appendix D		Required Operator Actions	Form ES-D-2
Op Test No: 2023 NRC		Scenario # 4 Event # 2	Page: 19 of 47
Event Description: Thermal Barrier Leak on the “A” Reactor Coolant Pump			
Time/ Position	Applicant’s Actions or Behavior		
RO	i. Adjust PCV-145, LO PRESS LTDN, to maintain PI-145, LO PRESS LTDN PRESS PSIG, between 300 psig and 400 psig.		
RO	j. Place PCV-145, LO PRESS LTDN, in AUTO.		
RO	k. Place TCV-144, CC TO LTDN HX, in AUTO.		
RO	l. WHEN Letdown temperatures are stable, place TCV-143, LTDN TO VCT OR DEMIN, in DEMIN/AUTO.		
EVALUATOR NOTE:	The following is directions contained in Attachment 3 for restoring Normal Charging.		
RO	1. Place FCV-122, CHG FLOW in AUTO as follows: a. Place the following in MAN: 1) PZR LEVEL MASTER CONTROL 2) FCV-122, CHG FLOW		
RO	b. Adjust FCV, CHG FLOW, in MAN to establish Pressurizer level at or near programmed level.		
RO	c. Establish automatic FCV-122, CHG FLOW, control as follows: 1) Adjust FCV-122, CHG FLOW, to establish 75 gpm flow as indicated on FI-122A, CHG FLOW GPM. 2) Manually adjust the PZR LEVEL MASTER CONTROL to 50% demand. 3) Place FCV-122, CHG FLOW, in AUTO.		
RO	d. Adjust PZR LEVEL MASTER CONTROL in MAN, as necessary, to maintain Pressurizer level at or near programmed level.		
RO	e. When Pressurizer level is within 1% and trending toward programmed level, place PZR LEVEL MASTER CONTROL in AUTO.		
EVALUATOR NOTE:	The following is a return to the guidance in the body of AOP-101.1.		

Op Test No: 2023 NRC Scenario # 4 Event # 2 Page: 20 of 47
 Event Description: Thermal Barrier Leak on the "A" Reactor Coolant Pump

Time/ Position	Applicant's Actions or Behavior	
	<u>CAUTION – Step 14</u> Proper radiological precautions must be taken when obtaining steamline samples to minimize personnel exposure.	AOP-101.1
CREW	14. Verify no SG tubes are leaking: - Narrow Range level in no SG is increasing with feed flow LESS THAN steam flow. - Radiation levels on all of the following are normal: - RM-G19A(B)(C), STMLN HI RNG GAMMA. - RM-A9, CNDSR EXHAUST GAS ATMOS MONITOR. - RM-L3, STEAM GENERATOR BLOWDOWN LIQUID MONITOR. - RM-L10, SG BLOWDOWN CW DISCHARGE LIQUID MONITOR. - No steam flow/feed flow mismatch (feed flow low). - As determined by Chemistry sample analysis of all SG secondary sides for activity.	AOP-101.1
RO	15. Check the PZR PORVs: Check if RCS pressure is LESS THAN 2330 psig.	AOP-101.1
	<u>CAUTION – Step 15.b</u> If any PZR PORV opens because of high PZR pressure, Step 15.b should be repeated after pressure decreases to LESS THAN 2300 psig to ensure the PORV recloses.	AOP-101.1
RO	- Verify all PZR PORVs are closed. - Check if PRT conditions are normal by verifying PRT LVL LO/TEMP/LVL/PRESS HI (XCP-616 4-4), is NOT lit. - Verify at least one PZR PORV Block Valve is open.	AOP-101.1

Op Test No: 2023 NRC		Scenario # 4		Event # 2		Page: 21 of 47	
Event Description: Thermal Barrier Leak on the "A" Reactor Coolant Pump							
Time/ Position		Applicant's Actions or Behavior					
CREW		16. Check if Reactor Building conditions are normal: a. RB radiation levels are normal on the following: - RM-G5, RB PERSONNEL ACCESS AREA GAMMA. - RM-G6, RB REFUEL BRIDGE AREA GAMMA. - RM-A2, RB SAMPLE LINE PARTICULATE (IODINE) (GAS) ATMOS MONITOR. b. RB Sump levels are normal. c. RB pressure is LESS THAN 1.5 psig. d. The following annunciators are NOT lit: - RBCU 1A/2A DRN FLO HI (XCP-606 2-2). - RBCU 1B/2B DRN FLO HI (XCP-607 2-2). - RCS LEAK DET >1 GPM (XCP-6153-6).					
		<u>NOTE – Step 17</u> Conditions for implementing Emergency Plan Procedures should be evaluated using EPP.001, ACTIVATION AND IMPLEMENTATION OF EMERGENCY PLAN.					
CREW		17. Check if Aux Building conditions are normal: a. Radiation levels are normal on the following: - RM-A13, PLANT VENT HI RANGE. - RM-A3, MAIN PLANT VENT EXH ATMOS MONITOR: PARTICULATE (IODINE) (GAS). - RM-A11, AB VENT GAS ATMOS MONITOR. - Aux Building local area radiation monitors. b. AB SMP LVL HI (XCP-631 6-1), is NOT lit. c. LD TRBL AB SMP/FLDRN LVL HI (XCP-606(607) 3-4), is NOT lit.					
RO		18. Check if the Component Cooling Water System is intact: - Radiation Level is normal on RM-L2A(B), COMPONENT COOLING LIQUID MONITOR. (NO) OR - CCW Surge Tank is normal and stable.					

Op Test No: 2023 NRC	Scenario # 4 Event # 2	Page: 22 of 47
Event Description: Thermal Barrier Leak on the "A" Reactor Coolant Pump		

Time/ Position	Applicant's Actions or Behavior	
US	ALTERNATIVE ACTION 18. GO TO Step 20.	AOP-101.1
RO	20. Check if flow on FT-130, SL INJ FLO on IUR01156, is GREATER THAN 6 GPM.	AOP-101.1
RO	21. Close MVT-9593A, FROM RCP A THERM BARR.	AOP-101.1
RO	22. Check if the leak has been isolated: - CCW Surge Tank level is stable. - If necessary, calculate the RCS leak rate. REFER TO STP-114.002, OPERATIONAL LEAKAGE CALCULATION.	AOP-101.1
US	23. GO TO Step 42.	AOP-101.1
CREW	42. Evaluate Plant status: a. Maintain stable plant conditions. b. Consult with the Shift Manager to determine further actions.	AOP-101.1
US	43. RETURN TO Procedure and Step in effect.	AOP-101.1
US	Enters T.S. 3.4.6.2, Reactor Coolant System Operational Leakage and applies Action b: 10 GPM IDENTIFIED LEAKAGE from the Reactor Coolant System With any operational Reactor Coolant System leakage greater than any one of the above limits, excluding PRESSURE BOUNDARY LEAKAGE, primary-to-secondary leakage, and leakage from Reactor Coolant System Pressure Isolation Valves, reduce the leakage rate to within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Tech Specs	AOP-101.1
EVALUATOR NOTE:	The next event may be inserted following the US assessment of Tech Specs, after they have closed 9593A or at any time per the discretion of the Lead Examiner.	

Appendix D		Required Operator Actions	Form ES-D-2
Op Test No: 2023 NRC		Scenario # 4 Event # 3	Page: 23 of 47
Event Description: Loss of running Condenser Vacuum Pump.			
Time/ Position	Applicant's Actions or Behavior		
EVALUATOR NOTE:	On cue from the Examiner, "A" CVP will trip.		
BOOTH OPERATOR:	When directed – initiate Event 3 (TRIGGER 3).		
Symptoms/ Cues	- XCP-628 1-1, CVP A/B/C TRIP. - Increasing pressure indication on PI-3006, MAIN CNDSR MAIN A PRESS INCHES HG		
US	Enters ARP-001- XCP-628 1-1.		
BOOTH OPERATOR:	If contacted as field operator regarding Condenser Vacuum pump status, wait 1 minute then report as follows in accordance with the information requested: "The "A" condenser vacuum pump is stopped and the motor bearings are extremely hot." "The "C" Condenser Vacuum pump is ready for start" "Good start on the "C" Condenser Vacuum pump" If contacted about the status of XVB00118C, wait 1 minute and report that the valve is open after "C" Condenser Vacuum pump is started. If contacted about the status of XVB00118A, wait 1 minute and report that the valve is closed.		
BOP	CORRECTIVE ACTIONS: - Determine which vacuum pump tripped. - If Main Vacuum Pump A tripped, perform the following: - Open MVB-102A, VAC PP C TO CNDSR A. - Start XAC-0001C, MAIN CVP C. - Place XAC-0001A, MAIN CVP A, to STOP.		
BOP	5. Verify vacuum is stable on PI-3006(3016), MAIN A(B) PRESS INCHES HG.		
EVALUATOR NOTE:	The next event may be initiated after the "C" Condenser Vacuum Pump has been started or at any time per the discretion of the Lead Evaluator.		

XCP-628 1-1

XCP-628 1-1

XCP-628 1-1

XCP-628 1-1

Appendix D		Required Operator Actions	Form ES-D-2
Op Test No: 2023 NRC		Scenario # 4 Event # 4	Page: 24 of 47
Event Description: FCV-122 fails OPEN in AUTO			
Time/ Position	Applicant's Actions or Behavior		
EVALUATOR NOTE:	FCV-122 fails OPEN in AUTO.		
BOOTH OPERATOR:	When directed – initiate Event 4 (TRIGGER 4).		
RO	The RO may take action in accordance with OP-AA-100 for equipment not responding properly in Automatic control. RO may establish manual control and restore charging flow.		
	OP-AA-100		
US/RO	Enters XCP-614, 5-1, CHG LINE FLO HI/LO.		
	CORRECTIVE ACTIONS:		
	1. If the running Charging Pump suction flowpath has become isolated, secure the Charging Pump and go to AOP-102.2, Loss of Charging. (NO)		
	XCP-614, 5-1		
	2. If the PUMP A(B) or PUMP C TRAIN A(B) ammeter indication is abnormal for the running Charging Pump and the pump must be tripped, go to AOP-102.2, Loss of Charging. (NO)		
	XCP-614, 5-1		
RO	3. Monitor LT-112A and LT-115, % LEVEL, to verify proper VCT level.		
	XCP-614, 5-1		
RO	4. Monitor FI-122A, CHG FLOW GPM.		
	XCP-614, 5-1		
RO	5. Verify the Charging header valve lineup:		
	XCP-614, 5-1		
	a. Verify the following valves are open:		
	1. FCV-122, CHG FLOW.		
	2. MVG-8107, CHG LINE ISOL.		
	3. MVG-8108, CHG LINE ISOL.		
	4. Either of the following:		
	a. PVT-8146, NORM CHG TO RCS LP B.		
	b. PVT-8147, ALT CHG TO RCS LP A.		
	b. If the Charging header has isolated go to AOP-102.2, Loss of Charging. (NO)		

Op Test No: 2023 NRC Scenario # 4 Event # 4 Page: 25 of 47
 Event Description: FCV-122 fails OPEN in AUTO

Time/ Position	Applicant's Actions or Behavior
RO	6. If Charging flow has NOT been lost but a loss of automatic control of FCV-122, CHG FLOW, is suspected perform the following: a. Place FCV-122, CHG FLOW, in MAN and adjust, as required, to maintain TI-140, REGEN HX OUT TEMP °F, between 250°F and 350°F while maintaining Pressurizer level. b. If FCV-122, CHG FLOW, fails to respond in MAN, perform SOP-102, Off Normal, Response To Malfunction Of FCV-122, to bypass FCV00122-CS, CHARGING HEADER FLOW CONTROL VALVE (AB-412 West Pen).
EVALUATOR NOTE:	The next event may be initiated while the RO is re-establishing manual Pressurizer Level and Regenerative Heat Exchanger Outlet temperature, or at the discretion of the Lead Examiner.

XCP-614, 5-1

Appendix D		Required Operator Actions	Form ES-D-2
Op Test No: 2023 NRC		Scenario # 4 Event # 5 and 6	Page: 26 of 47
Event Description: "B" Motor Driven EFW pump BRG failure followed by trip requiring EFW flow adjustments. After plant is stable and Technical specification have been addressed the "A" Motor Driven EFW pump will trip and start of Turbine Driven EFW pump will be required.			
Time/ Position	Applicant's Actions or Behavior		
EVALUATOR NOTE:	At approximately 1-3% power, on cue from the Examiner the "B" MDEFW pump bearing will fail and the "B" EFW Pump will trip after a short delay. The BOP may adjust EFW flow to maintain Steam Generator levels.		
BOOTH OPERATOR:	When directed – initiate Event 5 (TRIGGER 5).		
Symptoms/ Cues	• XCP-623 1-5, MD EFP B MOTOR OVRLD • XCP-623 1-3, MD EFP B TRIP		
US	Enters ARP-001- XCP-623, 1-5, MD EFP B MOTOR OVRLD.		XCP-623 1-5
EVALUATOR NOTE:	The 400 gpm demand referred to in the Overload Annunciator is a reduced flow intended to clear the condition.		
BOP	AUTOMATIC ACTIONS: 1. If overload condition continues, pump may trip on overcurrent. CORRECTIVE ACTIONS: 1. If possible, reduce demand to less than 400 gpm by throttling the flow control valves to the Steam Generators. 2. Start Motor Driven Emergency Feedwater Pump A if necessary to maintain Steam Generator levels.		XCP-623 1-5
US	3. Refer to SOP-211, EMERGENCY FEEDWATER SYSTEM.		XCP-623 1-5
BOOTH OPERATOR:	If contacted as field operator to investigate the condition of the "B" MD EFW pump and or breaker, wait 3 minutes and report, "The pump bearings are hot to the touch." If dispatched as an operator to check breaker status, wait 3 minutes then report, "The breaker is open with no flags."		
EVALUATOR NOTE:	The US may direct the BOP to Stop the "B" MD EFW Pump.		
US	Enters ARP-001- XCP-623, 1-3, MD EFP B TRIP.		XCP-623 1-3

Op Test No: 2023 NRC		Scenario # 4 Event # 5 and 6		Page: 27 of 47
Event Description: "B" Motor Driven EFW pump BRG failure followed by trip requiring EFW flow adjustments. After plant is stable and Technical specification have been addressed the "A" Motor Driven EFW pump will trip and start of Turbine Driven EFW pump will be required.				
Time/ Position		Applicant's Actions or Behavior		
BOP	CORRECTIVE ACTIONS: 1. Start Motor Driven Emergency Feedwater Pump A if necessary to maintain Steam Generator levels. 2. Reduce feedwater demand to less than 400 gpm. SUPPLEMENTAL ACTIONS: 1. If Steam Generator levels cannot be maintained with one motor driven pump start the Turbine Driven Emergency Feedwater Pump. 2. Place PUMP B control switch in NORMAL-AFTER-STOP to clear the alarm. 3. Determine the cause of the trip and correct as soon as possible. 4. If the pump is inoperable, refer to Tech Spec 3.7.1.2.			XCP-623 1-3
US	Refer to Technical Specification 3.7.1.2 EMERGENCY FEEDWATER SYSTEM: ACTION a: With one emergency feedwater pump inoperable, restore the required emergency feedwater pumps to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.			T.S. 3.7.1.2
EVALUATOR NOTE:	After Technical specification have been addressed, a trip of the "A" MDEFW pump will occur requiring starting of the TDEFW pump. If the candidates trip the reactor when "B" MDEFW pump trips, the "A" MDEFW pump will automatically trip when the reactor trips.			
BOOTH OPERATOR:	When directed – initiate Event 6 (TRIGGER 6).			
US	Enters ARP-001- XCP-622, 1-3, MD EFP A TRIP.			XCP-622 1-3

Op Test No: 2023 NRC Scenario # 4 Event # 5 and 6 Page: 28 of 47

Event Description: "B" Motor Driven EFW pump BRG failure followed by trip requiring EFW flow adjustments. After plant is stable and Technical specification have been addressed the "A" Motor Driven EFW pump will trip and start of Turbine Driven EFW pump will be required.

Time/ Position	Applicant's Actions or Behavior

BOP Critical Task	CORRECTIVE ACTIONS: 1. Start Motor Driven Emergency Feedwater Pump B if necessary to maintain Steam Generator levels. 2. Reduce feedwater demand to less than 400 gpm. SUPPLEMENTAL ACTIONS: 1. If Steam Generator levels cannot be maintained with one motor driven pump start the Turbine Driven Emergency Feedwater Pump. 2. Place PUMP A control switch in NORMAL-AFTER-STOP to clear the alarm.
EVALUATOR NOTE:	Critical Task is to start the Turbine Driven EFW pump prior to requiring a transition to EOP-15.0, FR-H.1 RESPONSE TO A LOSS OF SECONDARY HEATSINK.
EVALUATOR NOTE:	The crew may immediately start the TDEFW pump by placing either PVG-2030 control switch to open.
EVALUATOR NOTE:	The next event automatically initiates on starting of the TDEFW pump, or at any time per the discretion of the Lead Evaluator.

XCP-622 1-3

Op Test No: 2023 NRC Scenario # 4 Events #7-9 Page: 29 of 47
 Event Description: SBLOCA on "C" loop Hot Leg of 500 gpm.

Time/ Position	Applicant's Actions or Behavior	
EVALUATOR NOTE:	On start of the TDEFW pump, a SBLOCA will occur on the "C" Hot Leg.	
BOOTH OPERATOR:	Automatically initiated –Event 7 (TRIGGER 7).	
US	Enters EOP-1.0, E-0 LOSS OF REACTOR COOLANT NOT REQUIRING SI.	
RO (IOA)	1. Verify Reactor Trip: • Trip the Reactor using either Reactor Trip Switch. • Verify all Reactor Trip and Bypass Breakers are open. • Verify all Rod Bottom Lights are lit. • Verify Reactor Power level is decreasing.	EOP-1.0
BOP (IOA)	2. Verify Turbine/Generator Trip: a. Verify all Turbine STM STOP VLVs are closed. b. Ensure Generator Trip (after 30 second delay): 1. Ensure the GEN BKR is open. 2. Ensure the GEN FIELD BKR is open. 3. Ensure the EXC FIELD CNTRL is tripped.	EOP-1.0
BOP (IOA)	3. Verify both ESF buses are energized.	EOP-1.0
RO/BOP (IOA)	4. Check if SI is actuated: a. Check if either: • SI ACT status light is bright on XCP-6107 1-1. OR • Any red first-out SI annunciator is lit on XCP-626 top row. b. Actuate SI using either SI ACTUATION Switch. c. GO TO Step 6.	EOP-1.0

Op Test No: 2023 NRC Scenario # 4 Events #7-9 Page: 30 of 47
Event Description: SBLOCA on "C" loop Hot Leg of 500 gpm.

Time/ Position	Applicant's Actions or Behavior

Crew	5. Check if SI is required: a. Check if any of the following conditions exist: • PZR pressure LESS THAN 1850 psig. OR • RB pressure GREATER THAN 3.6 psig. OR • Steamline pressure LESS THAN 675 psig. OR • Steamline differential pressure GREATER THAN 97 psid. b. Actuate SI using either SI ACTUATION Switch.

EOP-1.0

Op Test No: 2023 NRC

Scenario # 4 Events #7-9

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Event Description: SBLOCA on "C" loop Hot Leg of 500 gpm.

Time/ Position	Applicant's Actions or Behavior

REFERENCE PAGE FOR EOP-1.0

EOP-1.0

1 RCP TRIP CRITERIA

a. IF Phase B Containment Isolation has actuated (XCP-612 4-2), THEN trip all RCPs.

b. IF both of the following conditions occur, THEN trip all RCPs:

- SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM.

AND

- RCS Wide Range pressure is LESS THAN 1418 psig.

2 REDUCING CONTROL ROOM EMERGENCY VENTILATION

Reduce Control Room Emergency Ventilation to one train in operation within 30 minutes of actuation. REFER TO SOP-505, CONTROL BUILDING VENTILATION SYSTEM.

3 MONITOR SPENT FUEL COOLING

Periodically check status of Spent Fuel Cooling by monitoring the following throughout event recovery:

- Spent Fuel Pool level.
- Spent Fuel Pool temperature.

4 RUPTURED STEAM GENERATOR

IF a RUPTURED Steam Generator has been positively identified, THEN throttle EFW to the RUPTURED Steam Generator WHEN its Narrow Range Level is GREATER THAN 26%[41%].

5 FAULTED STEAM GENERATOR

- IF a FAULTED Steam Generator has been positively identified, THEN isolate EFW to the faulted Steam Generator as soon as possible UNLESS all three Steam Generators are FAULTED.

- IF all three Steam Generators are FAULTED, THEN throttle EFW flow to all three Steam Generators to 50 gpm.

**EVALUATOR
NOTE:**

Attachment 3, SI Equipment Verification, is included for reference on page 43 of 47 of this scenario guide.

Critical Task is to establish containment isolation prior to transitioning out of EOP-2.0.

Op Test No: 2023 NRC Scenario # 4 Events #7-9 Page: 32 of 47
 Event Description: SBLOCA on "C" loop Hot Leg of 500 gpm.

Time/ Position	Applicant's Actions or Behavior	
BOP	6. Initiate ATTACHMENT 3, SI EQUIPMENT VERIFICATION.	EOP-1.0
CREW	7. Announce plant conditions over the page system.	EOP-1.0
RO	*8. Verify RB pressure has remained LESS THAN 12 psig on PR951, RB PSIG (P-951), red pen.	EOP-1.0
RO	*9. Check RCS temperature: - With any RCP running, RCS Tavg is stable at OR trending to 557°F. - OR - With no RCP running, RCS Tcold is stable at OR trending to 557°F. (NO)	EOP-1.0
RO	9. ALTERNATIVE ACTION IF RCS temperature is LESS THAN 557°F AND decreasing, THEN stabilize temperature by performing the following as required: - Close IPV-2231, MS/PEGGING STM TO DEAERATOR. - Perform one of the following: - IF Narrow Range SG level is LESS THAN 26% [41%] in all SGs, THEN reduce EFW flow as necessary to stop cooldown, while maintaining total EFW flow GREATER THAN 450 gpm. - OR - WHEN Narrow Range SG level is GREATER THAN 26% [41%] in at least one SG, THEN control EFW flow as necessary to stabilize RCS temperature at 557°F. - Initiate ATTACHMENT 6, STEAM VALVE ISOLATION, while continuing with this procedure. - IF RCS cooldown continues, THEN close: - MS Isolation Valves, PVM-2801A(B)(C). - MS Isolation Bypass Valves, PVM-2869A(B)(C).	EOP-1.0

Op Test No: 2023 NRC Scenario # 4 Events #7-9 Page: 33 of 47
 Event Description: SBLOCA on "C" loop Hot Leg of 500 gpm.

Time/ Position	Applicant's Actions or Behavior	
RO	10. Check PZR PORVs and Spray Valves: a. PZR PORVs are closed. b. PZR Spray Valves are closed. c. Verify power is available to at least one PZR PORV Block Valve: • MVG-8000A, RELIEF 445 A ISOL. • MVG-8000B, RELIEF 444 B ISOL. • MVG-8000C, RELIEF 445 B ISOL. d. Ensure one of the following Block Valves is open unless it was closed to isolate an open PZR PORV: • MVG-8000A, RELIEF 445 A ISOL. • MVG-8000B, RELIEF 444 B ISOL.	EOP-1.0
RO	11. Check if RCPs should be stopped: a. Check if either of the following criteria is met: • Annunciator XCP-612 4-2 is lit (PHASE B ISOL). OR • RCS pressure is LESS THAN 1418 psig AND SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. b. Stop all RCPs.	EOP-1.0
EVALUATOR NOTE:	RCPs are not required to be stopped because the event occurred from MODE 2 in accordance with OAP-103.4, EOP/FSP/AOP/ARP USER'S GUIDE, 6.11.b.	EOP-1.0
	12. Verify no SG is FAULTED: • No SG pressure is decreasing in an uncontrolled manner. • No SG is completely depressurized.	EOP-1.0

Op Test No: 2023 NRC Scenario # 4 Events #7-9 Page: 34 of 47
 Event Description: SBLOCA on "C" loop Hot Leg of 500 gpm.

Time/ Position	Applicant's Actions or Behavior	
	13. Verify Secondary radiation levels indicate SG tubes are NOT RUPTURED: • RM-G19A(B)(C), STMLN HI RNG GAMMA. • RM-A9, CNDSR EXHAUST GAS ATMOS MONITOR. • RM-L3, STEAM GENERATOR BLOWDOWN LIQUID MONITOR. • RM-L10, SG BLOWDOWN CW DISCHARGE LIQUID MONITOR.	EOP-1.0
	14. Check if the RCS is INTACT: a. RB radiation levels are normal on: • RM-G7, CNTMT HI RNG GAMMA. • RM-G18, CNTMT HI RNG GAMMA. b. RB Sump levels are normal. (NO) c. RB pressure is LESS THAN 1.5 psig. d. The following annunciators are NOT lit: • XCP-606 2-2 (RBCU 1A/2A DRN FLO HI). • XCP-607 2-2 (RBCU 1B/2B DRN FLO HI).	EOP-1.0
	ALTERNATIVE ACTION 14. GO TO EOP-2.0, E-1 LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.	EOP-1.0
US	Transition to EOP-2.0, E-1 LOSS OF REACTOR OR SECONDARY COOLANT	EOP-1.0

Op Test No: 2023 NRC

Scenario # 4 Events #7-9

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Event Description: SBLOCA on "C" loop Hot Leg of 500 gpm.

Time/ Position	Applicant's Actions or Behavior

EOP-2.0

REFERENCE PAGE FOR EOP-2.0

1 SI REINITIATION CRITERIA

IF either of the following conditions occurs, THEN start Charging Pumps and operate valves as necessary:

- RCS subcooling on TI-499A(B), A(B) TEMP °F, is LESS THAN 52.5°F [67.5°F].
- PZR level can NOT be maintained GREATER THAN 10% [28%].

2 RCP TRIP CRITERIA

IF either of the following criteria is met, THEN trip all RCPs:

- Annunciator XCP-612 4-2 is lit (PHASE B ISOL).
- RCS pressure is LESS THAN 1418 psig AND SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM.

3 SECONDARY INTEGRITY TRANSITION CRITERIA

IF any unisolated SG pressure is decreasing in an uncontrolled manner OR is completely depressurized, THEN GO TO EOP-3.0, E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1.

4 TUBE RUPTURE TRANSITION CRITERIA

IF any SG level increases in an uncontrolled manner OR if any SG has abnormal radiation, THEN start Charging Pumps and operate valves as necessary, and GO TO EOP-4.0, E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.

5 COLD LEG RECIRCULATION TRANSITION CRITERION

IF RWST level decreases to LESS THAN 18%, THEN GO TO EOP-2.2, ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, Step 1.

6 LOSS OF EMERGENCY COOLANT RECIRCULATION TRANSITION CRITERION

IF Emergency Coolant Recirculation is established and subsequently lost, THEN GO TO EOP-2.4, ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION, Step 1.

7 REDUCING CONTROL ROOM EMERGENCY VENTILATION

Reduce Control Room Emergency Ventilation to one train in operation within 30 minutes of actuation. REFER TO SOP-505, CONTROL BUILDING VENTILATION SYSTEM.

Op Test No: 2023 NRC Scenario # 4 Events #7-9 Page: 36 of 47
 Event Description: SBLOCA on "C" loop Hot Leg of 500 gpm.

Time/ Position	Applicant's Actions or Behavior	
RO	<u>NOTE</u> Seal Injection flow should be maintained to all RCPs. 1. Check if RCPs should be stopped: a. Check if either of the following criteria is met: Annunciator XCP-612 4-2 is lit (PHASE B ISOL). OR RCS pressure is LESS THAN 1418 psig AND SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. b. Stop all RCPs	EOP-2.0
BOP	2. Verify no SG is faulted: • No SG pressure is decreasing in an uncontrolled manner. • No SG is completely depressurized.	EOP-2.0
BOP	*3. Check INTACT SG levels: a. Verify Narrow Range level in INTACT SGs is GREATER THAN 26% [41%]. b. Control EFW flow to maintain Narrow Range level in each INTACT SG between 26% [41%] and 60%.	EOP-2.0
RO	4. Reset both SI RESET TRAIN A(B) Switches.	EOP-2.0
RO	5. Reset Containment Isolation: • RESET PHASE A - TRAIN A(B) CNTMT ISOL. • RESET PHASE B - TRAIN A(B) CNTMT ISOL.	EOP-2.0
BOOTH OPERATOR:	When contacted as Chemistry to sample for abnormal activity acknowledge request, wait 5 minutes and report: "The steam generator activities are normal."	

Op Test No: 2023 NRC Scenario # 4 Events #7-9 Page: 37 of 47
 Event Description: SBLOCA on "C" loop Hot Leg of 500 gpm.

Time/ Position	Applicant's Actions or Behavior	
CREW	6. Check if Secondary radiation levels are normal: a. Check radiation levels normal on: • RM-G19A(B)(C), STMLN HI RNG GAMMA. • RM-A9, CNDSR EXHAUST GAS ATMOS MONITOR. • RM-L3, STEAM GENERATOR BLOWDOWN LIQUID MONITOR. • RM-L10, SG BLOWDOWN CW DISCHARGE LIQUID MONITOR. b. Place SVX-9398A(B)(C), SG A(B)(C) SMPL ISOL, in AUTO. c. Notify Chemistry to sample all SG secondary sides, and screen samples for abnormal activity using a frisker.	EOP-2.0
RO	*7. Check PZR PORVs and Block Valves: a. Verify power is available to the PZR PORV Block Valves: 1) MVG-8000A, RELIEF 445 A ISOL. 2) MVG-8000B, RELIEF 444 B ISOL. 3) MVG-8000C, RELIEF 445 B ISOL.	EOP-2.0
RO	<u>CAUTION - Step 7.b</u> If any PZR PORV opens because of high PZR pressure, Step 7.b should be repeated after pressure decreases to LESS THAN 2330 psig, to ensure the PORV recloses. b. Verify all PZR PORVs are closed. c. Verify at least one PZR PORV Block Valve is open.	EOP-2.0
BOP	8. Place both ESF LOADING SEQ A(B) RESETS to: a. NON-ESF LCKOUTS. b. AUTO-START BLOCKS.	EOP-2.0
RO	9. Establish Instrument Air to the RB: a. Start one Instrument Air Compressor and place the other in Standby. b. Verify PI-8342, INSTR AIR HDR PRESS PSIG, indicates GREATER THAN 60 psig. c. Open PVA-2659, INST AIR TO RB AIR SERV. d. Open PVT-2660, AIR SPLY TO RB.	EOP-2.0

Op Test No: 2023 NRC Scenario # 4 Events #7-9 Page: 38 of 47
 Event Description: SBLOCA on "C" loop Hot Leg of 500 gpm.

Time/ Position	Applicant's Actions or Behavior	
RO	*10. Check if SI flow should be reduced: a. RCS subcooling on TI-499A(B), A(B) TEMP °F, is GREATER THAN 52.5°F [67.5°F]. b. Secondary Heat Sink is adequate: - Total EFW flow to INTACT SGs is GREATER THAN 450 gpm. OR - Narrow Range level is GREATER THAN 26% [41%] in at least one INTACT SG. c. RCS pressure is stable OR increasing. <u>NOTE - Step 10.d</u> If PZR level is LESS THAN 10% [28%], the PZR should refill from SI flow after pressure is stabilized. d. PZR level is GREATER THAN 10% [28%]. (NO) ALTERNATIVE ACTION d. Try to stabilize RCS pressure with Normal PZR Spray. GO TO Step 11.	EOP-2.0
RO	*11. Check if RB Spray should be stopped: a. Check if any RB Spray Pumps are running: (NO)	EOP-2.0
US	*11. ALTERNATIVE ACTION a. IF no RB Spray Pump was previously running, THEN GO TO Step 12. Observe the CAUTION prior to Step 12.	EOP-2.0
	<u>CAUTION - Step 12</u> RCS pressure should be monitored. If RCS pressure decreases in an uncontrolled manner to LESS THAN 325 psig, the RHR Pumps must be manually restarted to supply water to the RCS.	EOP-2.0

Op Test No: 2023 NRC Scenario # 4 Events #7-9 Page: 39 of 47
 Event Description: SBLOCA on "C" loop Hot Leg of 500 gpm.

Time/ Position	Applicant's Actions or Behavior	
RO	*12. Check if RHR Pumps should be stopped: a. Check RCS pressure: 1) RCS pressure is GREATER THAN 325 psig. 2) RCS pressure is stable OR increasing. (NO) ALTERNATIVE ACTION 2) GO TO Step 13.	EOP-2.0
EVALUATOR NOTE:	RHR pumps may be tripped here even though RCS pressure is slowly decreasing. This step is to check if you will need low head injection and at this point, we do not, so the crew is trained to secure the RHR pumps in this step for these conditions and restart them if necessary.	
RO	13. Check if RCS pressure is stable OR decreasing.	EOP-2.0
BOP	14. Check if pressure in all SGs is stable OR increasing.	EOP-2.0
	<u>CAUTION - Step 15</u> The DGs should NOT be run at a minimum load or unloaded for extended periods of time, to prevent carbon fouling.	EOP-2.0
BOP	15. Check if DGs should be stopped: a. Verify both ESF buses are energized by offsite power. b. Stop any unloaded DG. REFER TO SOP-306, EMERGENCY DIESEL GENERATOR.	EOP-2.0

Op Test No: 2023 NRC Scenario # 4 Events #7-9 Page: 40 of 47
 Event Description: SBLOCA on "C" loop Hot Leg of 500 gpm.

Time/ Position	Applicant's Actions or Behavior
RO	16. Verify equipment is available for Cold Leg Recirculation: a. Verify A Train equipment available: 1. XPP0031A-RH, RESIDUAL HEAT REMOVAL PUMP A. 2. XVG08809A-SI, REFUEL WTR STG TK RH PUMP A SUCT VLV. 3. XVG08811A-SI, CNTMT SUMP RH PUMP A SUCT ISOL VALVE. 4. XVG08812A-SI, RH PUMP A SUCTION HEADER VALVE. 5. One Train A Charging Pump: • XPP0043A CHARGING/SI PUMP A. OR • XPP0043C CHARGING/SI PUMP C (Train A). 6. LCV00115B-CS, CHG PUMP A SUCTION HDR RWST HDR ISOL VALVE. 7. XVG08706A-RH, CHG/SI PUMP SUCT HDR RH HDR A(B) INLET VLV. b. Verify B Train equipment available: 1. XPP0031B-RH, RESIDUAL HEAT REMOVAL PUMP B. 2. XVG08809B-SI, REFUEL WTR STG TK RH PUMP B SUCT VLV. 3. XVG08811B-SI, CNTMT SUMP RH PUMP B SUCT ISOL VALVE. 4. XVG08812B-SI, RH PUMP B SUCTION HEADER VALVE. 5. One Train B Charging Pump: • XPP0043B CHARGING/SI PUMP B. OR • XPP0043C CHARGING/SI PUMP C (Train B). 6. LCV00115D-CS, CHG PUMP B SUCTION HDR RWST HDR ISOL VALVE. 7. XVG08706B-RH, CHG/SI PUMP SUCT HDR RH HDR B INLET VLV. c. Open both MVB-9503A(B), CC TO RHR HX A(B).

EOP-2.0

Appendix D		Required Operator Actions	Form ES-D-2
Op Test No: 2023 NRC		Scenario # 4 Events #7-9	Page: 41 of 47
Event Description: SBLOCA on “C” loop Hot Leg of 500 gpm.			
Time/ Position	Applicant’s Actions or Behavior		
	CAUTION - Step 16.d - If the swing CCW Pump is NOT available, the running pump should NOT be secured to shift it to fast speed, to prevent damage to the Charging Pump on that train. - If CCW can NOT be shifted to fast speed, this procedure should be continued. CCW alignment will be addressed in EOP-2.2, ES-1.3, TRANSFER TO COLD LEG RECIRCULATION.		
RO	d. Shift the CCW Train to fast speed in the Active Loop. REFER TO SOP-118, COMPONENT COOLING WATER. e. Consult with TSC personnel to determine if equipment required for Cold Leg Recirculation is available.		
EVALUATOR NOTE:	SOP-118 Att. VIIA and VIIIA are not in the simulator. Provide a blank copy of each attachment upon request.		
BOOTH OPERATOR:	When called as the TSC for Step 16.e, acknowledge request. When directed to perform SOP-118 Attachment VIIIA, wait 2 minutes and insert Trigger 11 to shift “C” CCW pump to fast speed. When directed to perform SOP-118 Attachment VIIA, wait 2 minutes and insert Trigger 12 to shift “A” CCW pump to fast speed. If requested to check “C” CCW pump out for a start, wait 1 minute and report back that it is ready for a start.		
	NOTE - Step 17 Presence of abnormally high levels of radioactivity in the AB indicates that a Containment breach may be in progress. Conditions for upgrading the Emergency status should be evaluated using EPP-001, ACTIVATION AND IMPLEMENTATION OF EMERGENCY PLAN.		

Op Test No: 2023 NRC Scenario # 4 Events #7-9		Page: 42 of 47
Event Description: SBLOCA on "C" loop Hot Leg of 500 gpm.		
Time/ Position	Applicant's Actions or Behavior	
CREW	17. Check the AB for evidence of ECCS leakage: a. Verify AB radiation levels are normal on: • RM-A3, MAIN PLANT VENT EXH ATMOS MONITOR: PARTICULATE, IODINE, GAS. • RM-A13, PLANT VENT HI RANGE. • RM-A11, AB VENT GAS ATMOS MONITOR. • Local area monitors. b. Verify annunciator XCP-631 6-1 is NOT lit (AB SMP LVL HI). c. Verify annunciators XCP-606 3-4 and XCP-607 3-4 are NOT lit (LD TRBL AB SMP/FLDRN LVL HI). d. Verify annunciators XCP-606 3-1 and XCP-607 3-1 are NOT lit (LTDN LD TEMP HI).	EOP-2.0
CREW	18. Obtain necessary Chemistry samples: a. Ensure all RCS sample valves are in AUTO: • SVX-9364B and SVX-9365B, RCS LP B SMPL ISOL. • SVX-9364C and SVX-9365C, RCS LP C SMPL ISOL. b. Notify Chemistry to sample the following: • RCS. • All SGs for isotopic activity.	EOP-2.0
CREW	19. Shut down and stabilize the Secondary Plant. REFER TO AOP-214.1, TURBINE TRIP.	EOP-2.0
RO	20. Check if RCS cooldown and depressurization is required: a. RCS pressure is GREATER THAN 325 psig. b. GO TO EOP-2.1, ES-1.2, POST-LOCA COOLDOWN AND DEPRESSURIZATION, Step 1.	EOP-2.0
EVALUATOR NOTE:	The scenario may be terminated once the crew has transitioned to EOP-2.1, ES-1.2 Post LOCA Cooldown and Depressurization or at the Lead Examiners discretion.	

Op Test No: 2023 NRC Scenario # 4 Event # N/A Page: 43 of 47
 Event Description: EOP-1.0, Attachment 3.

Time/ Position	Applicant's Actions or Behavior

EVALUTOR NOTE:	THESE ARE THE STEPS OF EOP-1.0, ATTACHMENT 3	
BOP	1. Ensure EFW Pumps are running: a. Ensure both MD EFW Pumps are running. b. Verify the TD EFW Pump is running if necessary to maintain SG levels.	EOP-1.0 Attachment 3
BOP	2. Ensure the following EFW valves are open: • FCV-3531(3541)(3551), MD EFP TO SG A(B)(C). • FCV-3536(3546)(3556), TD EFP TO SG A(B)(C). • MVG-2802A(B), MS LOOP B(C) TO TD EFP.	Attachment 3
BOP	3. Verify total EFW flow is GREATER THAN 450 gpm.	Attachment 3
BOP	4. Ensure FW Isolation: a. Ensure the following are closed: • FW Flow Control, FCV-478(488)(498). • FW Isolation, PVG-1611A(B)(C). • FW Flow Control Bypass, FCV-3321(3331)(3341). • SG Blowdown, PVG-503A(B)(C). • SG Sample, SVX-9398A(B)(C). b. Ensure all Main FW Pumps are tripped.	Attachment 3
BOP	5. Ensure SI Pumps are running: • Two Charging Pumps are running. • Both RHR Pumps are running.	Attachment 3
BOP	6. Ensure two RBCU Fans are running in slow speed (one per train).	Attachment 3

Op Test No: 2023 NRC Scenario # 4 Event # N/A Page: 44 of 47
 Event Description: EOP-1.0, Attachment 3.

Time/ Position	Applicant's Actions or Behavior
BOP	7. Verify Service Water to the RBCUs: a. Ensure two Service Water Pumps are running. b. Check if Service Water Booster Pump A is running. (NO) ALTERNATIVE ACTION b. GO TO Step 7.d. d. Verify both of the following: (NO) • XVB-3107A, RBCU 64A/65A RTN TO SW PND is closed. AND • Alarm XCP-604 1-5 XVB3107A-SW SLOW CLOSURE is NOT lit. ALTERNATIVE ACTION d. Perform the following: 1) Place Service Water Booster Pump A in PULL TO LK NON-A. 2) Close MVG-3103A, RBCU 64A/65A OUT HDR ISOL. 3) Contact the TSC to coordinate efforts to close XVB-3107A, RBCU 64A/65A RTN TO SW PND. 4) WHEN XVB-3107A, RBCU 64A/65A RTN TO SW PND, is closed, THEN refill Train A RBCUs with the Service Water Booster Pump A tripped per SOP-117, SERVICE WATER SYSTEM. 5) GO TO Step 7.f. f. Check if Service Water Booster Pump B is running. g. GO TO Step 7.j j. Verify GREATER THAN 2000 gpm flow for each train on: (NO) • FI-4466, SWBP A DISCH FLOW GPM. • FI-4496, SWBP B DISCH FLOW GPM. ALTERNATIVE ACTION j. Consult with TSC personnel for evaluation.
BOP	8. Ensure one CCW pump per train is running.
BOP	9. Ensure two Chilled Water Pumps and Chillers are running.

Attachment 3

Attachment 3

Attachment 3

Op Test No: 2023 NRC Scenario # 4 Event # N/A Page: 45 of 47
 Event Description: EOP-1.0, Attachment 3.

Time/ Position	Applicant's Actions or Behavior	
BOP	10. Verify both trains of Control Room Ventilation are running in Emergency Mode.	Attachment 3
BOP	11. Check if Main Steamlines should be isolated: a. Check if any of the following conditions are met: • RB pressure GREATER THAN 6.35 psig. - OR • Steamline pressure LESS THAN 675 psig. - OR • Steamline flow GREATER THAN 1.6 MPPH AND Tav_g LESS THAN 552°F. b. Ensure all the following are closed: • MS Isolation Valves, PVM-2801A(B)(C). • MS Isolation Bypass Valves, PVM-2869A(B)(C).	Attachment 3
BOP	12. Ensure Excess Letdown Isolation Valves are closed: • PVT-8153, XS LTDN ISOL. • PVT-8154, XS LTDN ISOL.	Attachment 3
BOP	13. Verify ESF monitor lights indicate Phase A AND Containment Ventilation Isolation on XCP-6103, 6104, and 6106. REFER TO ATTACHMENT 4, CONTAINMENT ISOLATION VALVE MCB STATUS LIGHT LOCATIONS, as needed. (NO)	Attachment 3
EVALUATOR NOTE:	Critical Task is to close SVX-6050A.	

Op Test No: 2023 NRC Scenario # 4 Event # N/A Page: 46 of 47
 Event Description: EOP-1.0, Attachment 3.

Time/ Position	Applicant's Actions or Behavior

BOP Critical Task	ALTERNATIVE ACTION 13. Perform the following: a) Actuate Phase A/Containment Ventilation Isolation by placing either CS-SG02A(B), TRAIN A & B, Switch to ACTUATE b) Close each required Containment Isolation Valve OR its Backup Valve from the MCB. REFER TO ATTACHMENT 5, CONTAINMENT ISOLATION AND BACKUP VALVE LOCATIONS. c) IF at least one valve for each RB penetration is NOT closed, THEN isolate each AFFECTED penetration locally. REFER TO ATTACHMENT 5, CONTAINMENT ISOLATION AND BACKUP VALVE LOCATIONS.
BOP	14. Verify proper SI alignment: a. Verify SI valve alignment by verifying SAFETY INJECTION/PHASE A ISOL monitor lights are bright on XCP-6104. b. Verify all SAFETY INJECTION monitor lights are dim on XCP-6106. c. Verify SI flow on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. d. Check if RCS pressure is LESS THAN 325 psig. (NO)
BOP	14. ALTERNATIVE ACTION d. Notify the US that ATTACHMENT 3, SI EQUIPMENT VERIFICATION, is complete.

Attachment 3

Attachment 3

Op Test No: 2023 NRC

Scenario # 4 Event # N/A

Page: 47 of 47

Event Description: N/A

Time/ Position	Applicant's Actions or Behavior

Procedure Revisions used in this Scenario Guide			
Number	Title	Rev	Date
GOP-3	REACTOR STARTUP FROM HOT STANDBY TO STARTUP (MODE 3 TO MODE 2)	14C	1/18/23
GOP-4A	POWER OPERATION (MODE 1 – ASCENDING)	3I	1/6/23
XCP-603	ANNUNCIATOR RESPONSE PROCEDURE	5F	11/13/15
XCP-614	ANNUNCIATOR RESPONSE PROCEDURE	6E	6/7/17
XCP-623	ANNUNCIATOR RESPONSE PROCEDURE	5B	7/29/19
XCP-628	ANNUNCIATOR RESPONSE PROCEDURE	7E	2/6/23
XCP-644	ANNUNCIATOR RESPONSE PROCEDURE	1D	12/4/12
AOP-101.1	LOSS OF REACTOR COOLANT NOT REQUIRING SI	4	5/5/21
EOP-1.0	E-0, REACTOR TRIP OR SAFETY INJECTION	32	7/15/21
EOP-2.0	E-1, LOSS OF REACTOR OR SECONDARY COOLANT	18	2/5/20
EOP-2.1	ES-1.2, POST-LOCA COOLDOWN AND DEPRESSURIZATION	20	2/5/20
	V.C. SUMMER TECHNICAL SPECIFICATIONS	223	11/10/22

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **JPS-a-N23**

CANDIDATE: _____

EVALUATOR: _____

JPM: JPS-a-N23

DESCRIPTION: Emergency boration using gravity feed.

TASK: 000-024-05-01 PERFORM EMERGENCY BORATION

TASK Candidate performs the following:

- STANDARD:**
- Dispatches operator to locally open XVD08329-CS, CHARGING/SI PUMPS SUCTION HEADER VALVE and XVD08331-CS, CHARGING/SI PUMPS SUCT HDR ISOL VALVE.
 - Closes either LCV-115C or LCV-115E VCT OUTLET ISOL.

TERMINATING CUE: Operator verifies flow on FI-122A CHG FLOW GPM indicates >30 GPM.

LOCATION:

SIMULATOR

METHOD:

PERFORM

REFERENCES: AOP-106.1, EMERGENCY BORATION
XCP-621 1-1, CRB INSERT LMT LO-LO

K/A: 004 A4.18 Ability to manually operate and/or monitor in the control room:
Emergency Borate valve (4.2)

TOOLS: AOP-106.1, EMERGENCY BORATION
XCP-621 1-1, CRB INSERT LMT LO-LO

VALIDATED TIME: 10 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** YES

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

PERFORMANCE RATING: (CIRCLE) SAT UNSAT

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- PT-446 has failed low causing control rods to step in to below the rod insertion limits.
- The crew has placed control rods in manual and has selected PT-447.
- When attempting restore Tavg, control rods failed to move.

INITIATING CUES:

US directs you as the RO to respond to XCP-621 1-1, CRB INSERT LMT LO-LO.

A more rapid emergency boration is required.

A surrogate operator will acknowledge non-related alarms per your direction.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: JPS-a-N23

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 1	1						
ARP-621, 1-1 CRB INSERT LMT LO-LO							
CORRECTIVE ACTIONS:							
Step 1: Observe TI-412A (422A) (432A), LOOP A(B)(C) ΔT , and Digital Rod Position indications.							
Step 2: If the alarm is valid, immediately Emergency Borate per AOP-106.1, EMERGENCY BORATION until Shutdown Margin is restored							
STEP STANDARD:							
Candidate will go to AOP-106.1, EMERGENCY BORATION based on TI-412A (422A) (432A), LOOP A(B)(C) ΔT , and Digital Rod Position indications as well as SPCS screen for Rod Insertion Limits.							
CUES:							
EVALUATOR CUE: Provide the candidate with a brief using the JPM Briefing Sheet before starting the JPM.							
BOOTH OPERATOR: Place the Simulator in RUN when the Evaluator indicates the JPM may begin.							
EVALUATOR NOTES:							
• The candidate may also look at the Yokogawa Recorder readings for Rod Insertion Limits. • The candidate may go directly to AOP-106.1 without referring to XCP-621, 1-1 in advance based on rods below rod insertion limits.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 2	2						
AOP-106.1, EMERGENCY BORATION							
NOTE: If ESFLS has actuated, XPP-13A(B), BA XFER PP A(B), will NOT operate until the NON-ESF LCKOUTS are reset.							
NOTE: If more rapid Emergency Boration is desired, Step 1 is NOT required.							
STEP STANDARD:							
Reads the Notes, acknowledges input from US and goes to Step 2.							
CUES:							
EVALUATOR CUE: If the candidate asks US if desired, inform them to refer to the cue sheet. Candidate may address step 1 of AOP-106.1. It will be ineffective if performed.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 3	3						
Step 1, Emergency Borate through the Boric Acid Blender: a. Check if the plant is in Mode 1 OR Mode 2. b. Place RX COOL SYS MU switch to STOP. c. Place RX COOL SYS MU MODE SELECT switch to BOR. d. Set FIS-113, BA TO BLNDR FLOW, batch integrator to GREATER THAN OR EQUAL TO 1000. e. Adjust FCV-113 A&B, BA FLOW, controller to 8.0. NOTE - Step 1.f If boration stops, this step may be repeated as desired. f. Place RX COOL SYS MU switch to START. g. Place FCV-113 A&B BA FLOW controller in AUTO. NOTE - Step 1.h The Auto setpoint dial for FCV-113A&B, BA FLOW, controller may be slowly adjusted as necessary to obtain desired flow rate. h. Verify GREATER THAN 30 gpm flow on FR-113, BA TO BLNDR GPM (F-113). (NO) Step 1, ALTERNATIVE ACTION, GO TO Step 2.							
STEP STANDARD:							
EVALUATOR CUE: Step 1 of AOP-106.1. It will be ineffective if performed. The Step is provided here to allow evaluator to follow candidate actions if performed.							
CUES:							
COMMENTS:							

JPM: JPS-a-N23

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 4	4						
Step 2, Emergency Borate via the Emergency Borate Valve:							
a. Ensure at least one Charging Pump is running.							
STEP STANDARD:							
Verifies that the "A" Charging pump is running, the pump shows amps and red light ON, green light OFF.							
CUES:							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 5	5						
Step 2							
b. Verify PZR pressure is LESS THAN 2330 psig.							
STEP STANDARD:							
Verifies PZR pressure instrumentation reads less than 2330 psig.							
CUES:							
COMMENTS:							

JPM: JPS-a-N23

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 6	6						
Step 2							
c. Open MVT-8104, EMERG BORATE.							
STEP STANDARD:							
Opens MVT-8104, EMER BORATE valve, valve indicates -red light ON, green light OFF.							
CUES:							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 7	7						
Step 2							
d. Ensure XPP-13A(B), BA XFER PP A(B), is running.							
STEP STANDARD:							
Verifies either "A" or "B" Boric Acid Transfer Pump indication is red light ON, green light OFF.							
CUES:							
COMMENTS:							

JPM: JPS-a-N23

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 8	8						
Step 2							
e. Verify GREATER THAN 30 gpm flow on FI-110, EMERG BORATE FLOW GPM.							
STEP STANDARD:							
Determines boric acid flow near zero by FI-110 indication. Transitions to the Alternative Action of Step 2 which reads "GO TO Step 3".							
CUES:							
EVALUATOR NOTE: The JPM is alternate path beginning with this step.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 9	9						
Step 3, Emergency Borate through the Boric Acid Blender:							
a. Close MVT-8104, EMERG BORATE.							
STEP STANDARD:							
Closes MVT-8104, EMERG BORATE valve and verifies the following indications, -red light OFF, green light ON							
CUES:							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 10	10						
Step 3 b. Align the Chemical And Volume Control System for boration: 1) Ensure both LCV-115C(E), VCT OUTLET ISOL are open 2) Open FCV-113B, MU TO CHG PP.							
STEP STANDARD:							
Ensures LCV-115C (E) are open by verifying red light ON, green light OFF for each valve. Opens FCV-113B, MU TO CHG PP valve, verifies red light ON, green light OFF.							
CUES:							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 11	11						
Step 3 c. Close FCV-168B, MU WTR TO BLENDER.							
STEP STANDARD:							
Closes FCV-168B, MU WTR TO BLENDER and verifies red light OFF, green light ON.							
CUES:							
COMMENTS:							

JPM: JPS-a-N23

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 12	12						
Step 3							
d. Ensure XPP-13A(B), BA XFER PP A(B), is running.							
STEP STANDARD:							
Verifies either "A" or "B" Boric Acid Transfer Pump indicates red light ON, green light OFF.							
CUES:							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 13	13						
Step 3							
e. Open FCV-113A, BA TO BLENDER.							
f. Ensure at least one Charging Pump is operating.							
STEP STANDARD:							
Opens FVC-113A, BA TO BLENDER, valve, indicates open -red light ON, green light OFF.							
CUES:							
EVALUATOR NOTE: Charging Pump was verified running in a previous step.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 14	14						
Step 3 g. Verify GREATER THAN 30 gpm flow on FR-113, BA TO BLNDR AND TOTAL MU.							
STEP STANDARD:							
Reads FR-113 and sees 0 gpm, transitions to the Alternative Action step 3 g, which reads IF Emergency Boration flow is NOT established, THEN GO TO Step 4. Observe the CAUTION prior to Step 4.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 15	15						
CAUTION: Charging Pump amps and flow should be closely monitored to ensure suction supply is maintained to prevent pump damage. Step 4: Emergency Borate by gravity drain of the Boric Acid Tank: a. Locally open both Charging Pump Suction Header Isolation Valves (AB-456): • XVD08329-CS, CHARGING/SI PUMPS SUCTION HEADER VALVE. • XVD08331-CS, CHARGING/SI PUMPS SUCT HDR ISOL VALVE.							
STEP STANDARD:							
Directs local operator to open XVD08329 and 8331.							
CUES:							
BOOTH OPERATOR: When called as the local operator to open XVD-8329 and 8331 initiate trigger #1 and report back valves have been opened. EVALUATOR NOTE: It is critical that the local operator be directed to open both of these valves since they are in series and must be open to provide a flowpath to the Charging Pump suction.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 16	16						
Step 4 b. Adjust FCV-122, CHG FLOW, to obtain GREATER THAN 30 gpm Charging flow.							
STEP STANDARD:							
Adjusts FCV-122 for > 30 gpm.							
CUES:							
EVALUATOR NOTE: This is the minimum required boration flow in accordance with Technical Specification 3.1.3.5 for Shutdown Margin.							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 17	17						
Step 4 c. Close LCV-115C(E), VCT OUTLET ISOL							
STEP STANDARD:							
Closes LCV-115C and LCV-115E, VCT OUTLET ISOL, valves and verifies -red light OFF, green light ON.							
CUES:							
EVALUATOR NOTE: Candidate only needs to close one of these valves to isolate the VCT.							
COMMENTS:							

JPM: JPS-a-N23

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 18	18						
Step 4							
d. Verify GREATER THAN 30 gpm flow on FI-122A CHG FLOW GPM. IF flow is NOT indicated, THEN immediately open LCV-115 C(E), VCT OUTLET ISOL.							
STEP STANDARD:							
Verifies greater than 30 gpm on FI-122A.							
CUES:							
EVALUATOR NOTE: The JPM can be ended once the candidate verifies flow >30 gpm on FI-122A.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM SETUP SHEET

JPM: JPM: JPS-a-N23

IC SET: 268

INSTRUCTIONS:

RUN IC- 268

NOTE: IC-268 is setup to begin this JPM when the simulator is taken to run. If IC-268 is not available or if conditions must be reestablished, then the following instructions will create the proper setup using IC-10:

1. RUN
2. Activate MAL-TUR012A FINAL VALUE=0 (PT-446 Failure)
3. When CRB INSERT LMT LO-LO annunciator is in alarm:
FREEZE
4. Place rod control in MAN and select PT-447.
5. Run 60 seconds and acknowledge annunciators.
6. Load LOA-CVC058 FINAL VALUE =1 (Open 8329 & 8331) Trigger #1
7. Activate MAL-CVC009 FINAL VALUE =100% (Plugged boric acid filter)
8. Activate MAL-CRF001 ROD FAIL TO MOVE, on Trigger #11.
9. When student is ready: RUN
10. When requested: LOA-CVC058 SEVERITY=1 (Open 8329 & 8331) Trigger #1

PRE-LOAD

LOA-CVC058 SEVERITY=1 (Open 8329 & 8331) Trigger #1

COMMENTS:

Provide spare operator to silence alarms.

REVISION HISTORY:

This is a reformatted version of 2017 NRC JPM a. Added rods failed to move information in turnover and MAL-CRF001 ROD FAIL TO MOVE code to setup.

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- PT-446 has failed low causing control rods to step in to below the rod insertion limits.
- The crew has placed control rods in manual and has selected PT-447.
- When attempting restore Tavg, control rods failed to move.

INITIATING CUES:

US directs you as the RO to respond to XCP-621 1-1, CRB INSERT LMT LO-LO.

A more rapid emergency boration is required.

A surrogate operator will acknowledge non-related alarms per your direction.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **JPS-b-N23**

CANDIDATE: _____

EVALUATOR: _____

JPM: JPS-b-N23

DESCRIPTION: Transfer In-Service Charging Pump (Alternate Path)

TASK: 004-001-01-01 PERFORM LINEUPS OF THE CHEMICAL AND VOLUME CONTROL SYSTEM PER GOP-1/SOP-102

TASK STANDARD: While aligning "B" Charging pump for train swap, the following items are performed:

- The "B" Charging Pump is started.
- The "A" Charging pump is running before securing the "B" Charging pump.
- The "B" Charging pump is secured after receiving XCP-614 3-6, CCW TO CHG PP B VLV NOT FULL OPEN alarm.

TERMINATING CUE: The "B" Charging pump is stopped after starting.

PREFERRED LOCATION:

SIMULATOR

PREFERRED METHOD:

PERFORM

REFERENCES:

ARP-001-XCP-614, ANNUNCIATOR RESPONSE PROCEDURE (PANEL XCP-614)

SOP-118, COMPONENT COOLING SYSTEM

SOP-102, CHEMICAL AND VOLUME CONTROL SYSTEM

K/A 004 A4.08 Ability to manually operate and/or monitor in the control room: Charging (RO 3.8 SRO 3.4)

10CFR55: 45 (a) 3

TOOLS: Copy of SOP-118 Section III B, ACTIVE LOOP SWITCHOVER, marked with IC, step 2.1 and 2.2 complete, step 2.3 and 2.4 N/A and step 2.5 complete up to 2.5.h.

Copy of SOP-102 Section III F marked with initial conditions complete and Section 2.1 and 2.2 N/A.

VALIDATION TIME: 5 Mins.

TIME CRITICAL: NO

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

PERFORMANCE RATING: (CIRCLE) SAT UNSAT

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

When I tell you to begin, you are to perform the actions as directed in the initiating cues.

I will describe the general conditions under which this task is to be performed and provide the necessary tools with which to perform this task.

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, this Job Performance Measure will be satisfied.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The plant is operating at 100% power.
- Train "B" is being established as the active loop.
- "C" Charging pump is Out of Service.
- Both the "A" and "B" CCW pumps are running in accordance with SOP- 118, Component Cooling Water Section III B, Active Loop Switchover.
- SOP-118 Section III B step 2.5.h directs "Transfer the in service Charging Pump to Train "B" per SOP-102."
- SOP-102 initial conditions have been met and it has been determined that there is no need to perform the 175 gallon flush of "B" Charging pump.

INITIATING CUES:

The US has directed you to place "B" Charging pump in service on "B" train and stop the "A" Charging pump, per SOP-102, Section III F, Step 2.3.

A surrogate operator will acknowledge non-related alarms per your direction.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: JPS-b-N23

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	1						
Section III.F. Step 2.3. To start XPP-0043B, PUMP B, on mini flow, proceed as follows: a. If XSW1DB 15, CHARGING INJ PUMP B XPP0043B-CS, is racked down, then initiate Attachment VD.							
STEP STANDARD:							
No action required.							
CUES:							
EVALUATOR NOTE: "B" Charging Pump is already racked up. EVALUATOR CUE: Provide the candidate with a brief using the JPM Briefing Sheet before starting the JPM.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	2						
Step 2.3 continued: b. Ensure XPP-43B-PP1, CHG PP B AUX OIL PP, is running.							
STEP STANDARD:							
Candidate locates CHG PP B AUX OIL PP control switch, verifies switch positioned to AUTO, red light ON, green light OFF.							
CUES:							
COMMENTS:							

JPM: JPS-b-N23

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	3						
Step 2.3 continued:							
c. Ensure Train B Component Cooling is operating per SOP-118.							
STEP STANDARD:							
Candidate locates COMPONENT COOLING PUMPS, PUMP B XPP-0001B, observes red light ON, green light OFF and pump amps indicated.							
CUES:							
EVALUATOR NOTE: The candidate may alternately refer to the turnover information which states that "B" CCW train is running IAW SOP-118.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	4						
Step 2.3 continued:							
d. Ensure Train B Chill Water is operating per SOP-501.							
STEP STANDARD:							
Candidate walks to the HVAC Panel and locates "B" Train Chill Water controls and verifies red light ON and green light OFF for "B" Train Chiller and Chill Water PP.							
CUES:							
EVALUATOR NOTE: Candidate may also look on Main Control Board at XCP 6104 and see "WTR CHLR 1B/1C RUN" light BRIGHT.							
BOOTH OPERATOR: If Unit 4 (CB Operator) is called, report that the "B" Chiller and Chill Water PP are running.							
COMMENTS:							

JPM: JPS-b-N23

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	

JPM STEP	5

Step 2.3 continued:

e. Verify IPI00152A, CHARGING PUMP B SUCTION PRESS IND (AB-388), indicates pump suction pressure is greater than one of the following:

- 1) 15 psig if the Charging Pump suction is aligned to the RWST.
- 2) 30 psig if the Charging Pump suction is aligned to the VCT with VCT level 20% or greater.

STEP STANDARD:

Candidate contacts building operator for pump suction pressure.

CUES:

BOOTH OPERATOR: When contacted to check out the "B" Charging pump acknowledge request, wait 30 secs and report "The "B" Charging pump is ready for start, suction pressure is 52 psig.

COMMENTS:

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	

JPM STEP	6

Step 2.3 continued:

f. Ensure MINIFLOW ISOL, MVT-8109B, CHG PP B, is open.

STEP STANDARD:

Candidate locates control switch CHG PP B, MVT-8109B, verifies red light ON, green light OFF.

CUES:

COMMENTS:

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	7						
Step 2.3 continued:							
g. Start XPP-0043B, PUMP B. (PEER ✓)							
STEP STANDARD:							
Candidate locates CHARGING PUMP B XPP-0043B switch and places it in START, observes red light ON, green light OFF and pump amps indicated.							
CUES:							
EVALUATOR NOTE: Candidate should make a plant announcement. BOOTH OPERATOR: Candidate may call as soon as they start the charging pump and realize 9684 didn't open. If the Candidate requests local temperature monitoring, acknowledge request and report "Local temperature monitoring is NOT available."							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	8						
CAUTION Step 2.3.h If the Auxiliary Oil Pump does not stop automatically, do not manually stop the Auxiliary Oil Pump. This is to prevent bearing damage due to the potential that the attached oil pump has failed.							
Step 2.3 continued:							
h. Verify XPP-43B-PP1, CHG PP B AUX OIL PP, stops automatically when the Charging Pump comes up to full speed.							
STEP STANDARD:							
Candidate locates CHG PP B AUX OIL PP control switch and observes red light OFF and green light ON.							
CUES:							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	

JPM STEP	9

Step 2.3 continued:

i. Monitor the following to verify proper pump operation:

- 1) Charging Pump B running current is between 30 amps and 50 amps.
- 2) PI-121, CHG PRESS PSIG, is between 2650 psig and 2850 psig.

STEP STANDARD:

Candidate locates:

- Pump ammeter and observes between 30 and 50 amps.
- CVCS CHG PRESS PSIG PI-121 and observes between 2650 and 2850 psig.

CUES:

COMMENTS:

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	

JPM STEP	10

Step 2.3 continued:

i. Monitor the following to verify proper pump operation:

- 3) XVG-9684B-CC, CCW TO CHG PP B, is open.

STEP STANDARD:

Candidate locates XVG9684B-CC, CCW TO CHG PP B and observes red light OFF, green light ON.

Responds to annunciator XCP-614 3-6, CCW TO CHG PP B VLV NOT FULL OPEN.

CUES:

EVALUATOR NOTE: Alternate Path begins here

EVALUATOR NOTE: The candidate may take an early action once they have noticed that this valve did not open and secure the "B" Charging Pump since it is not currently needed.

COMMENTS:

JPM: JPS-b-N23

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	11						
Annunciator XCP-614 3-6, CCW TO CHG PP B VLV NOT FULL OPEN:							
CORRECTIVE ACTIONS:							
Step 1 Check XVG-9684B-CC, CC WTR TO CHG PP B position indication.							
STEP STANDARD:							
Candidate locates XVG9684B-CC, CCW TO CHG PP B and observes red light OFF, green light ON.							
CUES:							
BOOTH OPERATOR: If the Candidate requests local temperature monitoring, acknowledge request and report "Local temperature monitoring is NOT available."							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	12						
CAUTION 2 Any Charging Pump can continue to be operated on a loss of Component Cooling Water to its oil coolers within one of the following: 1) 20 minutes without local temperature monitoring. OR 2) No time limit as long as any maximum temperature of Attachment 5, Charging Pump Temperature Monitoring, of AOP-118.1, Loss of Component Cooling, is NOT exceeded AND local Charging Pump temperature monitoring remains in place.							
Step 2. If the pump is running without Component Cooling Water, perform the following: a. Check electrical alignment of C Charging Pump. If aligned to B Train, start C Charging Pump per SOP-102.							
STEP STANDARD:							
No action required.							
CUES:							
EVALUATOR NOTE: The "C" Charging Pump is unavailable as stated in the Initial Conditions.							
COMMENTS:							

JPM: JPS-b-N23

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	13						
Step 2.a. continued							
IF NOT:							
1) Ensure a Train A Component Cooling Pump is running.							
2) Start a Train A Charging Pump per SOP-102.							
b. Stop Charging Pump B.							
STEP STANDARD:							
Candidate locates:							
• COMPONENT COOLING PUMPS, PUMP A XPP-0001A, observes red light ON, green light OFF and pump amps indicated. • CHARGING PUMP A XPP-0043A switch, observes red light ON, green light OFF and pump amps indicated. • CHARGING PUMP B XPP-0043B switch and places it in STOP, observes red light OFF, green light ON and no pump amps indicated.							
CUES:							
EVALUATOR NOTE: The "A" Charging pump should still be running. If it was stopped it must be restarted IAW SOP-102.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM SETUP SHEET

JPM: NRC JPS-b-N21

IC SET: 269

INSTRUCTIONS:

RUN IC-269

1. Place Simulator in RUN.
2. Put Hold Tag on the "C" Charging pump.
3. Ensure the CCW placard is on the "A" CCW Pump.
4. Ensure the Charging Pump placard is on the "B" Charging Pump.
5. Mark rack copy of SOP-118 with Section III B Initial conditions complete, Step 2.1 and 2.2 complete, step 2.4 as N/A and step 2.5 complete up to step 2.5.h.
6. Mark rack copy of SOP-102 Section III F initial conditions complete and Section 2.1 and 2.2 N/A.
7. Reset SIPCS screens to normal at power arrangement and clear all SIPCS and Bailey alarms.

IF IC-269 is unavailable, perform the following:

1. Reset to IC-10 and FREEZE.

PRE-LOAD

OVR-CC048A

XVG-9684B-VU CCW TO CHG PP B (XVG-9684B-VU)

Override To: ON

OVR-CC048B

XVG-9684B-VU CCW TO CHG PP B (XVG-9684B-VU)

Override To: OFF

AUTO TRIGGER 1 (x04i058s) "B" Charging pump placed in start, 614 3-6 turns on.

ANN-CC046

CCW TO CHG PP B VLV NOT FULL OPEN

Delay: 5 sec

Fail To: ON

AUTO TRIGGER 2 (x04i058t) "B" Charging pump placed in stop, 614 3-6 turns off.

ANN-CC046 (NEW)

CCW TO CHG PP B VLV NOT FULL OPEN

Fail To: OFF

Delete in: 1 sec

2. Place the simulator in RUN.

Continued on next page.

JPM: JPS-b-N23

3. Swap "C" CCW pump to Train "B" using the following on Trigger 3:

LOA-CCW001
CCW PUMP C DISCONNECT SWITCH
Position to: TRAIN B

LOA-CCW009
CC PP C SUCT LP B ISO VLV - 9519
Final Value: 1 (OPEN)

LOA-CCW010
CC PP C SUCT LP A ISO VLV – 9521
Final Value: 0 (CLOSED)

LOA-CCW011
CC PP C DISCH LP B ISO VLV - 9523C
Final Value: 1 (OPEN)

LOA-CCW012
CC PP C DISCH LP A ISO VLV - 9523D
Final Value: 0 (CLOSED)

LOA-CCW044
CELL SWITCH OF CCW PUMP C TRAIN A
Position To: RACK OUT

4. Establish Train "B" as the active loop of CCW by performing SOP-118 Section III B step 2.5 a-g. Use the below to Rack in "C" CCW pump on Train "B";

LOA-CCW045
CELL SWITCH OF CCW PUMP C TRAIN B
Position To: RACK IN

5. Place the simulator in FREEZE and save to desired IC.
6. Place the simulator in RUN.
7. Put Hold Tag on the "C" Charging pump.
8. Ensure the CCW placard is on the "A" CCW Pump.
9. Ensure the Charging Pump placard is on the "B" Charging Pump.
10. Mark rack copy of SOP-118 with Section III B Initial conditions complete, Step 2.1 and 2.2 complete, step 2.4 as N/A and step 2.5 complete up to step 2.5.h.
11. Mark rack copy of SOP-102 Section III F initial conditions complete and Section 2.1 and 2.2 N/A.
12. Reset SIPCS screens to normal at power arrangement and clear all SIPCS and Bailey alarms.

COMMENTS:

Provide spare operator to silence alarms.

REVISION HISTORY:

This JPM is a reformat of 2018 JPM JPSF-011-A17 used for ILO-16-01.

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The plant is operating at 100% power.
- Train "B" is being established as the active loop.
- "C" Charging pump is Out of Service.
- Both the "A" and "B" CCW pumps are running in accordance with SOP- 118, Component Cooling Water Section III B, Active Loop Switchover.
- SOP-118 Section III B step 2.5.h directs "Transfer the in service Charging Pump to Train "B" per SOP-102."
- SOP-102 initial conditions have been met and it has been determined that there is no need to perform the 175 gallon flush of "B" Charging pump.

INITIATING CUES:

The US has directed you to place "B" Charging pump in service on "B" train and stop the "A" Charging pump, per SOP-102, Section III F, Step 2.3.

A surrogate operator will acknowledge non-related alarms per your direction.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **JPS-c-N23**

CANDIDATE: _____

EVALUATOR: _____

JPM: JPS-c-N23

DESCRIPTION: Pressurizer Pressure Control Malfunction

TASK: 000-509-05-02 Recover From Reactor Trip per EOP-1.1.

TASK STANDARD: The "A" and "C" RCPs are stopped before Pressurizer Pressure reaches the Auto SI setpoint of 1850 psig.

TERMINATING CUE: RCS depressurization is halted.

LOCATION: SIMULATOR
METHOD: PERFORM

REFERENCES: EOP-1.1, ES-0.1 REACTOR TRIP RESPONSE

K/A: 027 AA1.01 Ability to operate and/or monitor the following as they apply to a Pressurizer Pressure Control System Malfunction: PZR heaters, sprays, and PORVs (3.8)

TOOLS: EOP-1.1, ES-0.1 REACTOR TRIP RECOVERY with steps 1-7 marked as complete.

VALIDATED TIME: 7 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** YES

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

PERFORMANCE RATING: (CIRCLE) SAT UNSAT

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The reactor was tripped from 100% power.
- The crew have transitioned to EOP-1.1, ES-0.1 REACTOR TRIP RESPONSE and have completed steps 1 through 7.

INITIATING CUES:

The US directs you to perform EOP-1.1 beginning with step 8.

A surrogate operator will acknowledge non-related alarms per your direction.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: JPS-c-N23

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 1	1						
Step 8: Verify all Control Rods are fully inserted.							
STEP STANDARD:							
Candidate locates Control Rod Position Indication and verifies all rod bottom red lights ON and all rods indicate fully inserted, green column LIT for each rod.							
CUES:							
EVALUATOR CUE: Provide the marked up rack copy of EOP-1.1, ES-0.1, REACTOR TRIP RESPONSE once the candidate has been briefed on the initiating cue.							
BOOTH OPERATOR: Place the Simulator in RUN when the Evaluator indicates the JPM may begin.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 2	2						
Step 9: Check DA level control: Step 9 a: Open LCV-3235, DEAER START UP DRAIN CNTRL, as necessary to maintain DA level LESS THAN 10.5 ft as indicated on LI-3135, DEAER STOR TK WR LVL FEET. Step 9 b: Locally adjust ITV-3062A(B)(C), BD COOLER A(B)(C) CDSTE OUT TEMP, to 90% (XPN-0029, NUCLEAR BLOWDOWN PROCESSING PANEL, AB-436).							
STEP STANDARD:							
Candidate locates DA Level Indication LI-3135 and verifies level is less than 10.5 ft. Candidate contacts AO and directs adjustment of Condensate flow from the Blowdown heat exchangers.							
CUES:							
BOOTH OPERATOR: When contacted as AO to adjust Blowdown Hx condensate flow acknowledge request. BOOTH OPERATOR: The "Set TCV-3062A, B, C to 10% Open" button on the COMMON LOA/RESET PANEL will set the ITV to the requested value. BOOTH OPERATOR: Once candidate completes EOP-1.1 Step 9 insert TRIGGER 1 – PZR spray valves 444C and 444D fail partially open. EVALUATOR NOTE: The low Pressurizer Pressure SI setpoint will be reached in approximately 2 minutes after inserting trigger 1 if no operator action is taken.							
COMMENTS:							

CRITICAL:	No	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 3	3						
Step 10: Check PZR level control:							
Step 10a: Verify PZR level is GREATER THAN 17%.							
STEP STANDARD:							
Candidate locates PZR LEVEL % LI-459A, 460 and 461 and verifies level is greater than 17%.							
CUES:							
COMMENTS:							

CRITICAL:	No	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 4	4						
Step 10b: Verify Charging and Letdown are in service.							
STEP STANDARD:							
Candidate locates Charging controls and notes Charging and Letdown are in service.							
CUES:							
EVALUATOR NOTE: Charging and letdown indications may be found on panel XCP-6107. Indications include: "A" Charging pump breaker red light ON, green light OFF and normal running amps on the ammeter. - CHG FLOW GPM, FI-122A. - LO PRESS LTDN FLOW GPM, FI-150. - PVT-459 and 460, LTDN LINE ISOL indicate red lights ON, green lights OFF. - PVT-8149A and 8149B, LTDN ORIFCE A (B) ISOL indicate red lights ON, green lights OFF.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 5	5						
Step 10c: Verify PZR level is trending to program level. Step 10c: Alternative action: Control Charging and Letdown to maintain PZR level at program level.							
STEP STANDARD:							
Candidate locates indications and verifies level is trending to program level. (Program level is 25% for this condition) Candidate locates controls and adjusts as necessary to maintain PZR level.							
CUES:							
EVALUATOR NOTE: Control of PZR level may be accomplished by placing FCV-122 in manual. Candidate may choose to allow auto control to restore level to 25%. Pressurizer level indication may be found on panel XCP-6109L on meters LEVEL % LI-459A, 460 and 461.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 6	6						
Step 11: Check PZR pressure control: Step 11a: Verify PZR pressure is GREATER THAN 1850 psig.							
STEP STANDARD:							
Candidate locates indications and verifies pressure is greater than 1850 psig.							
CUES:							
EVALUATOR NOTE: Pressurizer pressure may be found on panel XCP-6109L on meters PRESS PSIG PI-455, 456, 457 and 444.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 7	7						
Step 11b: Verify PZR pressure is stable at OR trending to 2230 psig (2220 psig to 2250 psig). (NO)							
STEP STANDARD:							
Candidate locates indications and verifies pressure is less than 2230 psig and trending downward.							
CUES:							
EVALUATOR NOTE: Candidate may refer to IPSC trend and or the WR pressure recorder (PR-402) in order to validate trend.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 8	8						
Step 11b ALTERNATIVE ACTION: IF PZR pressure is LESS THAN 2230 psig AND decreasing, THEN: 1) Ensure the PZR PORVs are closed. IF any PORV fails to close, THEN close its Block Valve.							
STEP STANDARD:							
Candidate locates PZR controls and notes; PCV-445A, 445B and 444B, PWR RELIEF indicate Red lights OFF, Green lights ON.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 5	9						
Step 11b ALTERNATIVE ACTION: IF PZR pressure is LESS THAN 2230 psig AND decreasing, THEN: 2) Ensure PZR Spray Valves are closed. IF any valve fails to close, THEN perform the following: a) Stop RCP A.							
STEP STANDARD:							
Candidate locates PZR controls and notes: • PCV-444C, PZR SPR CNTRL FR LOOP C indicates Red light ON, Green light ON and attempts to close PCV-444C are unsuccessful. • PCV-444D, PZR SPR CNTRL FR LOOP A indicates Red light ON, Green light ON and attempts to close PCV-444D are unsuccessful. • Candidate locates RCP controls and places switch for RCP "A" in STOP, observes Red light off, Green light on and zero amps on ammeter prior to PZR pressure lowering to less than 1850 psig.							
CUES:							
EVALUATOR NOTE: The critical step is to stop the "A" RCP to assure spray flow is eliminated and RCS pressure is stabilized. EVALUATOR NOTE: This is the point where the JPM becomes alternate path.							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 10	10						
Step 11b ALTERNATIVE ACTION: IF PZR pressure is LESS THAN 2230 psig AND decreasing, THEN: b) IF PZR pressure continues to decrease, THEN perform the following: - IF PCV-444C, PZR SPR CNTRL FR LOOP C, will NOT close, THEN stop RCP C. - IF PCV-444D, PZR SPR CNTRL FR LOOP A, will NOT close, THEN stop either RCP B or RCP C.							
STEP STANDARD:							
Candidate locates indications and verifies pressure is trending downward. Candidate locates RCP controls and places switch for RCP "C" in STOP, observes red light off, green light on and zero amps on ammeter prior to PZR pressure lowering to less than 1850 psig.							
CUES:							
EVALUATOR NOTE: The critical step is to stop the "C" RCP to assure spray flow is eliminated and RCS pressure is stabilized.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP 11	11						
Step 11b ALTERNATIVE ACTION: IF PZR pressure is LESS THAN 2230 psig AND decreasing, THEN: 3) Ensure PZR Heaters are on.							
STEP STANDARD:							
Candidate locates PZR controls and notes: - BU GRP 1 breaker control indicates Red light ON, Green light OFF and BU GRP1 AMPS ammeter indicate amperage. - CNTRL GRP breaker control indicates Red light ON, Green light OFF and CNTRL GRP AMPS ammeter indicates amperage. - BU GRP 2 breaker control indicates Red light ON, Green light OFF and BU GRP 2 AMPS ammeter indicates amperage.							
CUES:							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM SETUP SHEET

JPM: JPM: JPS-c-N23

IC SET: 270

INSTRUCTIONS:

If IC-270 is designated for this JPM then reset to IC-270 leaving the simulator in FREEZE.

1. Mark up copy of EOP-1.0 steps 1-5 and EOP-1.1 steps 1-7.
2. Ensure any false red path on sub criticality is cleared.
3. When Candidate is ready (on Evaluator cue) go to RUN.

If IC-270 is **not** designated for this JPM then initial conditions may be established by resetting to IC-10 and following the below directions:

1. With the simulator reset to IC-10 and in FREEZE, insert the following:

- **TRIGGER 1**

- o MAL-PRS003A
PRESSURIZER SPRAY VALVE 444C FAILURE
Ramp: 60 sec
Final Value: 75%
- o MAL-PRS003B
PRESSURIZER SPRAY VALVE 444D FAILURE
Ramp: 60 sec
Final Value: 55%

2. Place the Simulator in RUN.
3. Insert a manual Reactor Trip.
4. Perform Actions from EOP-1.0 and EOP-1.1 through step 7.
5. FREEZE and SAVE IC.
6. Mark up copy of EOP-1.0 steps 1-5 and EOP-1.1 steps 1-7.
7. Ensure any false red path on sub criticality is cleared.
8. When Candidate is ready (on Evaluator cue) go to RUN.

COMMENTS:

Provide spare operator to silence alarms.

REVISION HISTORY:

This is a bank JPM from 2018 NRC Exam, JPS-002F-N18.

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The reactor was tripped from 100% power.
- The crew have transitioned to EOP-1.1, ES-0.1 REACTOR TRIP RESPONSE and have completed steps 1 through 7.

INITIATING CUES:

The US directs you to perform EOP-1.1 beginning with step 8.

A surrogate operator will acknowledge non-related alarms per your direction.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **JPS-d-N23**

CANDIDATE: _____

EVALUATOR: _____

JPM: JPS-d-N23

DESCRIPTION: Perform EOP-1.1, ATTACHMENT 1, STEAM VALVE ISOLATION

TASK: 000-509-05-02 Recover from Reactor Trip per EOP-1.1.

TASK Completion of EOP-1.1, Attachment 1, with the following:

STANDARD:

- MOV-1-5A, Closed.
- MOV-1-5B, Closed.
- MOV-1-5C, Closed.
- MVG-2896A, SV-1 BSD, Closed.
- MVG-2896B, SV-2 BSD, Closed.
- MVG-2896C, SV-3 BSD, Closed.
- MVG-2896D, SV-4 BSD, Closed.
- STM DUMP CNTRL Controller in STM PRESS Mode and in AUTO.

TERMINATING CUE: EOP-1.1, ATTACHMENT 1, STEAM VALVE ISOLATION is complete.

LOCATION:

SIMULATOR

METHOD:

PERFORM

REFERENCES: EOP-1.1 ES-0.1 REACTOR TRIP RESPONSE

K/A: 007 EA1.10 Ability to operate and monitor the following as they apply to a Reactor Trip: SGS (3.5)

TOOLS: EOP-1.1, ATTACHMENT 1, STEAM VALVE ISOLATION

VALIDATED TIME: 5 Mins.

TIME CRITICAL: NO

ALTERNATE PATH: NO

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

PERFORMANCE RATING: (CIRCLE) SAT UNSAT

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- A Reactor Trip has occurred.
- EOP-1.1, ES-0.1 REACTOR TRIP RESPONSE is in progress.
- RCS temperature less than 557°F.
- Shift Manager does not require any additional drain valves to be aligned.

INITIATING CUES:

The US directs you to perform EOP-1.1, ATTACHMENT 1, STEAM VALVE ISOLATION.

A surrogate operator will acknowledge non-related alarms per your direction.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: JPS-d-N23

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	1						
NOTE							
Drain valves may be aligned per Shift Manager discretion based on current and expected plant status.							
1. Close Feedwater Pump TURB DRN VLVs:							
• MOV-1-5A. • MOV-1-5B. • MOV-1-5C.							
STEP STANDARD:							
Candidate locates closes MOV-1-5A, MOV-1-5B, and MOV-1-5C. Observes red light OFF, green light ON.							
CUES:							
EVALUATOR CUE: Provide the candidate with a brief using the JPM Briefing Sheet before starting the JPM.							
EVALUATOR CUE: If the candidate asks Shift Manager directs no additional drain valves need to be aligned per EOP-1.1, ATTACHMENT 1.							
BOOTH OPERATOR: Place the Simulator in RUN when the Evaluator indicates the JPM may begin.							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	2						
2. Close the following turbine drain valves: • MVG-2896A, SV-1 BSD. • MVG-2896B, SV-2 BSD. • MVG-2896C, SV-3 BSD. • MVG-2896D, SV-4 BSD.							
STEP STANDARD:							
Candidate locates closes MVG-2896A, MVG-2896B, MVG-2896C, and MVG-2896D. Observes red light OFF, green light ON.							
CUES:							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	3						
3. Ensure the following drain valves are in AUTO: • PVT-2851A,B,C,D, MS LINES TO TURB DRN. • PVT-2713A,B,C,D, STM DUMP DRN BYP. • PVT-2870, TO MSR A & B DRN. • PVT-2875, TO MSR A & B DRN. • PVT-2845A,B,C, PVT-2824, PVT-2879A,B, LINE DRN. • PVT-2838A,B, HDR DRNS.							
STEP STANDARD:							
Candidate ensures switches are in AUTO for the following valves: • PVT-2851A,B,C,D, MS LINES TO TURB DRN. • PVT-2713A,B,C,D, STM DUMP DRN BYP. • PVT-2870, TO MSR A & B DRN. • PVT-2875, TO MSR A & B DRN. • PVT-2845A,B,C, PVT-2824, PVT-2879A,B, LINE DRN. • PVT-2838A,B, HDR DRNS.							
CUES:							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	4						
4. Place the STM DUMP CNTRL Controller in MAN and CLOSED.							
STEP STANDARD:							
Candidate places STM DUM CNTRL Controller in MAN and CLOSED. MAN indicating light is LIT, controller output reads 0.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	5						
5. Place the STM DUMP MODE SELECT Switch in STM PRESS.							
STEP STANDARD:							
Candidate places the STM DUMP MODE SELECT SWITCH to the STM PRESS position.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	6						
6. Place the STM DUMP CNTRL Controller in AUTO.							
STEP STANDARD:							
Candidate places the STM DUMP CNTRL Controller in AUTO, AUTO light is lit.							
CUES:							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	7						
7. WHEN the Condenser is NOT available, THEN perform the following							
a. Place the Steamline Power Relief A(B)(C) Mode Switches in PWR RLF.							
b. Adjust the PWR RELIEF A(B)(C) SETPT Controllers as necessary to control RCS temperature.							
STEP STANDARD:							
Candidate determines the Condenser is still available, C-9 light is LIT and this step is not required to be performed at this time.							
CUES:							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	8						
8. Verify proper response of all Steamline PORVs and Condenser Steam Dumps for existing plant conditions.							
STEP STANDARD:							
Candidate verifies Condenser Steam Dumps are attempting to maintain RCS Temperature.							
CUES:							
EVALUATOR NOTE: Condenser Steam Dumps should be closed for RCS Temperature less than 557°F.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	9						
9. Ensure SG Blowdown Valves, PVG-503A(B)(C), are closed.							
STEP STANDARD:							
Candidate ensures SG Blowdown Valves, PVG-503A(B)(C), are closed observes red light OFF, green light ON.							
CUES:							
COMMENTS:							

JPM: JPS-d-N23

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	10						
10. If desired, drain valves may be aligned per Shift Manager discretion based on current and expected plant status.							
STEP STANDARD:							
Candidate determines no drain valves need to be aligned per turnover information.							
CUES:							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM SETUP SHEET

JPM: JPM: JPS-d-N23

IC SET: 271

INSTRUCTIONS:

If IC-271 is designated for this JPM then reset to IC-271, leaving simulator in FREEZE.

1. When Candidate is ready, (on evaluator cue) go to RUN.

If IC-271 is not designated for this JPM then initial conditions may be established by resetting to IC-10 and following the below directions:

1. With the simulator reset to IC-10 and in FREEZE, insert the following:
2. Place the simulator in RUN and insert a manual reactor trip.
3. Perform actions of EOP-1.0 and 1.1 up to step 6.
4. Ensure RCS Tavg is less than 557°F and decreasing.
5. Place simulator in FREEZE and save to the desired IC.
6. When Candidate is ready, (on evaluator cue) go to RUN.

COMMENTS:

Provide spare operator to silence alarms.

REVISION HISTORY:

This is a new JPM

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- A Reactor Trip has occurred.
- EOP-1.1, ES-0.1 REACTOR TRIP RESPONSE is in progress.
- RCS temperature less than 557°F.
- Shift Manager does not require any additional drain valves to be aligned.

INITIATING CUES:

The US directs you to perform EOP-1.1, ATTACHMENT 1, STEAM VALVE ISOLATION.

A surrogate operator will acknowledge non-related alarms per your direction.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **JPS-e-N23**

CANDIDATE: _____

EVALUATOR: _____

JPM: JPS-e-N23

DESCRIPTION: Perform AOP-304.1B, ATTACHMENT 6B, BUS 1DB RE-ENERGIZATION ALIGNMENT.

TASK: 000-143-05-01 Respond to Loss of One Engineered Safety Features (ESF) Bus With D/G Not Available per AOP-304.1

TASK STANDARD: Completion of AOP-304.1B, Attachment 6B with the following:

- BUS 1EB FEED Breaker closed.
- BUS 1EB1 FEED Breaker closed.
- XFMR 1DB1&1DB2 FEED Breaker closed.
- BUS 1DB1 FEED Breaker closed.
- BUS 1DB2 FEED Breaker closed.

TERMINATING CUE: BUS 1DB stub buses energized in accordance with AOP-304.1B, ATTACHMENT 6B.

LOCATION:

SIMULATOR

METHOD:

PERFORM

REFERENCES: AOP-304.1B, LOSS OF BUS 1DB WITH THE DIESEL NOT AVAILABLE

K/A: 062 A4.01 Ability to operate and monitor in the control room: All breakers (including available switchyard) (3.5)

TOOLS: AOP-304.1B, ATTACHMENT 6B, BUS 1DB RE-ENERGIZATION ALIGNMENT

VALIDATED TIME: 5 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** NO

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

PERFORMANCE RATING: (CIRCLE) SAT UNSAT

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- A 51BX Lockout on 1DB occurred.
- AOP-304.1B, LOSS OF BUS 1DB WITH THE DIESEL NOT AVAILABLE is in progress.
- All faults have been corrected cleared.
- Power has been restored to bus 1DB.
- All evaluations and walk downs of the busses have been completed and all busses are ready to be re-energized.
- All stub bus breakers have been racked in.

INITIATING CUES:

The US directs you to perform AOP-304.1B, ATTACHMENT 6, BUS 1DB RE-ENERGIZATION ALIGNMENT to energize BUS 1DB stub buses.

A surrogate operator will acknowledge non-related alarms per your direction.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	1						
CAUTION							
ANY bus with questionable electrical integrity shall be considered unsafe to energize until an evaluation and walk down of the bus in question can be performed.							
1. Check if BUS 1EB1 is safe to energize.							
STEP STANDARD:							
Candidate verifies that all evaluation and walk down have been completed per turnover information.							
CUES:							
EVALUATOR CUE: Provide the candidate with a brief using the JPM Briefing Sheet before starting the JPM.							
EVALUATOR CUE: If the candidate asks Shift Manager directs no additional drain valves need to be aligned per AOP-304.1B, ATTACHMENT 6.							
BOOTH OPERATOR: Place the Simulator in RUN when the Evaluator indicates the JPM may begin.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	2						
2. Check if BUS 1EB is safe to energize.							
STEP STANDARD:							
Candidate verifies that all evaluation and walk down have been completed per turnover information.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	3						
3. Perform the following: a. Close BUS 1EB FEED breaker. b. Verify BUS 1EB breaker closed light is lit.							
STEP STANDARD:							
Candidate closes BUS 1EB FEED breaker by rotating the switch to close and verifying close light is lit.							
CUES:							
EVALUATOR CUE: Only closer of the breaker is critical.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	4						
4. Check if BUS 1EB1 FEED breaker is racked in.							
STEP STANDARD:							
Candidate determines that BUS 1EB1 FEED breaker is racked per turnover information.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	5						
5. Perform the following: a. Ensure XFMR 1EB1 FEED breaker is closed. b. Close BUS 1EB1 FEED c. Verify BUS 1EB1 FEED Breaker closed light is lit.							
STEP STANDARD:							
Candidate ensures XFMR 1EB1 FEED breaker is closed by verifying red light is lit and green light is off. Candidate closed BUS 1EB1 FEED by rotating control switch to close and verifying red light lit and green light is off.							
CUES:							
EVALUATOR CUE: Only closure of the breaker is critical.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	6						
6. Check if BUS 1DB1 is safe to energize.							
STEP STANDARD:							
Candidate verifies that all evaluation and walk down have been completed per turnover information.							
CUES:							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	7						
7. Check if BUS 1DB2 is safe to energize.							
STEP STANDARD:							
Candidate verifies that all evaluation and walk down have been completed per turnover information.							
CUES:							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	8						
8. Check if either of the following are safe to energize:							
• BUS 1DB1 FEED.							
OR							
• BUS 1DB2 FEED.							
STEP STANDARD:							
Candidate verifies that all evaluation and walk down have been completed per turnover information.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	9						
9. Perform the following: a. Close XFMR 1DB1&1DB2 FEED. b. Verify XFMR 1DB1&1DB2 FEED Breaker closed light is lit.							
STEP STANDARD:							
Candidate closes XFMR 1DB1&1DB2 FEED by rotating switch to close and verifying red light is lit and green light is off.							
CUES:							
EVALUATOR CUE: Only closer of the breaker is critical.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	10						
10. Check if BUS 1DB1 FEED is racked in.							
STEP STANDARD:							
Candidate determines that BUS 1EB1 FEED breaker is racked in per turnover information.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	11						
11. Perform the following: a. Close BUS 1DB1 FEED breaker. b. Verify BUS 1DB1 FEED Breaker closed light is lit.							
STEP STANDARD:							
Candidate closes BUS 1DB1 FEED breaker by rotating switch to close and verifying red light lit and green light off.							
CUES:							
EVALUATOR CUE: Only closer of the breaker is critical.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	12						
12. Check if BUS 1DB2 FEED is racked in.							
STEP STANDARD:							
Candidate determines that BUS 1DB2 FEED breaker is racked in per turnover information.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	13						
13. Perform the following:							
a. Close BUS 1DB2 FEED breaker.							
b. Verify BUS 1DB2 FEED Breaker closed light is lit.							
STEP STANDARD:							
Candidate closes BUS 1DB2 FEED breaker by rotating switch to close and verifying red light lit and green light off.							
CUES:							
EVALUATOR CUE: Only closer of the breaker is critical.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	14						
14. Notify the CRS of any ESF Bus that cannot be energized.							
STEP STANDARD:							
Candidate notifies US that all busses have been energized.							
CUES:							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM SETUP SHEET

JPM: JPM: JPS-e-N23

IC SET: 272

INSTRUCTIONS:

If IC-272 is designated for this JPM then reset to IC-272, leaving simulator in FREEZE.

1. When Candidate is ready, (on evaluator cue) go to RUN.

If IC-272 is not designated for this JPM then initial conditions may be established by resetting to IC-10 and following the below directions:

1. With the simulator reset to IC-10 and in FREEZE, insert the following:
2. Place the simulator in RUN and insert a 51BX lockout on 1DB.

LOA-EPS167

RELAY 51BX-1DB - 7.2 KV SWGR BUS 1DB OVERCURRENT USE LOA EPS-1 TO RESET

Position To: TRIP

3. Perform actions of AOP-304.1B up to step 30.
4. Reset 51BX lockout on 1DB.

LOA-EPS001

EPS BREAKER O/C TRIP RESET

Position To: RESET

5. Perform actions of AOP-304.1B up to step 35.
5. Place simulator in FREEZE and save to the desired IC.
6. When Candidate is ready, (on evaluator cue) go to RUN.

COMMENTS:

Provide spare operator to silence alarms.

REVISION HISTORY:

This is a new JPM

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- A 51BX Lockout on 1DB occurred.
- AOP-304.1B, LOSS OF BUS 1DB WITH THE DIESEL NOT AVAILABLE is in progress.
- All faults have been corrected cleared.
- Power has been restored to bus 1DB.
- All evaluations and walk downs of the busses have been completed and all busses are ready to be re-energized.
- All stub bus breakers have been racked in.

INITIATING CUES:

The US directs you to perform AOP-304.1B, ATTACHMENT 6, BUS 1DB RE-ENERGIZATION ALIGNMENT to energize BUS 1DB stub buses.

A surrogate operator will acknowledge non-related alarms per your direction.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **JPS-f-N23**

CANDIDATE: _____

EVALUATOR: _____

JPM: JPS-f-N23

DESCRIPTION: Return Power Range N-41 to service after operability is restored.

TASK: 000-034-05-01 RESPOND TO POWER RANGE INSTRUMENTATION
CHANNEL FAILURE PER AOP-401.10

TASK STANDARD: Power Range N-41 is restored to service in accordance with
AOP-401.10:

- Rate Mode switch is in reset.
- Comparator Channel Defeat switch is in normal.
- Upper Section switch in normal.
- Lower section switch in normal.
- Rod Stop Bypass switch for N-41 in operate.

TERMINATING CUE: PR N-41 restored to service in accordance with AOP-401.10 with
rods in automatic.

LOCATION:

SIMULATOR

METHOD:

PERFORM

REFERENCES: AOP-401.10 POWER RANGE CHANNEL FAILURE

K/A: 015 A4.02 Ability to manually operate and/or monitor in the control
room: NIS indicators (3.6)

TOOLS: Rack copy of AOP-401.10 marked complete through step 16.a.

VALIDATED TIME: 9 Mins.

TIME CRITICAL: NO

ALTERNATE PATH: NO

TIME START: _____

TIME FINISH: _____

PERFORMANCE TIME: _____

PERFORMANCE RATING: (CIRCLE)

SAT

UNSAT

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The plant is at 51% power.
- Power Range Channel N-41 failed and was removed from service in accordance with AOP-401.10, POWER RANGE CHANNEL FAILURE.
- I&C has repaired the channel and it is ready to be returned to service.

INITIATING CUES:

The US directs the NROATC to place PR Channel N-41 in service and restore automatic rod control in accordance with AOP-401.10, beginning at Step 16.b.

A surrogate operator will acknowledge non-related alarms per your direction.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT	☐	UNSAT	☐
JPM STEP	1						
Step 16 continued:							
b. Place RATE MODE Switch to RESET.							
STEP STANDARD:							
Operator locates and places RATE MODE Switch in RESET position.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT	☐	UNSAT	☐
JPM STEP	2						
Step 16 continued:							
c. Place COMPARATOR CHANNEL DEFEAT Switch (on the COMPARATOR AND RATE drawer) in NORMAL.							
STEP STANDARD:							
Operator locates and places COMPARATOR CHANNEL DEFEAT Switch in Normal position; verifies COMPARATOR DEFEAT Light OFF.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	3						
Step 16 continued:							
d. Place UPPER SECTION Switch (on the DETECTOR CURRENT COMPARATOR drawer) in NORMAL.							
STEP STANDARD:							
Operator locates and places UPPER SECTION Switch in NORMAL position; verifies Upper Section CHANNEL DEFEAT light OFF.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	4						
Step 16 continued:							
e. Place LOWER SECTION Switch (on the DETECTOR CURRENT COMPARATOR drawer) in NORMAL.							
STEP STANDARD:							
Operator locates and places LOWER SECTION Switch in NORMAL position; verifies Lower Section CHANNEL DEFEAT light OFF.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	5						
Step 16 continued: f. Place ROD STOP BYPASS Switch for the failed Power Range channel (on the MISCELLANEOUS CONTROL AND INDICATION PANEL drawer) in OPERATE.							
STEP STANDARD:							
Operator locates and places ROD STOP BYPASS Switch for Power Range Channel N-41 in OPERATE.							
CUES:							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	6						
Step 17. Ensure all the tripped bistables are reset.							
STEP STANDARD:							
Operator determines, at a minimum, that the following bistables are reset:							
• CHAN I PR FLUX HI SET PT • CHAN I PR FLUX RATE HI							
CUES:							
EVALUATOR NOTE: This can be performed by noting any of the following three methods: • Bistable lights are DIM/BRIGHT on the front of the N-41 drawer. • Verifies the following status lights: - XCP6111-3-11 (CHAN I PR FLUX RATE HI) – DIM - XCP6111-3-13 (CHAN I PR FLUX LO SET PT) – BRIGHT - XCP6111-3-15 (CHAN I PR FLUX HI SET PT) – DIM • Verifies the following alarms are clear: - XCP-620-1-1 (PR HI SETPT FLUX HI) - XCP-620-1-2 (PR LO SETPT FLUX HI) - XCP-620-2-2 (PR FLUX HI RATE SINGLE CHAN ALERT) EVALUATOR CUE: If the candidate expresses that STPs must be performed as part of the reset verification of bistables, cue the candidate that the Shift Engineer will verify completion of STPs.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM: JPS-f-N23

JPM SETUP SHEET

JPM: JPM: JPS-f-N23

IC SET: 273

INSTRUCTIONS:

RUN IC-273

IF IC-273 is unavailable, perform the following:

1. Load an IC-26.
2. Fail PR-N41 high.
3. Remove PR-N41 from service per AOP-401.10 through Step 11. It is not necessary to trip channel bistables.
4. Remove failure of PR-N41.
5. Save IC for multiple uses.

COMMENTS:

Provide a marked up copy of AOP-410.10 completed through step 16.a.

Ensure N-41 is removed from IPCS per OAP-107.1, does not save in IC snap.

Ensure N-41 restored after JPM is completed.

REVISION HISTORY:

This is a bank JPM was developed from JPSF-152.

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The plant is at 51% power.
- Power Range Channel N-41 failed and was removed from service in accordance with AOP-401.10, POWER RANGE CHANNEL FAILURE.
- I&C has repaired the channel and it is ready to be returned to service.

INITIATING CUES:

The US directs the NROATC to place PR Channel N-41 in service and restore automatic rod control in accordance with AOP-401.10, beginning at Step 16.b.

A surrogate operator will acknowledge non-related alarms per your direction.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **JPS-g-N23**

CANDIDATE: _____

EVALUATOR: _____

JPM: JPS-g-N23

DESCRIPTION: Respond to a leak in the Component Cooling Water system while swapping CCW booster pumps.

TASK: 008-021-01-01 Switch Component Cooling Water Trains per SOP-117/SOP-118/SOP-501.

TASK STANDARD: Candidate performs the following actions:

- Starts "B" CCW Booster pump.
- Secures "A" CCW Booster pump.
- Opens LCV-7090 and LCV-7088, MU TO SRG TK (A/B SIDE).

TERMINATING CUE: CCW surge tank level is increasing.

LOCATION: SIMULATOR
METHOD: PERFORM

REFERENCES: SOP-118, COMPONENT COOLING WATER
ARP-001-XCP-603, 1-4 CCW SRG TK AUTO MU LVL LO

K/A: 008 A4.07 Ability to manually operate and/or monitor in the control room: Control of minimum level in the CCWS surge tank (2.8)

TOOLS: Rack copy of SOP-118.
Rack copy of ARP-001-XCP-603, 1-4 CCW SRG TK AUTO MU LVL LO

VALIDATED TIME: 5 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** YES

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

PERFORMANCE RATING: (CIRCLE) SAT UNSAT

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The plant is at 100% power.
- “A” CCW loop is the active loop.

INITIATING CUES:

The US directs you to shift Component Cooling Booster Pumps to “B” running and “A” in Standby in accordance with SOP-118, COMPONENT COOLING WATER, section III.D, COMPONENT COOLING BOOSTER PUMP OPERATIONS.

A surrogate operator will acknowledge non-related alarms per your direction.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	1						
2.1. Shift operating Component Cooling Booster Pumps:							
a. Place the desired Component Cooling Booster Pump, XPP-58A(B)(C), in START.							
STEP STANDARD:							
Candidate starts the "B" CCW Booster pump, verifies red light on green light off.							
CUES:							
EVALUATOR CUE: Provide the candidate with the briefing, briefing sheet prior to beginning the JPM.							
BOOTH OPERATOR: Verify trigger 1 inserts when "B" CCW Booster pump is started.							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	2						
2.1. Shift operating Component Cooling Booster Pumps:							
b. Stop one of the running Component Cooling Booster Pumps.							
1) Place XPP-58A(B)(C), in OFF .							
2) Place XPP-58A(B)(C), in AUTO.							
STEP STANDARD:							
Candidate places "A" CCW Booster pump in OFF and then back to AUTO, red light off, green light on.							
CUES:							
COMMENTS:							

JPM: JPS-g-N23

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	3						
2.1. Shift operating Component Cooling Booster Pumps: b. Ensure MVT-9593A(B)(C), FROM RCP A(B)(C) THERM BARR is not closed due to high flow.							
STEP STANDARD:							
Candidate verifies MVT-9593A(B)(C) are open, red light on, green light off.							
CUES:							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	4						
Respond to annunciator XCP-603, 1-4 CCW SRG TK AUTO MU LVL LO							
STEP STANDARD:							
Candidate informs US of alarm and implements XCP-603, 1-4.							
CUES:							
EVALUATOR NOTE: This is where the JPM because alternate path.							
COMMENTS:							

JPM: JPS-g-N23

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	5						
SETPOINT: ORIGIN: 470' - 0" (61%) ILS07088 469' - 8.25" (58%) ILS07090							
XCP-603, 1-4, AUTOMATIC ACTIONS: 1. ILS07088 opens ILV-7088, MU TO SRG TK (B SIDE). 2. ILS07090 opens ILV-7090, MU TO SRG TK (A SIDE).							
CORRECTIVE ACTIONS: 1. Verify the appropriate makeup valve opens and tank level increases. 2. If tank level does not increase, ensure manual isolation valves are open and a Demineralized Water Pump is running.							
STEP STANDARD:							
Candidate determines level in the CCW surge tank is lowering, monitors levels, opens LCV-7088, MU TO SRG TK (B SIDE) and LCV-7090, MU TO SRG TK (A SIDE) and determines CCW surge tank level is increasing.							
CUES:							
EVALUATOR NOTE: • Both valves will be required to be open to increase level in the CCW surge tank. • PVG-9627A, SW TO CC LOOP A will not open to provide emergency makeup to the CCW surge tank. • Failure criteria will be if flow is lost to "A" CCW loop based on loss of level in the CCW Surge tank. • JPM may be terminated any time after an increase in CCW surge tank level is achieved.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM SETUP SHEET

JPM: JPM: JPS-g-N23

IC SET: 274

INSTRUCTIONS:

RUN IC-274

IF IC-274 is unavailable, perform the following:

1. Load an IC-10.

2. Insert the following codes:

Trigger 1 (x01o145r) "B" CCW Booster Pump is started

FLX-CCW004

FLEX LEAK CCW PMP A DISCH

Final Value: 100 GPM

Preload

VLV-CC018F

XVG09627A-CC SW SUP TO CCW FAIL AS IS

VLV-CC019F

XVG09627B-CC SW SUP TO CCW FAIL AS IS

VLV-CC002F

ILV07090-CC SRG TNK DEMIN WTR FAIL AS IS

VLV-CC001F

ILV07088-CC SRG TNK DEMIN WTR FAIL AS IS

Trigger 2 (x01i125o) LCV-7090 Switch taken to OPEN

VLV-CC002F

ILV07090-CC SRG TNK DEMIN WTR FAIL AS IS

Delete in: 1 sec

Trigger 3 (x01i124o) LCV-7088 Switch taken to OPEN

VLV-CC001F

ILV07088-CC SRG TNK DEMIN WTR FAIL AS IS

Delete in: 1 sec

3. Go to run

4. Lower CCW Surge tank to 62.5% by opening 9555A, CC SRG TK A SIDE DRN then close 9555A.

LOA-CCW002

CC SRG TK A SIDE DRN - 9555A

5. Freeze the simulator

6. Save IC for multiple uses.

JPM: JPS-g-N23

COMMENTS:

None.

REVISION HISTORY:

New JPM

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The plant is at 100% power.
- "A" CCW loop is the active loop.

INITIATING CUES:

The US directs you to shift Component Cooling Booster Pumps to "B" running and "A" in Standby in accordance with SOP-118, COMPONENT COOLING WATER, section III.D, D. COMPONENT COOLING BOOSTER PUMP OPERATIONS.

A surrogate operator will acknowledge non-related alarms per your direction.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **JPS-h-N23**

CANDIDATE: _____

EVALUATOR: _____

JPM: JPS-h-N23

DESCRIPTION: Aligning RBCU filters for high radiation in containment.

TASK: 000-101-05-01 RESPONSE TO HIGH RB RADIATION LEVEL PER EOP-12.0 /EOP-17.2

TASK STANDARD: Two RBCU Filter Trains are placed in service by:

- Placing RBCU damper controls for XDP-111A and XDP-110B in the FILTER position.
- The RBCU Train "A" Emergency switch has been placed to the XFN-65A position.
- RBCU XFN-65A and XFN-64B have been started.

TERMINATING CUE: Both RBCU Filter Trains are operating.

LOCATION:
SIMULATOR

METHOD:
PERFORM

REFERENCES: EOP-17.2, RESPONSE TO HIGH REACTOR BUILDING RADIATION LEVEL

K/A: 027 A4.01 Ability to manually operate and/or monitor in the control room: CIRS controls. 2.8

TOOLS: Rack copy of EOP-17.2, RESPONSE TO HIGH REACTOR BUILDING RADIATION LEVEL

VALIDATED TIME: 6 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** YES

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

PERFORMANCE RATING: (CIRCLE) SAT UNSAT

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- A LOCA is in progress.
- A Yellow Path on Containment exists due to Containment Radiation > 2 R/hr.

INITIATING CUES:

The US has directed you to implement EOP-17.2, RESPONSE TO HIGH REACTOR BUILDING RADIATION LEVEL.

A surrogate operator will acknowledge non-related alarms per your direction.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: JPS-h-N23

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	1						
Step 1. Verify Containment Ventilation Isolation Valves closed by verifying the following SAFETY INJECTION monitor lights are dim: a. XCP-6103 2-1 (POST ACCID HR EXH 6056/6066). b. XCP-6103 3-4 (POST ACCID HR EXH 6057 & 6067).							
STEP STANDARD:							
Candidate locates XCP 6103 and verifies light 2-1 POST ACCID HR EXH 6056/6066 and 3-4 POST ACCID HR EXH 6057 & 6067 are dim.							
CUES:							
EVALUATOR CUE: Provide the candidate with a brief using the JPM Briefing Sheet before starting the JPM.							
BOOTH OPERATOR: Place the Simulator in RUN when the Evaluator indicates the JPM may begin.							
EVALUATOR CUE: Provide the rack copy of EOP-17.2 once the candidate has been briefed on the initiating cue.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	2						
Step 2. Start both RBCU HEPA Filter Trains: a. Stop RBCU Normal Speed Fans: • XFN 0064A-AH, 1A NORM. • XFN 0065A-AH, 2A NORM. • XFN 0064B-AH, 1B NORM. • XFN 0065B-AH, 2B NORM.							
STEP STANDARD:							
Candidate locates RBCU controls and verifies RBCU Normal Speed Fans are stopped: • 1A NORM, XFN-0064A-AH, observes red light OFF, green light ON with 0 amps indicated. • 2A NORM, XFN-0065A-AH, observes red light OFF, green light ON with 0 amps indicated. • 1B NORM, XFN-0064B-AH, observes red light OFF, green light ON with 0 amps indicated. • 2B NORM, XFN-0065B-AH, observes red light OFF, green light ON with 0 amps indicated.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	3						
2 b. Place RBCU HEPA Filters in service by placing the switches in FILTER: • XDP-110A, RBCU 64A HEPA FLTR BYP DMPR. • XDP-111A, RBCU 65A HEPA FLTR BYP DMPR. • XDP-110B, RBCU 64B HEPA FLTR BYP DMPR. • XDP-111B, RBCU 65B HEPA FLTR BYP DMPR.							
STEP STANDARD:							
Candidate locates RBCU damper controls and places: • XDP-110A switch in FILTER, observes red BYP light ON and green FILTER light OFF. • XDP-111A switch in FILTER, observes red BYP light OFF and green FILTER light ON. • XDP-110B switch in FILTER, observes red BYP light OFF and green FILTER light ON. • XDP-111B switch in FILTER, observes red BYP light ON and green FILTER light OFF.							
CUES:							
EVALUATOR NOTE: RBCU 64A HEPA and RBCU 65B HEPA Filter Bypass dampers failed to reposition to filter as shown by XDP-110A; RBCU 64A HEPA FLTR BYP DMPR, red light ON, green light OFF and XDP-111B; RBCU 65BA HEPA FLTR BYP DMPR, red light ON, green light OFF. EVALUATOR NOTE: Alternate path begins at this step. EVALUATOR NOTE: Placing XDP-111A and XDP-110B in FILTER is critical because the damper will remain bypassed otherwise and there would be no HEPA filter in service on Train "A" or Train "B".							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	4						
Step 2 b: ALTERNATIVE ACTION b. IF any HEPA Filter fails to position to FILTER, THEN ensure the RBCU TRAIN A(B) EMERG Switch is selected to the fan with its respective filter aligned.							
STEP STANDARD:							
Candidate locates RBCU TRAIN A EMERG switch and places it to the XFN65A position, observes XFN 64A white light OFF, XFN 65A white light ON and RBCU-65A does not start. Candidate locates RBCU TRAIN B EMERG switch and verifies it is in the XFN64B position, observes XFN 64B white light ON, XFN 65B white light OFF.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	5						
2 c. Start the RBCU Slow Speed Fans selected on RBCU TRAIN A EMERG and RBCU TRAIN B EMERG.							
STEP STANDARD:							
Candidate places XFN 0065A-AH slow speed fan switch to START, observes; red light ON, green light OFF, and normal amps. Candidate places XFN 0064B-AH slow speed fan switch to START, observes; red light ON, green light OFF, and normal amps.							
CUES:							
EVALUATOR NOTE: The Candidate may place XFN 0064A-AH to stop. EVALUATOR NOTE: Placing the XFN-65A switch in START is critical because the fan must be started in order to align a Train "A" HEPA filter. Placing the XFN-64B switch in START is critical because the fan must be started in order to align a Train "B" HEPA filter.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM SETUP SHEET

JPM: JPM: JPS-h-N23

IC SET: 275

INSTRUCTIONS:

RUN IC- 275

If IC-275 is designated for this JPM then reset to IC-275 leaving the simulator in FREEZE.

1. When Candidate is ready (on Evaluator cue) go to RUN.

If IC-275 is not designated for this JPM then initial conditions may be established by following the below directions:

1. With the simulator reset to IC-10 and in FREEZE, insert the following:

PRE-LOAD

MAL-RCS010
GROSS ISOTOPIC CONCENTRATION IN THE RCS
Final Value: 1.42e+008 uC/gm

PLP-RMS027
AREA RAD MON RM-G7 BACKGROUND
Final Value: 2.1R/hr

PLP-RMS038
AREA RAD MON RM-G18 BACKGROUND
Final Value: 2.1R/hr

OVR-AH025E
SS-AH281 RBCU HEPA FILTER BYPASS DAMPER
Override To: False

OVR-AH025A
SS-AH281 RBCU HEPA FILTER BYPASS DAMPER
Override To: Off

OVR-AH025B
SS-AH281 RBCU HEPA FILTER BYPASS DAMPER
Override To: On

OVR-AH018E
SS-AH283 RBCU HEPA FILTER BYPASS DAMPER
Override To: False

OVR-AH018A
SS-AH283 RBCU HEPA FILTER BYPASS DAMPER
Override To: Off

OVR-AH018B
SS-AH283 RBCU HEPA FILTER BYPASS DAMPER
Override To: On

JPM: JPS-h-N23

OVR-AH026E
SS-AH282 RBCU HEPA FILTER BYPASS DAMPER
Override To: False

OVR-AH026A
SS-AH282 RBCU HEPA FILTER BYPASS DAMPER
Override To: Off

OVR-AH026B
SS-AH282 RBCU HEPA FILTER BYPASS DAMPER
Override To: On

OVR-AH024E
SS-AH284 RBCU HEPA FILTER BYPASS DAMPER
Override To: False

OVR-AH024A
SS-AH284 RBCU HEPA FILTER BYPASS DAMPER
Override To: Off

OVR-AH024B
SS-AH284 RBCU HEPA FILTER BYPASS DAMPER
Override To: On

PMP-AH046F
XFN0064BL RB CLG FAN LOW FAIL TO START

ANN-AH005
RBCU 2A DISCH EMP HI/SMOKE
Fail To: ON

TRIGGER 1

MAL-RCS019C
DBA LOCA (HOT LEG) LOOP 3

AUTO TRIGGER 2 (x02i082f) HEPA Filter Bypass damper XDP-111A placed in filter

OVR-AH018E (NEW)
SS-AH283 RBCU HEPA FILTER BYPASS DAMPER
Override To: False
Delete in: 1 sec

OVR-AH018A (NEW)
SS-AH283 RBCU HEPA FILTER BYPASS DAMPER
Override To: Off
Delete in: 1 sec

OVR-AH018B (NEW)
SS-AH283 RBCU HEPA FILTER BYPASS DAMPER
Override To: On
Delete in: 1 sec

JPM: JPS-h-N23

AUTO TRIGGER 3 (x02i394f) HEPA Filter Bypass damper XDP-110B placed in filter

OVR-AH026E (NEW)
SS-AH282 RBCU HEPA FILTER BYPASS DAMPER
Override To: False
Delete in: 1 sec

OVR-AH026A (NEW)
SS-AH282 RBCU HEPA FILTER BYPASS DAMPER
Override To: Off
Delete in: 1 sec

OVR-AH026B (NEW)
SS-AH282 RBCU HEPA FILTER BYPASS DAMPER
Override To: On
Delete in: 1 sec

AUTO TRIGGER 4 (x02i093s) RB Cooling Fan 64B slow speed switch to start.

PMP-AH046F (NEW)
XFN0064BL RB CLG FAN LOW FAIL TO START
Delete in: 1 sec

2. Place simulator in RUN and activate TRIGGER 1.
3. Perform EOP-1.0.
4. Perform steps of EOP-2.0 as necessary.
5. Run until RB Press < 11 psig and Containment CSFST is YELLOW due to high RB Rad Levels.
6. Place simulator in FREEZE and SAVE IC.
7. When Candidate is ready (on Evaluator cue) go to RUN

COMMENTS:

Provide spare operator to silence alarms.

BOOTH OPERATOR: Use LOA resets page to silence HVAC alarms when they come in.

REVISION HISTORY:

This is a reformatted version of 2018 NRC JPM h.

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- A LOCA is in progress.
- A Yellow Path on Containment exists due to Containment Radiation > 2 R/hr.

INITIATING CUES:

The US has directed you to implement EOP-17.2, RESPONSE TO HIGH REACTOR BUILDING RADIATION LEVEL.

A surrogate operator will acknowledge non-related alarms per your direction.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION JOB PERFORMANCE MEASURE

JPM NO: **23 NRC In-Plant i**

CANDIDATE: _____

EVALUATOR: _____

JPM: 23 NRC In-Plant i

DESCRIPTION: Energizing the ESF Loading Sequencer in accordance with STP-125.017.

TASK: 062-008-02-04: Station Blackout Test per STP-125.010 or STP-125.017.

TASK STANDARD: Candidate re-energizes the ESF Loading Sequencer by performing the following in accordance with STP-125.017:

- Close breaker APN5901 16, ESF LOADING SEQ CONT PNL TRN A XPN6020.
- At XPN6020, ESF LOADING SEQUENCE CONTROL PANEL - UNIT 1 (CB-436) reset the ESFLS as follows:
 - Ensures the panel CIRCUIT BREAKER is closed.
 - Places the ON/RESET Toggle Switch in the RESET position.
 - Returns the ON/RESET Toggle Switch to the ON position.

TERMINATING CUE: Once the candidate states they have completed step 6.6.b.3.

LOCATION: **METHOD:**
PLANT **SIMULATE**

REFERENCES:

STP-115.017, DIESEL GENERATOR A LOSS OF OFFSITE POWER TEST

K/A: 013 A4.016: Ability to manually operate and or monitor in the control room: ESF testing.

TOOLS: 23 NRC In-plant JPM i Handout 1 and 2.

VALIDATED TIME: 5 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** NO

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

PERFORMANCE RATING: (CIRCLE) SAT UNSAT

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS:

Personal Protection Equipment (PPE).

AT NO TIME ARE YOU TO OPERATE ANY PLANT EQUIPMENT!

FOR ELECTRICAL MANIPULATIONS, AT NO TIME ARE YOU TO BREAK THE PLANE OF THE ELECTRICAL PANEL!

INITIAL CONDITIONS:

- Plant is shutdown for a refueling outage.
- STP-125.017, DIESEL GENERATOR A LOSS OF OFFSITE POWER TEST is in progress.

INITIATING CUES:

The US has directed you to perform Step 6.6.a and Step 6.6.b of STP-125.017 for re-energizing the ESF Loading Sequencer.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: 23 NRC In-Plant i

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	1						
6.6. Energize and reset XPN6020, ESF LOADING SEQUENCE CONTROL PANEL - UNIT 1, by performing the following: a. Close breaker APN5901 16, ESF LOADING SEQ CONT PNL TRN A XPN6020 (CB-436).							
STEP STANDARD:							
At APN5901, Candidate closes breaker APN5901 16.							
CUES:							
EVALUATOR NOTE: DO NOT OPEN PANEL APN5901!!!							
EVALUATOR CUE: When candidate has closed the breaker, notify the candidate that the breaker is closed.							
EVALUATOR CUE: Show picture of APN5901 after candidate locates the panel.							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	2						
6.6. Energize and reset XPN6020, ESF LOADING SEQUENCE CONTROL PANEL - UNIT 1, by performing the following: b. At XPN6020, ESF LOADING SEQUENCE CONTROL PANEL - UNIT 1 (CB-436) reset the ESFLS as follows: 1) Ensure the panel CIRCUIT BREAKER is closed. 2) Place the ON/RESET Toggle Switch in the RESET position (Bottom, left side of the AUTOMATIC TEST Section of the panel). 3) Return the ON/RESET Toggle Switch to the ON position.							
STEP STANDARD:							
Candidate should close the CIRCUIT BREAKER on the panel. (On bottom of panel) Candidate places the toggle switch to the RESET position and then returns the Toggle switch to the ON position.(On Middle left of panel)							
CUES:							
EVALUATOR NOTE: DO NOT OPEN THE PANEL ON XPN6020!!! This will violate exam security because there is an alarm in the Control Room when this panel is opened. EVALUATOR CUE: When the candidates mentions the CIRCUIT BREAKER position, Inform them that the CIRCUIT BREAKER on the panel is open. EVALUATOR CUE: Show picture of XPN6020 after candidate locates the panel. Show close-up pictures of circuit breaker and reset switch when candidate locates them on full cabinet picture.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM: 23 NRC In-Plant i

JPM SETUP SHEET

JPM: 2023 NRC JPM i

IC SET: N/A

INSTRUCTIONS:

None

COMMENTS:

None

REVISION HISTORY:

New JPM for 2023 NRC Exam JPM.

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS:

Personal Protection Equipment (PPE).

AT NO TIME ARE YOU TO OPERATE ANY PLANT EQUIPMENT!

FOR ELECTRICAL MANIPULATIONS, AT NO TIME ARE YOU TO BREAK THE PLANE OF THE ELECTRICAL PANEL!

INITIAL CONDITIONS:

- Plant is shutdown for a refueling outage.
- STP-125.017, DIESEL GENERATOR A LOSS OF OFFSITE POWER TEST is in progress.

INITIATING CUES:

The US has directed you to perform Step 6.6.a and Step 6.6.b of STP-125.017 for re-energizing the ESF Loading Sequencer.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **23 NRC In-Plant j**

CANDIDATE: _____

EVALUATOR: _____

JPM: 23 NRC In-Plant j

DESCRIPTION: Local isolation of RCP seals during a loss of all ESF AC power.

TASK: 000-055-05-01 RESPOND TO LOSS OF OFF SITE AND ON SITE
ESF POWER PER EOP-6.0/EOP-1.0.

TASK STANDARD: The following valves have been closed to isolate the RCP Seals in
accordance with EOP-6.0:

- XVT-8100, RC PUMP SEAL RETURN HDR ISOL VLV.
- XVG-9606, RB CC RETURN HEADER VALVE.
- XVT-8105, SEAL INJECTION HEADER ISOLATION VALVE.

TERMINATING CUE: RCP seals isolated per Attachment 9 of EOP-6.0.

LOCATION: **METHOD:**
PLANT SIMULATE

REFERENCES: EOP-6.0 ECA-0.0 LOSS OF ALL ESF AC POWER

K/A: 055 EA1.10 Ability to operate and/or monitor the following as they
apply to a Station Blackout: CVCS (3.6)

TOOLS: 23 NRC In-Plant JPM j HO, copy of EOP-6.0, Attachment 9
23 NRC In-Plant JPM j HO2, picture of valve operator.

VALIDATED TIME: 10 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** NO

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

PERFORMANCE RATING: (CIRCLE) SAT UNSAT

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS:

Personal Protection Equipment (PPE).

AT NO TIME ARE YOU TO OPERATE ANY PLANT EQUIPMENT!

FOR ELECTRICAL MANIPULATIONS, AT NO TIME ARE YOU TO BREAK THE PLANE OF THE ELECTRICAL PANEL!

INITIAL CONDITIONS:

- A total loss of offsite power has occurred and both D/G's have failed to start.
- The US has implemented EOP-6.0, ECA-0.0 LOSS OF ALL ESF AC POWER and is directing actions for locally isolating RCP seals.

INITIATING CUES:

NROATC calls and directs you, the AB Operator to isolate RCP seals IAW Step 1 of Attachment 9 of EOP-6.0.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: 23 NRC In-Plant j

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	1						
Step 1: Locally isolate the RCP Seals by closing the following and record on the table below: a) XVT08100-CS, RC PUMP SEAL RETURN HDR ISOL VLV (ORC) (AB-412 West Pen).							
STEP STANDARD:							
Engages manual handwheel by pressing down on the declutch lever on XVT08100-CS and turns handwheel fully clockwise until resistance is felt.							
CUES:							
EVALUATOR CUE: Provide the candidate with a brief using the JPM Briefing Sheet before starting the JPM.							
EVALUATOR CUE: Provide the candidate with 2023 NRC JPM j HO, EOP-6.0 Attachment 9							
EVALUATOR NOTE: MVT-8100 is in the north end of the 412' West Penetration area, which has elevated radiation levels. Accessing the North door to the West Pen will provide the least amount of radiation exposure. Have the examinee point to the correct valve in order to reduce radiation exposure and then leave the room.							
EVALUATOR NOTE: 23 NRC In-Plant JPM j HO2 can be used for demonstrating valve operations in the low does waiting area.							
EVALUATOR CUE: Handwheel rotates clockwise until resistance is felt and threaded shaft is seen.							
COMMENTS:							

JPM: 23 NRC In-Plant j

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	2						
Step 1 continued: b) XVG09606-CC, RB CC RETURN HEADER VALVE (AB-436 West Pen).							
STEP STANDARD:							
Engages manual handwheel by pressing down on the declutch lever on XVG09606-CC and turns handwheel fully clockwise until resistance is felt.							
CUES:							
EVALUATOR CUE: Handwheel rotates clockwise until resistance is felt and threaded shaft is seen.							
EVALUATOR NOTE: 23 NRC In-Plant JPM j HO2 can be used for demonstrating valve operations.							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	3						
Step 1 continued: c) XVT08105-CS, SEAL INJECTION HEADER ISOLATION VALVE (AB-436).							
STEP STANDARD:							
Engages manual handwheel by pressing down on the declutch lever on XVT08105-CS and turns handwheel fully clockwise until resistance is felt.							
CUES:							
EVALUATOR NOTE: The lighting in this room may be dim. The use of a flash light may be necessary.							
EVALUATOR NOTE: 23 NRC In-Plant JPM j HO2 can be used for demonstrating valve operations.							
EVALUATOR CUE: Handwheel rotates clockwise until resistance is felt and threaded shaft is seen.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM: 23 NRC In-Plant j

JPM SETUP SHEET

JPM: 2023 NRC JPM j

IC SET: N/A

INSTRUCTIONS:

Provide examinee with 2023 NRC JPM j HO, EOP-6.0, Attachment 9.

COMMENTS:

None

REVISION HISTORY:

Bank JPM

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS:

Personal Protection Equipment (PPE).

AT NO TIME ARE YOU TO OPERATE ANY PLANT EQUIPMENT!

FOR ELECTRICAL MANIPULATIONS, AT NO TIME ARE YOU TO BREAK THE PLANE OF THE ELECTRICAL PANEL!

INITIAL CONDITIONS:

- A total loss of offsite power has occurred and both D/G's have failed to start.
- The US has implemented EOP-6.0, ECA-0.0 LOSS OF ALL ESF AC POWER and is directing actions for locally isolating RCP seals.

INITIATING CUES:

NROATC calls and directs you, the AB Operator to isolate RCP seals IAW Step 1 of Attachment 9 of EOP-6.0.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **23 NRC In-Plant JPM k**

CANDIDATE: _____

EVALUATOR: _____

JPM: 23 NRC In-Plant JPM k

DESCRIPTION: PLACING INVERTER XIT-5901 IN AN ALTERNATE AC LINEUP

TASK: 062-010-01-04 REMOVE ENGINEERING SAFETY FEATURES VITAL INVERTER FROM SERVICE PER SOP-310

TASK STANDARD: APN-5901 has been shifted to its alternate power source in accordance with SOP-310 by:

- Rotating the BYPASS MANUAL SWITCH - Q050 to the BYPASS position.
- Positioning the BATTERY BREAKER - Q004 to the OFF position.
- Positioning the INPUT BREAKER - Q001 to the OFF position.
- Placing the selector Switch S001 in position 1 till the RECTIFIER OUTPUT VOLTAGE reads 0.

TERMINATING CUE: XIT-5901 is placed in an alternate AC lineup

LOCATION: **METHOD:**
PLANT SIMULATE

REFERENCES:

SOP-310, ENGINEERED SAFETY FEATURES 120 VAC INSTRUMENTATION AND CONTROL POWER SYSTEM

K/A: 062 A4.07 Ability to manually operate and/or monitor in the control room: Synchronizing and paralleling of different AC supplies (3.7)

TOOLS: 23 NRC In-Plant k Handout 1, SOP-310, SECTION IV.E, SHIFTING APN5901 POWER SOURCE TO 1FA AT INVERTER 5901

23 NRC In-Plant k HO2, HO3, HO4, Pictures of control screen.

VALIDATED TIME: 14 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** NO

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

PERFORMANCE RATING: (CIRCLE) SAT UNSAT

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS:

Personal Protection Equipment (PPE).

AT NO TIME ARE YOU TO OPERATE ANY PLANT EQUIPMENT!

FOR ELECTRICAL MANIPULATIONS, AT NO TIME ARE YOU TO BREAK THE PLANE OF THE ELECTRICAL PANEL!

INITIAL CONDITIONS:

- Plant is at 100% power.
- 'A1' Train maintenance work week.
- XIT-5901 is scheduled for preventive maintenance.

INITIATING CUES:

The Shift Manager directs the shifting of APN5901 power source to 1FA at inverter 5901 in accordance with SOP-310, Section IV.E for inverter PMs. All initial conditions are completed.

STP-506.005, DEENERGIZATION OF THE ESF LOAD SEQUENCER LOSS OF VOLTAGE AND DEGRADED VOLTAGE RELAYS has been completed.

The PM's require the Static Switch be manually bypassed.

The breakers will **NOT** be red tagged.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: 23 NRC In-Plant JPM k

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	1						
CAUTION 2.0 a. STP-506.005, De-Energization Of The ESF Load Sequencer Loss Of Voltage And Degraded Voltage Relays A Train, XEG0001A, should be completed on Train A prior to removing Inverter XIT5901 from service. This should be tracked on the Diesel Generator A R&R. b. Do not actuate the BYPASS MANUAL SWITCH - Q050 when the system is running in NORMAL. NOTE 2.0 a. All steps are performed in the Relay Room (CB-436) unless otherwise stated. b. XCP-636 1-5 (INVERTER 5901 TROUBLE) will be locked in alarm at the completion of this procedure. CAUTION 2.1 If during BYPASS OPERATION a fault occurs the inverter will automatically switch to NORMAL operation if the rectifier is available OR to BATTERY operation if the Battery is available and within tolerance. 2.1 Select .							
STEP STANDARD:							
Selects  .							
CUES:							
EVALUATOR CUE: Provide the candidate with a brief using the JPM Briefing Sheet and 23 NRC In-Plant JPM k Handout 1 before starting the JPM. EVALUATOR CUE: Cue operator that  is selected.							
COMMENTS:							

JPM: 23 NRC In-Plant JPM k

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	2						
2.2 Cursor up  as necessary until Bypass operation : OFF is displayed.							
STEP STANDARD:							
Depresses cursor up  until Bypass operation : OFF is displayed.							
CUES:							
EVALUATOR CUE: Cue operator that Bypass operation : OFF is displayed by displaying 23 NRC HO2.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	3						
2.3 Select  (Activation).							
STEP STANDARD:							
Depresses the  button.							
CUES:							
EVALUATOR CUE: Cue operator that the  button has been pressed.							
COMMENTS:							

JPM: 23 NRC In-Plant JPM k

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	4						
2.4 Verify the following: a. LED 9, BYPASS MAINS O.K. is lit. b. LED 6, SYNCHRONOUS is lit. c. Display indicates Bypass operation :.							
STEP STANDARD:							
Verifies that LED 9 and LED 6 are lit and the display indicates Bypass operation : .							
CUES:							
EVALUATOR CUE: Cue operator that LED 9 and LED 6 lights are lit and display indicates Bypass operation : by displaying 23 NRC HO3.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	5						
If MANUAL BYPASS operation is desired perform the following additional steps: CAUTION In this mode a Bypass Fault will trip the inverter with no alternate supply available for auto transfer. 2.5 Verify static switch LED 10, LOAD VIA EN is lit.							
STEP STANDARD:							
Verifies LED 10, LOAD VIA EN light is lit.							
CUES:							
EVALUATOR CUE: Cue operator that LED 10, LOAD VIA EN light is lit.							
COMMENTS:							

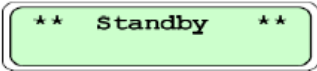
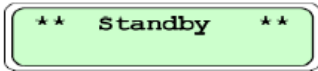
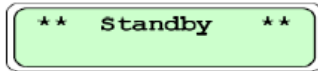
JPM: 23 NRC In-Plant JPM k

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	6						
NOTE 2.6							
Placing the Bypass Manual Switch in TEST isolates the Static Switch and the Inverter output from the Alternate Source and will cause the following:							
1) XCP-636 1-5 (INVERTER 5901 TROUBLE) annunciates (MCB).							
2) AC OUTPUT Voltage and Frequency indication is lost.							
2.6 Turn the BYPASS MANUAL SWITCH - Q050 to TEST.							
STEP STANDARD:							
The BYPASS MANUAL SWITCH - Q050 is rotated to the TEST position.							
CUES:							
EVALUATOR NOTE: The turnover sheet says that the PM's require the Static Switch be manually bypassed.							
EVALUATOR CUE: Cue operator that BYPASS MANUAL SWITCH - Q050 is in the TEST position.							
EVALUATOR CUE: Acknowledge report of XCP-636 1-5 (INVERTER 5901 TROUBLE) alarm on the MCB if candidate reports it the control room.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	7						
2.7 Verify the following:							
• Static switch LED 11, MANUAL BYPASS is lit. • MANUAL BYPASS alarm is lit.							
STEP STANDARD:							
Verifies LED 11 light is lit and Manual Bypass light are lit.							
CUES:							
EVALUATOR CUE: Cue operator that Static switch LED 11, MANUAL BYPASS is lit and MANUAL BYPASS alarm light is lit.							
COMMENTS:							

JPM: 23 NRC In-Plant JPM k

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	8						
2.8 Turn off XIT5901 by pressing  and  simultaneously.							
STEP STANDARD:							
Simultaneously presses both  and  to turn off XIT5901.							
CUES:							
EVALUATOR CUE: Cue operator that both  and  have been pressed.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	9						
2.9 Verify the display indicates  .							
STEP STANDARD:							
Verifies that display indicates  .							
CUES:							
EVALUATOR CUE: Cue operator that display indicates  by displaying 23 NRC HO4.							
COMMENTS:							

JPM: 23 NRC In-Plant JPM k

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	10						
2.10 Turn the BYPASS MANUAL SWITCH - Q050 to BYPASS.							
STEP STANDARD:							
BYPASS MANUAL SWITCH - Q050 is rotated to the BYPASS position.							
CUES:							
EVALUATOR CUE: Cue operator that BYPASS MANUAL SWITCH - Q050 is in the BYPASS position.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	11						
2.11 Verify the following:							
• Static switch LED 11, MANUAL BYPASS is lit. • MANUAL BYPASS alarm is lit.							
STEP STANDARD:							
Verifies that LED 11, MANUAL BYPASS Light and MANUAL BYPASS alarm are lit.							
CUES:							
EVALUATOR CUE: Cue operator that LED 11, MANUAL BYPASS Light and MANUAL BYPASS alarm are lit.							
COMMENTS:							

JPM: 23 NRC In-Plant JPM k

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	12						
2.12 Turn BATTERY BREAKER - Q004 to OFF.							
STEP STANDARD:							
Positions the BATTERY BREAKER - Q004 to the OFF position.							
CUES:							
EVALUATOR CUE: Cue operator that the BATTERY BREAKER - Q004 is in the OFF position.							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	13						
2.13 Turn INPUT BREAKER - Q001 to OFF.							
STEP STANDARD:							
Positions the INPUT BREAKER - Q001 to the OFF position.							
CUES:							
EVALUATOR CUE: Cue operator that the INPUT BREAKER - Q001 is in the OFF position.							
COMMENTS:							

JPM: 23 NRC In-Plant JPM k

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	14						
2.14 Discharge the capacitors by placing selector Switch S001 in Position 1 and hold until RECTIFIER OUTPUT VOLTAGE reads 0.							
STEP STANDARD:							
Places the selector Switch S001 in position 1 till the RECTIFIER OUTPUT VOLTAGE reads 0.							
CUES:							
EVALUATOR CUE: Cue operator that the selector Switch S001 is in Position 1 and RECTIFIER OUTPUT VOLTAGE reads 0.							
EVALUATOR NOTE: Switch is on the left panel, voltage indicator is on the right panel							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	15						
2.15 Verify XCP-636 1-5 (INVERTER 5901 TROUBLE) is in alarm (MCB).							
STEP STANDARD:							
Call Control Room and verifies XCP-636 1-5 (INVERTER 5901 TROUBLE) is in alarm.							
CUES:							
EVALUATOR CUE: Cue operator that XCP-636 1-5 (INVERTER 5901 TROUBLE) is in alarm on the MCB.							
COMMENTS:							

JPM: 23 NRC In-Plant JPM k

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	16						
NOTE 2.16 If the electricians are to perform inverter PMs and breakers are NOT red tagged, Step 2.16 may be omitted. 2.16 Open the following feeder breakers: a. XMC1DA2Y 06ABL, INVERTER 1 NSSS FEED XIT5901-EV (AB-412). b. DPN1HA 22, INVERTER XIT5901 (IB-412).							
STEP STANDARD:							
Determines that step 2.16 is not required to be performed based on turnover information.							
CUES:							
EVALUATOR NOTE: Operator does not perform Step 2.16, turnover sheet says that the breakers will NOT be red tagged.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM: 23 NRC In-Plant JPM k

JPM SETUP SHEET

JPM: 23 NRC In-Plant k

IC SET: N/A

INSTRUCTIONS:

None

COMMENTS:

None

REVISION HISTORY:

Bank JPM, 2021 AUDIT.

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS:

Personal Protection Equipment (PPE).

AT NO TIME ARE YOU TO OPERATE ANY PLANT EQUIPMENT!

FOR ELECTRICAL MANIPULATIONS, AT NO TIME ARE YOU TO BREAK THE PLANE OF THE ELECTRICAL PANEL!

INITIAL CONDITIONS:

- Plant is at 100% power.
- 'A1' Train maintenance work week.
- XIT-5901 is scheduled for preventive maintenance.

INITIATING CUES:

The Shift Manager directs the shifting of APN5901 power source to 1FA at inverter 5901 in accordance with SOP-310, Section IV.E for inverter PMs. All initial conditions are completed.

STP-506.005, DEENERGIZATION OF THE ESF LOAD SEQUENCER LOSS OF VOLTAGE AND DEGRADED VOLTAGE RELAYS has been completed.

The PM's require the Static Switch be manually bypassed.

The breakers will **NOT** be red tagged.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **23 NRC A1-a (R)**

CANDIDATE: _____

EVALUATOR: _____

JPM: 23 NRC A1-a (R)

DESCRIPTION: Verification of Operator Watchstanding Certification

TASK: 119-003-03-01 Conduct Shift and Relief Turnover

TASK STANDARD: Candidate determines that one 12 hour shift must be stood by the end of December 31st to maintain an active license.

TERMINATING CUE: The candidate determines one 12 hour shift is required, enters answers on the handout provided and returns it to the evaluator.

LOCATION:
CLASSROOM

METHOD:
PERFORM

REFERENCES:

OAP-110.2, OPERATOR WATCHSTANDING CERTIFICATION AND TRACKING
OP-AA-103, OPERATOR QUALIFICATIONS

K/A: 2.1.4 Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, and maintenance of active license status, 10 CFR Part 55 (RO 3.3)

TOOLS: Calculator
23 NRC A1-a (R) – Handout 1
Access to paper or electronic copies of V.C. Summer procedures

VALIDATED TIME: 10 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** NO

PERFORMANCE RATING: (CIRCLE)

SAT

UNSAT

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- Today is **December 21.**
- You have been working a special assignment and it is anticipated that you will be permanently assigned to a shift on January 20.
- Your REACTOR OPERATOR license was issued on **September 26** of this year.
- **After** September 26, while on special assignment, you also stood watches on the dates indicated on the handout that has been provided to you.

INITIATING CUES:

You are directed to evaluate the work history provided and determine whether you can stand an RO shift on January 20, in accordance with VCS administrative requirements.

- If so, **justify your answer.**
- If not, **then identify the remaining requirements,** if any.

Enter your answers on Handout 1.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: 23 NRC A1-a (R)

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	1						
Candidate reviews information provided to determine whether the operator can stand an RO shift in accordance with VCS administrative requirements given watchstanding history.							
STEP STANDARD:							
Determines the following:							
• 12 hours are left to be stood to maintain an active license. • The watch must be stood in 12 hour shift in a licensed position. • The watch must be stood by end of the quarter (December31).							
CUES:							
EVALUATOR CUE: Provide the candidate with a brief using the JPM Briefing Sheet before starting the JPM.							
EVALUATOR CUE: Provide the candidate with 23 NRC A1-a (R) Handout 1 before starting the JPM.							
EVALUATOR NOTE: It is not critical for the candidate to refer to the procedure if the candidate can make the correct determination in step 4 from memory.							
EVALUATOR NOTE: 60 hours - 48 hours (four 12-hour shifts) = 12 hours in one 12 hour shift left to be stood to maintain the license.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM SETUP SHEET

JPM: 23 NRC A1-a (R)

IC SET: N/A

INSTRUCTIONS:

Ensure that current procedures and curve book are available in hard copy or electronically.

Provide Handout containing the following:

Your Watchstanding History

NROATC	0730 - 1930	October 8
NROATC	0730 - 1230	October 15
BOP	0730 - 1930	October 19
BOP	0730 - 1430	November 11
BOP	0730 - 1330	November 20
CONTROL BUILDING	1930 - 0730	November 22
BOP	0730 - 1930	December 9
NROATC	1930 - 0730	December 13

Record your answer below:

COMMENTS:

REVISION HISTORY:

Bank JPM

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- Today is **December 21.**
- You have been working a special assignment and it is anticipated that you will be permanently assigned to a shift on January 20.
- Your REACTOR OPERATOR license was issued on **September 26** of this year.
- **After** September 26, while on special assignment, you also stood watches on the dates indicated on the handout that has been provided to you.

INITIATING CUES:

You are directed to evaluate the work history provided and determine whether you can stand an RO shift on January 20, in accordance with VCS administrative requirements.

- If so, **justify your answer.**
- If not, **then identify the remaining requirements,** if any.

Enter your answers on the Handout 1.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **23 NRC A1-b (R)**

CANDIDATE: _____

EVALUATOR: _____

JPM: 23 NRC A1-b (R)

DESCRIPTION: Perform boron change calculations

TASK: 004-006-01-01 PERFORM BORON CONCENTRATION CHANGE CALCULATIONS

TASK STANDARD: Candidate completes OAP-100.6 Attachment IA within the tolerance bands of the answer key.

TERMINATING CUE: The candidate completes OAP-100.6, Attachment IA, enters answers on the handout and returns it to the evaluator.

LOCATION:
CLASSROOM

METHOD:
PERFORM

REFERENCES:

OAP-100.6, CONTROL ROOM CONDUCT AND CONTROL OF SHIFT ACTIVITIES

K/A: 2.1.25 Ability to interpret reference materials, such as graphs, curves, and tables (reference potential) (RO 3.9)

TOOLS: Calculator
23 NRC A1-b (R) Handout 1 – Reactivity Parameters
23 NRC A1-b (R) Handout 2 – OAP-100.6, CONTROL ROOM CONDUCT AND CONTROL OF SHIFT ACTIVITIES ATTACHMENT IA
23 NRC A1-b (R) Handout 3 – Required Figures from Curve Book
Access to paper or electronic copies of V.C. Summer procedures

VALIDATED TIME: 29 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** NO

PERFORMANCE RATING: (CIRCLE)

SAT

UNSAT

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The plant is in MODE 1.
- It is Sunday day shift.

INITIATING CUES:

The US directs you to complete Attachment IA, Reactivity Control Parameters, of OAP-100.6, CONTROL ROOM CONDUCT AND CONTROL OF SHIFT ACTIVITIES.

***HAND JPM BRIEFING SHEET TO
OPERATOR AT THIS TIME!***

JPM: 23 NRC A1-b (R)

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	1						
Complete OAP-100.6, Attachment IA.							
STEP STANDARD:							
Completes OAP-100.6, Attachment IA in accordance with the key.							
CUES:							
EVALUATOR CUE: Provide the candidate with a brief using the JPM Briefing Sheet before starting the JPM.							
EVALUATOR CUE: Provides candidate with 23 NRC A1-b Handout 1 and 2 with the information on RCS Boron Concentration, Burnup, "A" Boric Acid Tank Boron Concentration, and "B" Boric Acid Tank Boron Concentration and OAP-100.6, Attachment IA with directions to show all work.							
EVALUATOR CUE: Provides candidate with paper copies of Curve Book figures 23 NRC A1-b Handout 3.							
EVALUATOR NOTE: Critical calculation items are noted by arrows on the answer key. Any difference in the non-critical items or transposition errors should be noted and discussed at the end of the JPM to ensure understanding and recorded as potential procedure adherence issues.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM SETUP SHEET

JPM: 23 NRC A1-b (R)

IC SET: N/A

INSTRUCTIONS:

Ensure that current procedures and curve book are available in hard copy or electronically.

Provide Handout 1 containing the following:

- RCS Boron Concentration: 185 ppm
- Core Burnup: 20150 MWD/MTU
- 'A' Boric Acid Tank in service @ 7565 ppm boron
- 'B' Boric Acid Tank is @ 7515 ppm boron

Provide Handout 2 OAP-100.6, Attachment IA.

Provide Handout 3 Copies of Appropriate Curve Book Figures.

COMMENTS:

None

REVISION HISTORY:

Rev. 0: This is a reformatted and modified version of JPA-006A. Updated data for changes to Station Curve Book.

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The plant is in MODE 1.
- It is Sunday day shift.

INITIATING CUES:

The US directs you to complete Attachment IA, Reactivity Control Parameters, of OAP-100.6, CONTROL ROOM CONDUCT AND CONTROL OF SHIFT ACTIVITIES.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **23 NRC A2 (R)**

CANDIDATE: _____

EVALUATOR: _____

JPM: 23 NRC A2 (R)

DESCRIPTION: Perform Boration system flow path verification and determine operability.

TASK: 004-001-02-01 Perform Boration System Flow Path Verification

TASK STANDARD: Determines the flowpath operability, indicates the correct status in step 6.4 of attachment I and lists the deficiencies for attachments IIB, IIC:

- Attachment IIA: SAT
- Attachment IIB: UNSAT - XVD08323A-CS, BORIC ACID TANK A OUTLET ISOL VALVE should be CLOSED and XVD08323B-CS, BORIC ACID TANK B OUTLET ISOL VALVE should be OPEN.
- Attachment IIC: UNSAT -- XVD08323A-CS, BORIC ACID TANK A OUTLET ISOL VALVE should be CLOSED and XVD08323B-CS, BORIC ACID TANK B OUTLET ISOL VALVE should be OPEN.
- Attachment IID: SAT
- Indicates SAT for step 6.7 in Attachment I.

TERMINATING CUE: Attachment I is complete, and the candidate returns the completed Handouts and instruction sheet to the evaluator.

LOCATION:

CLASSROOM

METHOD:

PERFORM

REFERENCES:

STP-104.003 BORATION SYSTEM VALVE LINEUP VERIFICATION

K/A: 2.2.12 Knowledge of surveillance procedures. (RO 3.7)

TOOLS: 23 NRC A2 (R) Handout 1 (marked up STP-104.003, BORATION SYSTEM VALVE LINEUP VERIFICATION procedure and Attachment I, IIA, IIB, IIC and IID) and Handout 2 to document deficiencies.

VALIDATED TIME: 27 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** NO

PERFORMANCE RATING: (CIRCLE)

SAT

UNSAT

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- Operators are performing a plant startup in GOP-2, PLANT STARTUP AND HEATUP (MODE 5 TO MODE 3) after a refueling outage.
- Current RCS cold leg temperatures are 290°F.
- "B" boric acid tank is in service with a concentration of 7300 ppm.
- "A" boric acid tank is at a concentration of 6800 ppm.
- "A" boric acid tank was declared inoperable and is out of service.
- STP-104.003, BORATION SYSTEM VALVE LINEUP VERIFICATION is due.
- The valve lineups from Attachments IIA, IIB, IIC and IID of STP-104.003 have been completed.
- Operators have also verified the Gravity Drain Flowpath piping is full of water by performing venting and have returned the vent path to the required operable position.

INITIATING CUES:

The US directs you to review the completed valve lineup entries and determine boration flowpath operability by performing the remaining steps of STP-104.003 and completing Attachment I, TEST DATA SHEET through step 6.7.

List deficiencies that are noted during your review, if any, on Handout 2 provided to you.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: 23 NRC A2 (R)

CRITICAL:	NO	SEQUENCED:	NO	SAT		UNSAT	
JPM STEP	1						
6.3 Determine flowpath operability as follows: a. Evaluate the position, as appropriate, of components listed on Attachments IIA through IID.							
STEP STANDARD:							
Reviews Attachment IIA. Determines that the lineup for Attachment IIA is SAT.							
CUES:							
EVALUATOR CUE: Provide the candidate with a brief using the JPM Briefing Sheet before starting the JPM.							
EVALUATOR CUE: Provide a copy of 23 NRC A2 (R) Handout 1 and 2 to candidate.							
EVALUATOR NOTES: • Candidate may comment on the fact that PVT-8146, NORM CHG TO RCS LP B is CLOSED with a Test Position of **OPEN and that PVT-8147, ALT CHG TO RCS LP A is OPEN with a Test Position of **CLOSED. The ** indicates a note that says, "that one valve, open, the other valve closed", and so the valve lineup is satisfactory. • This step is not marked as critical because it may not be observed. The critical step is to properly record if the attachment is SAT or UNSAT on Attachment I. This is step 6 of this JPM. • Step to review Attachments IIA through IID are not sequenced since the candidate is reviewing entries made by another operator. These reviews may take place in any order.							
COMMENTS:							

JPM: 23 NRC A2 (R)

CRITICAL:	NO	SEQUENCED:	NO	SAT		UNSAT	
JPM STEP	2						
6.3 Determine flowpath operability as follows: a. Evaluate the position, as appropriate, of components listed on Attachments IIA through IID.							
STEP STANDARD:							
Reviews Attachment IIB. Determines that the lineup for Attachment IIB is UNSAT.							
CUES:							
EVALUATOR NOTES: - Valve XVD08323A-CS, BORIC ACID TANK A OUTLET ISOL VALVE should be CLOSED since "A" tank is OOS with a low boron concentration and valve XVD08323B-CS, BORIC ACID TANK B OUTLET ISOL VALVE should be OPEN for the in-service BAT. - This step is not marked as critical because it may not be observed. The critical step is to properly record if the attachment is SAT or UNSAT on Attachment I. This is step 5 of this JPM.							
COMMENTS:							

JPM: 23 NRC A2 (R)

CRITICAL:	NO	SEQUENCED:	NO	SAT		UNSAT	
JPM STEP	3						
6.3 Determine flowpath operability as follows: a. Evaluate the position, as appropriate, of components listed on Attachments IIA through IID.							
STEP STANDARD:							
Reviews Attachment IIC. Determines that the lineup for Attachment IIC is UNSAT.							
CUES:							
EVALUATOR NOTES: - Valve XVD08323A-CS, BORIC ACID TANK A OUTLET ISOL VALVE should be CLOSED since "A" tank is OOS with a low boron concentration and valve XVD08323B-CS, BORIC ACID TANK B OUTLET ISOL VALVE should be OPEN for the in-service BAT. - This step is not marked as critical because it may not be observed. The critical step is to properly record if the attachment is SAT or UNSAT on Attachment I. This is step 5 of this JPM.							
COMMENTS:							

JPM: 23 NRC A2 (R)

CRITICAL:	NO	SEQUENCED:	NO	SAT		UNSAT	
JPM STEP	4						
6.3 Determine flowpath operability as follows: a. Evaluate the position, as appropriate, of components listed on Attachments IIA through IID.							
STEP STANDARD:							
Reviews Attachment IID. Determines that the lineup for Attachment IID is SAT.							
CUES:							
EVALUATOR NOTES:							
- LCV-115D is closed with no position indication and there is a note stating that the valve is tagged out electrically. This does not match the required position, however, in Mode 4 with RCS Cold Leg temperatures less than 300°F, only one flow path is required per step 8.2 of the Acceptance Criteria. - Note that only one valve is required since the initial condition is Mode 4 with RCS Cold Leg temperatures less than 300°F. - This step is not marked as critical because it may not be observed. The critical step is to properly record if the attachment is SAT or UNSAT on Attachment I. This is step 6 of this JPM.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	5						
Step 6.3b. Verify the Gravity Drain Flowpath piping is full of water by venting as follows (AB-456):							
STEP STANDARD:							
No action required. Previously performed as stated in initial conditions:							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	6						
Step 6.4 Record results on Attachment I.							
STEP STANDARD:							
Determines the flowpath operability and indicates the correct status in step 6.4 of attachment I and lists the deficiencies for attachments IIB, IIC and IID: Attachment IIA: SAT Attachment IIB: UNSAT - XVD08323A-CS, BORIC ACID TANK A OUTLET ISOL VALVE should be CLOSED and XVD08323B-CS, BORIC ACID TANK B OUTLET ISOL VALVE should be OPEN. Attachment IIC: UNSAT -- XVD08323A-CS, BORIC ACID TANK A OUTLET ISOL VALVE should be CLOSED and XVD08323B-CS, BORIC ACID TANK B OUTLET ISOL VALVE should be OPEN. Attachment IID: SAT (<u>See note below</u>) - LCV-115D is tagged out electrically and does not match the required AUTO/CLOSED.							
CUES:							
EVALUATOR NOTES: <u>Both</u> Attachments IIB and IIC are UNSAT because Valve XVD08323A-CS, BORIC ACID TANK A OUTLET ISOL VALVE should be CLOSED since "A" tank is OOS with a low boron concentration and valve XVD08323B-CS, BORIC ACID TANK B OUTLET ISOL VALVE should be OPEN for the in-service BAT. - Attachment IID is SAT because LCV-115D is tagged out electrically and does not match the required AUTO/CLOSED position required. Only 1 valve in that attachment is required in Mode 4 less than 300°F.							
COMMENTS:							

JPM: 23 NRC A2 (R)

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	7						
Step 6.5 Record the present Plant Mode on Attachment I:							
STEP STANDARD:							
Records present plant mode as FOUR (4) in step 6.5 on Attachment I.							
CUES:							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	8						
Step 6.6 Compare the operable flowpaths to the required operable flowpaths for the present Plant Mode.							
STEP STANDARD:							
Determines that the requirements for Modes 4**, 5 and 6 are applicable; IIA and IIB or IIC or IID are required to be operable.							
CUES:							
EVALUATOR NOTES:							
• Because the plant is in MODE 4 the * and ** differentiate the requirements based on whether RCS Cold Legs are greater than or less than 300°F. Since Tave is 290°F the requirement is Mode 4** which is in line with what is required for 4**, 5, 6. • This step is not critical since it may not be observed.							
COMMENTS:							

JPM: 23 NRC A2 (R)

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	9						
Step 6.7 Record results on Attachment I.							
STEP STANDARD:							
Compares the operable flowpaths to the required operable flowpaths for the present conditions and indicates SAT for step 6.7 in Attachment I.							
CUES:							
EVALUATOR NOTE:							
If the applicant does not indicate which attachments are used to determine that the lineup is overall SAT, ask a followup question as to how it was determined that the lineup verification was overall SAT.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM SETUP SHEET

JPM: 23 NRC A2 (R)

IC SET: N/A

INSTRUCTIONS:

Provide candidate with briefing sheet and copy of 23 NRC A2 (R) Handout 1 (marked up STP-104.003 BORATION SYSTEM VALVE LINEUP VERIFICATION procedure and Attachment I, IIA, IIB, IIC and IID) and Handout 2 to document deficiencies.

COMMENTS:

None

REVISION HISTORY:

Bank 2021 Audit A2 (R)

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- Operators are performing a plant startup in GOP-2, PLANT STARTUP AND HEATUP (MODE 5 TO MODE 3) after a refueling outage.
- Current RCS cold leg temperatures are 290°F.
- "B" boric acid tank is in service with a concentration of 7300 ppm.
- "A" boric acid tank is at a concentration of 6800 ppm.
- "A" boric acid tank was declared inoperable and is out of service.
- STP-104.003, BORATION SYSTEM VALVE LINEUP VERIFICATION is due.
- The valve lineups from Attachments IIA, IIB, IIC and IID of STP-104.003 have been completed.
- Operators have also verified the Gravity Drain Flowpath piping is full of water by performing venting and have returned the vent path to the required operable position.

INITIATING CUES:

The US directs you to review the completed valve lineup entries and determine boration flowpath operability by performing the remaining steps of STP-104.003 and completing Attachment I, TEST DATA SHEET through step 6.7.

List deficiencies that are noted during your review, if any, on Handout 2 provided to you.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **23 NRC A3 (R)**

CANDIDATE: _____

EVALUATOR: _____

JPM: 23 NRC A3 (R)

DESCRIPTION: Determine worker exposure and apply administrative exposure limits.

TASK: 119-010-03-01 Apply radiation and contamination safety procedures

TASK Candidate determines the following:

- STANDARD:**
- The expected additional exposure for the performed task is 10 -11 mrem.
 - The total exposure of 1995.5 mrem (1995 - 1996 mrem is acceptable) does not exceed the 2000 mrem administrative exposure limit.

TERMINATING CUE: The candidate calculates exposure and returns the handout and briefing sheet to evaluator.

LOCATION:
CLASSROOM

METHOD:
PERFORM

REFERENCES:

VCS-HPP-0153, ADMINISTRATIVE EXPOSURE LIMITS

K/A: 2.3.12 Knowledge of radiological safety principles and procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, or alignment of filters (RO 3.2)

TOOLS: Access to paper or electronic copies of V.C. Summer procedures.
23 NRC A3 (R) Handout 1 containing survey maps of "B" RHR/Spray pump rooms.

23 NRC A3 (R) Handout 2 answer sheet.

VALIDATED TIME: 5 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** NO

PERFORMANCE RATING: (CIRCLE) SAT UNSAT

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The plant is in mode 5 with an outage in progress.
- To support work, you will be required to stand in the “B” RHR pump room inside the contaminated area for 3.5 hours.
- You will stand inside the contaminated area boundary adjacent to the step-off pad where the lowest exposure will be received.
- You have signed NRC Form 4 and your total 2023 dose is 1985 mrem TEDE.

INITIATING CUES:

You are to calculate what your total exposure will be if you perform this activity and whether you will require an extension to any exposure limit.

Assume no exposure other than as stated above.

SHOW ALL WORK ON THE HANDOUT PROVIDED TO YOU.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: 23 NRC A3 (R)

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	1						
Determines the administrative exposure limit.							
STEP STANDARD:							
Determines initial administrative exposure limit of 2000 mrem. (Section 5.1 VCS-HPP-153, ADMINISTRATIVE EXPOSURE LIMITS).							
CUES:							
EVALUATOR CUE: Provide the candidate with a brief using the JPM Briefing Sheet before starting the JPM.							
EVALUATOR CUE: Provide the candidate with 2023 NRC A3 Handout 1 and 2 before starting the JPM.							
EVALUATOR NOTE: This limit may be recalled from memory as long as work shown is correct.							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	2						
Determines expected exposure for the activity to be performed.							
STEP STANDARD:							
Uses 3 mr/hr for the dose rate: $3 \text{ mr/hr} \times 3.5 \text{ hours} = 10.5 \text{ mrem}$ (10 -11 mrem acceptable).							
CUES:							
EVALUATOR NOTE: 3 mr/hr is the dose rate inside the boundary at the lower right entrance to the "B" RHR Pump room on the survey map. Using 6 mr/hr dose rate from the other entrance would make this step UNSAT since this doubles the exposure received.							
COMMENTS:							

JPM: 23 NRC A3 (R)

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	3						
Calculates the total exposure after work is performed and compares to the limit.							
STEP STANDARD:							
Calculates that the total exposure of 1995.5 mrem (1995 - 1996 mrem is acceptable) does not exceed the 2000 mrem administrative exposure limit.							
CUES:							
EVALUATOR NOTE:							
• All work is required to be shown in the Handout provided • 1985 mrem previous exposure + 10.5 mrem for the work activity = 1995.5 mrem. • An Extension will not be required.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM SETUP SHEET

JPM: 23 NRC A3 (R)

IC SET: N/A

INSTRUCTIONS:

Provide a handout containing survey maps for the "B" RHR pump room with exposure at the step-off pads 3 mrem/hr and 6 mrem/hr.

Provide Handout 2 containing the following:

Name: _____ Date: _____

SHOW ALL WORK TO SUPPORT YOUR DETERMINATION BELOW:

Provide access to hard-copy or electronic station procedures.

COMMENTS:

None

REVISION HISTORY:

Rev.1: Modified version of 2019 NRC A3 (RO)

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The plant is in mode 5 with an outage in progress.
- To support work, you will be required to stand in the “B” RHR pump room inside the contaminated area for 3.5 hours.
- You will stand inside the contaminated area boundary adjacent to the step-off pad where the lowest exposure will be received.
- You have signed NRC Form 4 and your total 2023 dose is 1985 mrem TEDE.

INITIATING CUES:

You are to calculate what your total exposure will be if you perform this activity and whether you will require an extension to any exposure limit.

Assume no exposure other than as stated above.

SHOW ALL WORK ON THE HANDOUT PROVIDED TO YOU.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **23 NRC A1-a (S)**

CANDIDATE: _____

EVALUATOR: _____

JPM: 23 NRC A1-a (S)

DESCRIPTION: Determine conditions that must be corrected before starting core offload.

TASK: 341-029-03-02 SUPERVISE REFUELING OPERATIONS AS
REFUELING SUPERVISOR

TASK STANDARD: Candidate identifies the following discrepancies that must be corrected before core offload:

- STP-131.001 has not been performed within the last 100 hours and must be re-performed.
- The Audio Count Rate function must be turned ON.
- Refueling cavity level must be raised to meet the L.C.O limit of 461 feet.

TERMINATING CUE: 23 NRC A1-a (S) handouts 1 and 2 and the briefing sheet are returned to evaluator.

LOCATION:
CLASSROOM

METHOD:
PERFORM

REFERENCES:

V.C. Summer Technical Specifications.

STP-110.001 PRE-CORE ALTERATIONS VERIFICATIONS

GOP-7 CORE REFUELING (MODE 5 TO MODE 6 DEFUEL AND REFUEL TO MODE 6)

K/A: 2.1.40 Knowledge of refueling administrative requirements. (SRO 3.9)

TOOLS: 23 NRC A1-a (S) Handout 1. (Turnover Information)
23 NRC A1-a (S) Handout 2. (Answer Sheet)

VALIDATED TIME: 30 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** NO

PERFORMANCE RATING: (CIRCLE) SAT UNSAT

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The time is now 2300 on 12/15.
- The plant is in MODE 6 for a refueling outage.
- The Reactor Vessel Head is off and upper internals have been removed.
- Personnel are making preparations to begin the core off load.
- Additional turnover information for your use is contained in Handout 1.
- Conditions other than those stated in Handout 1 are as required for beginning the core off load.

INITIATING CUES:

As Shift Manager, determine if core offload can commence at the current time (2300 on 12/15) in accordance with V.C. Summer requirements.

If core offload cannot commence, list all conditions that must be corrected prior to refueling operations on Handout 2.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: 23 NRC A1-a (S)

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	1						
Candidate reviews information provided to determine discrepancies that would prevent moving fuel.							
STEP STANDARD:							
Identifies the following discrepancies that must be corrected before core offload:							
• STP-131.001 has not been performed within the last 100 hours and must be re-performed. • The Audio Count Rate function must be turned ON. • Refueling cavity level must be raised to meet the L.C.O limit of 461 feet.							
CUES:							
EVALUATOR CUE: Provide the candidate with a brief using the JPM Briefing Sheet and 23 NRC A1-a (S) handouts 1 and 2 before starting the JPM.							
EVALUATOR NOTES:							
• Justifications and additional information are contained on the 23 NRC A1-a (S) Key. • Items that are CRITICAL for this step are identified as "<u>MUST BE CORRECTED</u>" on the key. • The turnover items can each be evaluated individually in accordance with Technical Specifications and procedures. STP-110.001, PRE-CORE ALTERATIONS VERIFICATIONS also provides a checklist that covers many of these items but reference to this surveillance is not required to complete the task. • If the candidate identifies an incorrect condition that they wrongly believe would prevent core offload, which would create a <u>new critical step</u>.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM SETUP SHEET

JPM: 23 NRC A1-a (S)

IC SET: N/A

INSTRUCTIONS:

Provide Candidate with 23 NRC A1-a (SRO) Handout 1 and 2.

Handout 1 contains the following:

Turnover information for plant conditions prior to core offload.

Turnover information:

The following events have occurred on the dates and times indicated:

2300 12/10 Reactor Trip Breakers were opened at the beginning of the refueling outage.

1700 12/11 STP-131.001, MANIPULATOR CRANE TEST complete SAT.

1530 12/15 STP-302.054, SOURCE RANGE N31 OPERATIONAL TEST complete SAT.

1900 12/15 STP-302.055, SOURCE RANGE N32 OPERATIONAL TEST complete UNSAT.

2000 12/15 STP-102.001, SOURCE RANGE ANALOG CHANNEL OPERATIONAL TEST N-33 complete SAT.

2230 12/15 Communications verified between Control Room and Refueling SRO.

Time is NOW 2300 on 12/15 with the following conditions present:

- The AUDIO COUNT RATE CHANNEL drawer CHANNEL SELECTOR switch is in OFF.
- Temperature of Component cooling on inlet of Spent Fuel Heat Exchangers is 92°F.
- "A" RHR loop is in service with flow at 2900 gpm.
- "B" RHR loop is out of service but OPERABLE.
- Refueling cavity level indication is at 459 feet.
- Offsite power sources to buses 1DA and 1DB are OPERABLE.
- The "A" and "B" Train ESF sequencers are deenergized.

Handout 2 contains a space for answer justification.

COMMENTS:

None

REVISION HISTORY:

Modified JPM from 2019 A1-b SRO. JPM was modified by changed the temperature of Component Cooling on inlet of Spent Fuel Heat exchanger from 104°F to 92°F. If a candidate tried to recall the correct answers from the original JPM, they would be incorrect and would fail this JPM.

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The time is now 2300 on 12/15.
- The plant is in MODE 6 for a refueling outage.
- The Reactor Vessel Head is off and upper internals have been removed.
- Personnel are making preparations to begin the core off load.
- Additional turnover information for your use is contained in Handout 1.
- Conditions other than those stated in Handout 1 are as required for beginning the core off load.

INITIATING CUES:

As Shift Manager, determine if core offload can commence at the current time (2300 on 12/15) in accordance with V.C. Summer requirements.

If core offload cannot commence, list all conditions that must be corrected prior to refueling operations on Handout 2.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **23 NRC A1-b (S)**

CANDIDATE: _____

EVALUATOR: _____

JPM: 23 NRC A1-b (S)

DESCRIPTION: Review and calculate a Quadrant Power Tilt Ratio

TASK: 015-004-02-01 Perform a Quadrant Power Tilt Ratio (QPTR) Calculation Per STP-108.001.

TASK STANDARD: The candidate determines the following in accordance with STP-108.001:

- Determines max QPTR of 1.03 to 1.04. (This due to potential rounding errors.)
- Determines QPTR Acceptance Criteria is **not** met.
- Determines that power must be lowered to between 91% - 88% within 2 hours.

TERMINATING CUE: The candidate reviews the QPTR calculations and determines that a power reduction between 9% - 12% is required and returns them to the evaluator.

LOCATION:
CLASSROOM

METHOD:
PERFORM

REFERENCES:

STP-108.001, QUADRANT POWER TILT RATIO

V. C. SUMMER UNIT NUMBER ONE, STATION CURVE BOOK

K/A: 2.1.25 Ability to interpret reference materials, such as graphs, curves, and tables (reference potential) (SRO 4.2)

TOOLS: 23 NRC A1-b (S) Handout 1, (QPTR Calculation with errors).
23 NRC A1-b (S) Handout 2, (Tech Spec application)
Access to paper or electronic copies of V.C. Summer procedures
Calculator

VALIDATED TIME: 27 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** NO

PERFORMANCE RATING: (CIRCLE) SAT UNSAT

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- Rx PWR by NI's is 100%.
- Control Bank D position is 226 steps.
- IPCS is not available.
- A Quadrant Power Tilt Ratio calculation was performed.
- The following detector currents and indicated power readings exist on the power range NI's with them selected to 4000 μ A/SLOW:

	Detector A	Detector B	Power
N41	287	282	97%
N42	481	508	99%
N43	313	341	99%
N44	536	505	100%

INITIATING CUES:

The Shift Manager has directed you to perform a review of the Quadrant Power Tilt Ratio calculation that was performed.

A copy of the Calculation will be provided to you. If any errors are identified, line through the errors and insert the correct values using 4 decimal places.

QPTR was calculated 5 minutes prior to the start time of this JPM.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: 23 NRC A1-b (S)

CRITICAL:	<u>YES</u>	SEQUENCED:	NO	SAT		UNSAT																					
JPM STEP	1																										
6.2 a. Record the expected detector current for 100% power for each incore detector on Attachment II, from V.C. Station Curve Book Figure V-3A. (Detector A is the upper detector; Detector B is the lower detector.)																											
STEP STANDARD:																											
Locates detector currents from Station Curve Book and verifies correct data on Attachment II. Determines that an error has been made by the originator and that the N43 Expected Upper Current of 318 entered by the originator is <u>NOT</u> correct. Lines through the erroneous value and writes in 308 as the required Lower Current on Attachment II.																											
CUES:																											
EVALUATOR CUE: Provide the candidate with a brief using the JPM Briefing Sheet before starting the JPM. Provide 23 NRC A1-b (S) Handout 1.																											
EVALUATOR NOTE: Currents on page 115 of 310 of V.C. Station Curve Book. It is not critical for the candidate to display a step by step review of the attachment in the sequence of the steps in the JPM. The critical aspects of this JPM are to identify the errors in the attachment, correct the calculation to determine that Quadrant Power Tilt Ratio requirements are not met, and answer the question provided regarding surveillance requirements. EVALUATOR NOTE: It is critical to identify the error in this step. If the candidate fails to line through this item but later determines that QPTR is not met, the critical aspect of this step is satisfied. If the candidate decides to discontinue his verification at this point, provide a cue to continue to verify the rest of the Attachment prior to reporting the discrepancy.																											
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;"></th> <th style="width: 15%;">Power</th> <th style="width: 15%;">Detector A (μA)</th> <th style="width: 15%;">Detector B (μA)</th> </tr> </thead> <tbody> <tr> <td>N41</td> <td>100%</td> <td>296.0</td> <td>298.5</td> </tr> <tr> <td>N42</td> <td>100%</td> <td>486.1</td> <td>516.3</td> </tr> <tr> <td>N43</td> <td>100%</td> <td>308.0</td> <td>334.4</td> </tr> <tr> <td>N44</td> <td>100%</td> <td>540.1</td> <td>510.5</td> </tr> </tbody> </table>									Power	Detector A (μ A)	Detector B (μ A)	N41	100%	296.0	298.5	N42	100%	486.1	516.3	N43	100%	308.0	334.4	N44	100%	540.1	510.5
	Power	Detector A (μ A)	Detector B (μ A)																								
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N43	100%	308.0	334.4																								
N44	100%	540.1	510.5																								
COMMENTS:																											

JPM: 23 NRC A1-b (S)

CRITICAL:	NO	SEQUENCED:	NO	SAT		UNSAT	
JPM STEP	2						
6.2 b. Perform the following at the Nuclear Instrumentation Panel:							
1) Ensure that all detector range selector switches are selected to 4000μA/SLOW.							
STEP STANDARD:							
Reviews turnover data which says that all detector range selector switches are selected to 4000μA/SLOW.							
CUES:							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	NO	SAT		UNSAT	
JPM STEP	3						
6.2 b. Perform the following at the Nuclear Instrumentation Panel:							
2) Record the actual excore current readings from the digital meters on Attachment II.							
STEP STANDARD:							
Determines that an error has been made by the originator and that the N43 Expected Lower Current of 331 entered by the originator is <u>NOT</u> correct. Lines through the erroneous value and writes in 341 as the required Lower Current on Attachment II.							
CUES:							
EVALUATOR NOTE: It is critical to identify the error in this step. If the candidate fails to line through this item but later determines that QPTR is not met, the critical aspect of this step is satisfied. If the candidate decides to discontinue his verification at this point, provide a cue to continue to verify the rest of the Attachment prior to reporting the discrepancy.							
COMMENTS:							

JPM: 23 NRC A1-b (S)

CRITICAL:	NO	SEQUENCED:	NO	SAT		UNSAT	
JPM STEP	4						
6.2 b. Perform the following at the Nuclear Instrumentation Panel: 3) Record Reactor Power on Attachment II.							
STEP STANDARD:							
Verifies power recoded on Attachment II.							
CUES:							
EVALUATOR NOTE: Based on JPM Briefing sheet, Rx PWR by NI's is 100%.							
COMMENTS:							

CRITICAL:	NO	SEQUENCED:	NO	SAT		UNSAT	
JPM STEP	5						
6.2 c. Record Control Bank D rod position on Attachment II.							
STEP STANDARD:							
Verifies Control Bank D rod position on Attachment II of 226 steps.							
CUES:							
EVALUATOR NOTE: Based on JPM Briefing sheet, all rods are at 226 steps.							
COMMENTS:							

JPM: 23 NRC A1-b (S)

CRITICAL:	<u>YES</u>	SEQUENCED:	NO	SAT		UNSAT	
JPM STEP	6						
6.2 d. Perform the following calculations for upper and lower detectors on Attachment II. 1) Divide actual readings by expected currents to get normalized readings.							
STEP STANDARD:							
Determines that based on previous error with Detector N43 Upper and Lower Currents, new normalized reading calculation will be required. Lines through the erroneous value, writes in 1.0162 as the required N43 Upper Current normalized reading on Attachment II and writes in 1.0197 as the required N43 Lower Current normalized reading on Attachment II.							
CUES:							
EVALUATOR NOTE: It is critical to identify the error in this step. If the candidate fails to line through this item but later determines that QPTR is not met, the critical aspect of this step is satisfied. If the candidate decides to discontinue his verification at this point, provide a cue to continue to verify the rest of the Attachment prior to reporting the discrepancy.							
COMMENTS:							

JPM: 23 NRC A1-b (S)

CRITICAL:	<u>YES</u>	SEQUENCED:	NO	SAT		UNSAT	
JPM STEP	7						
6.2 d. Perform the following calculations for upper and lower detectors on Attachment II. 2) Divide the sum of the normalized readings by the number of detectors to obtain average normalized reading.							
STEP STANDARD:							
Determines that based on previous error with Detector N43 Upper and Lower Currents, new average normalized reading calculations will be required.							
CUES:							
EVALUATOR NOTE: It is critical to identify the error in this step. If the candidate fails to line through this item but later determines that QPTR is not met, the critical aspect of this step is satisfied. If the candidate decides to discontinue his verification at this point, provide a cue to continue to verify the rest of the Attachment prior to reporting the discrepancy.							
COMMENTS:							

JPM: 23 NRC A1-b (S)

CRITICAL:	<u>YES</u>	SEQUENCED:	NO	SAT		UNSAT	

JPM STEP	8

6.2 d. Perform the following calculations for upper and lower detectors on Attachment II.

3) Divide the highest normalized reading by the average normalized reading to obtain quadrant power tilt ratio.

STEP STANDARD:

Determines that based on previous error with Detector N43 Upper and Lower Currents, new quadrant power tilt ratio calculation will be required.

CUES:

EVALUATOR NOTE: It is critical to identify the error in this step. If the candidate fails to line through this item but later determines that QPTR is not met, the critical aspect of this step is satisfied. If the candidate decides to discontinue his verification at this point, provide a cue to continue to verify the rest of the Attachment prior to reporting the discrepancy.

COMMENTS:

CRITICAL:	<u>YES</u>	SEQUENCED:	NO	SAT		UNSAT	

JPM STEP	9

6.2 d. Perform the following calculations for upper and lower detectors on Attachment II.

4) Record the larger of the upper and lower quadrant power tilt ratio.

STEP STANDARD:

Determines that based on previous error with Detector N43 Upper and Lower Currents, new maximum quadrant power tilt ratio calculation will be required.

CUES:

EVALUATOR NOTE: It is critical to identify the error in this step. If the candidate fails to line through this item but later determines that QPTR is not met, the critical aspect of this step is satisfied. If the candidate decides to discontinue his verification at this point, provide a cue to continue to verify the rest of the Attachment prior to reporting the discrepancy.

COMMENTS:

JPM: 23 NRC A1-b (S)

CRITICAL:	<u>YES</u>	SEQUENCED:	NO	SAT		UNSAT	
JPM STEP	10						
6.2 e. Complete Attachment I and attach Attachments I and II to the STTS sheet.							
STEP STANDARD:							
Determines maximum quadrant power tilt ratio is above 1.02 and records Acceptance Criteria is not met on Attachment I.							
CUES:							
EVALUATOR CUE: If candidate asks for STTS sheet, inform him you will attach Attachment I and II after they are completed.							
EVALUATOR NOTE: It is critical that "Acceptance Criteria met" is <u>NOT</u> signed on Attachment I since it is not met.							
EVALUATOR NOTE: Maximum quadrant power tilt ratio is from lower detector; value must be between 1.03 and 1.04 to satisfy the critical step.							
COMMENTS:							

JPM: 23 NRC A1-b (S)

CRITICAL:	<u>YES</u>	SEQUENCED:	NO	SAT		UNSAT	
JPM STEP	11						
Answers the questions provided.							
1. What actions must be performed assuming QPTR remains as calculated for the next 2 hours?							
STEP STANDARD:							
Answers:							
Determines that action "a." of TS 3.2.4 applies.							
a. With the QUADRANT POWER TILT RATIO determined to exceed 1.02 but less than or equal to 1.09:							
1. Calculate the QUADRANT POWER TILT RATIO at least once per hour until either:							
a) The QUADRANT POWER TILT RATIO is reduced to within its limit, or							
b) THERMAL POWER Is reduced to less than 50% of RATED THERMAL POWER.							
2. Within 2 hours either:							
a) Reduce the QUADRANT POWER TILT RATIO to within its limit, or							
b) Reduce THERMAL POWER at least 3% from RATED THERMAL POWER for each 1% of Indicated QUADRANT POWER TILT RATIO in excess of 1.0 and similarly reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours.							
CUES:							
EVALUATOR CUE: After the candidate reports their Quadrant Power Tilt Ratio, hand the candidate the 23 NRC A1-b (S) Handout 2 and direct the candidate to answer the question.							
EVALUATOR NOTE:							
The Examinee may call up the GTP-702, SURVEILLANCE ACTIVITY TRACKING AND TRIGGERING, Attachments required to track compliance with TS. The applicable attachments are VI.E, VI.F.							
The correct answer should be between 91% and 88%, this power level is a potential Tech Spec interpretation that could involve Licensing.							
1. Lower power to = $100\% - ((\text{Max QPTR} - 1) \times 300)$ within 2 hours. Thus if their maximum QPTR is 1.03 then it should be 91%, but if their maximum QPTR is 1.04 then it should be 88%.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM: 23 NRC A1-b (S)

JPM SETUP SHEET

JPM: 23 NRC A1-b (S)

IC SET: N/A

INSTRUCTIONS:

Candidate will be handed the briefing sheet and only Handout 1 to begin the JPM.

After the candidate completes the recalculation of QPTR and records the results, the candidate will be given Handout 2 to answer follow-up question.

COMMENTS:

None

REVISION HISTORY:

Modified JPM because of all the numbers changing with the curve book changes.

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- Rx PWR by NI's is 100%.
- Control Bank D position is 226 steps.
- IPCS is not available.
- A Quadrant Power Tilt Ratio calculation was performed.
- The following detector currents and indicated power readings exist on the power range NI's with them selected to 4000 μ A/SLOW:

	Detector A	Detector B	Power
N41	287	282	97%
N42	481	508	99%
N43	313	341	99%
N44	536	505	100%

INITIATING CUES:

The Shift Manager has directed you to perform a review of the Quadrant Power Tilt Ratio calculation that was performed.

A copy of the Calculation will be provided to you. If any errors are identified, line through the errors and insert the correct values using 4 decimal places.

QPTR was calculated 5 minutes prior to the start time of this JPM.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **23 NRC A2 (S)**

CANDIDATE: _____

EVALUATOR: _____

JPM: 23 NRC A2 (S)

DESCRIPTION: Review RHR valve surveillance.

TASK: 342-026-03-02 Review results of surveillance tests (SAP-134, GTP-301, AND GTP-302)

TASK STANDARD: Candidate identifies the following items in accordance with STP-205.004:

- Identifies that the stroke time for XVG08706B-RH is less than the MINIMUM limiting stroke time.
- Identifies that the stroke time for XVG08809B-SI is greater than the MAXIMUM limiting stroke time.
- Determines that acceptance criteria are not met, and either determines that one retest can be performed prior to declaring inoperability OR immediately declared inoperable.

TERMINATING CUE: The candidate returns JPM briefing sheet and Handout materials provided to the examiner.

LOCATION:
CLASSROOM

METHOD:
PERFORM

REFERENCES:

STP-205.004 RHR PUMP AND VALVE OPERABILITY TEST

K/A: 2.2.12 Knowledge of surveillance procedures. (SRO 4.1)

TOOLS: 23 NRC A2 (S) Handout 1: STP 205.004 and attached data sheets
23 NRC A2 Handout 2: Answer sheet

VALIDATED TIME: 42 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** NO

PERFORMANCE RATING: (CIRCLE)

SAT

UNSAT

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The Plant is in MODE 1 at 100% power.
- STP-205.004, RHR PUMP AND VALVE OPERABILITY has just been completed on "B" RHR train valves and handed to the Unit Supervisor for review.

INITIATING CUES:

As the Unit Supervisor, review all entries made by the performers in STP-205.004 Attachments II.B and III.B (23 NRC A2 (S) Handout 1).

Record the required information as indicated on 23 NRC A2 (S) Handout 2 (Answer sheet)

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: 23 NRC A2 (S)

CRITICAL:	NO	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	1						
Identifies that FCV-605B was found in the incorrect position as identified on Attachment IIB.							
STEP STANDARD:							
Identifies that FCV-605B was found in the incorrect position as identified on Attachment IIB.							
CUES:							
EVALUATOR CUE: Provide the candidate with a brief using the JPM Briefing Sheet before starting the JPM.							
EVALUATOR CUE: Ensure that the Examinee has a copy of 23 NRCA2 (S) Handout 1 and Handout 2.							
EVALUATOR NOTE: See 23 NRC A2 (S) - Key.							
EVALUATOR NOTE: It is NOT critical to identify FCV-605B OPEN under the as found column of Attachment IIB because STP-205.004 directs those components be returned to the required position after the test is complete. If the candidate does not note the discrepancy, it is evaluated as a non-critical performance error.							
COMMENTS:							

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	2						
Determines that the Test Data does not meet the acceptance criteria of STP-205.004 for XVG08706B-RH.							
STEP STANDARD:							
Identifies that the stroke time for XVG08706B-RH is less than the MINIMUM limiting stroke time. The candidate enters the deficiency under Question 1 and the required action under Question 2 of 23 NRC A2 (S) HO 2.							
CUES:							
EVALUATOR NOTE: Determines that acceptance criteria are <u>not</u> met, and either determines that one retest can be performed prior to declaring inoperability OR immediately declared inoperable.							
COMMENTS:							

JPM: 23 NRC A2 (S)

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	3						
Determines that the Test Data does not meet the acceptance criteria of STP-205.004 for XVG08809B-SI.							
STEP STANDARD:							
Identifies that the stroke time for XVG08809B-SI is greater than the MAXIMUM limiting stroke time. The candidate enters the deficiency under Question 1 and the required action under Question 2 of 23 NRC A2 (S) HO 2.							
CUES:							
EVALUATOR NOTE: Determines that acceptance criteria are <u>not</u> met, and either determines that one retest can be performed prior to declaring inoperability OR immediately declared inoperable.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM SETUP SHEET

JPM: 23 NRC A2 (S)

IC SET: N/A

INSTRUCTIONS:

Provide candidate with briefing sheet and copies of 23 NRC A2 (S) Handouts 1 and 2.

Provide Handout 2 containing the following:

Name _____ Date _____

1. Were there any discrepancies in the data recorded during your review of the STP-205.004 surveillance? Explain below:
2. If you identified a discrepancy in question 1, is there a requirement to declare any component inoperable in the current system status? Explain below: Provide access to hard-copy or electronic station procedures.

COMMENTS:

None

REVISION HISTORY:

Bank 2021 Audit A2 (S)

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The Plant is in MODE 1 at 100% power.
- STP-205.004, RHR PUMP AND VALVE OPERABILITY has just been completed on "B" RHR train valves and handed to the Unit Supervisor for review.

INITIATING CUES:

As the Unit Supervisor, review all entries made by the performers in STP-205.004 Attachments II.B and III.B (23 NRC A2 (S) Handout 1).

Record the required information as indicated on 23 NRC A2 (S) Handout 2 (Answer sheet)

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **23 NRC A3 (S)**

CANDIDATE: _____

EVALUATOR: _____

JPM: 23 NRC A3 (S)

DESCRIPTION: Review a release permit prior to approval/release.

TASK: 341-012-03-02 Approve radioactive waste discharge/release permits (HPP-0709 and HPP-0710)

TASK STANDARD: The candidate identifies the following errors:

- More than 24 hours have passed since the Gas Decay Tank was sampled.
- BYPASS is incorrectly entered for RM-A3 and RM-A10.
- Wind speed is not sufficient for release due to the 10m wind speed.

TERMINATING CUE: The candidate returns JPM briefing sheet and Handout materials provided to the examiner.

LOCATION:
CLASSROOM

METHOD:
PERFORM

REFERENCES:

HPP-0709 Sampling and Release of Radioactive Gaseous Effluents
SOP-119 WASTE GAS PROCESSING

K/A: 2.3.6 Ability to approve liquid or gaseous release permits (SRO 3.8)

TOOLS: Copies of 23 NRC A3 (S) Handouts 1, 2 and 3
Electronic or Hardcopy versions of station procedures

VALIDATED TIME: 8 Mins. **TIME CRITICAL:** NO **ALTERNATE PATH:** NO

PERFORMANCE RATING: (CIRCLE) SAT UNSAT

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The plant is in MODE 1.
- The AB Ventilation System is operating normally.
- A release of Gas Decay Tank G is to occur during the next shift.
- The DATE and TIME is now 0830, 10/22/23.

INITIATING CUES:

You are to review HPP-0709, ATTACHMENT I, GASEOUS WASTE RELEASE PERMIT (GWRP) and approve the GWRP by signing it, if the release can be commenced.

If the release is not allowed to commence, circle all discrepancies that prevent release and explain them on the worksheet provided.

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: 23 NRC A3 (S)

CRITICAL:	<u>YES</u>	SEQUENCED:	NO	SAT		UNSAT	
JPM STEP	1						
Reviews the SOP-119, ATTACHMENT VA, GASEOUS WASTE RELEASE WORKSHEET-CONTROL ROOM and the HPP-0709, ATTACHMENT I, GASEOUS WASTE RELEASE PERMIT (GWRP).							
STEP STANDARD:							
Notes and records all the following discrepancies and does not sign the GWRP:							
• More than 24 hours have passed since the Gas Decay Tank was sampled. (HPP-0709, 4.16) • Notes that BYPASS is incorrectly entered for RM-A3 and RM-A10. (SOP-119, Attachment VA, step 3.b) • Notes that wind speed is not sufficient for release due to the 10m wind speed being less than the required 6.6 mph for stability class E. (SOP-119 Attachment VA, page 5 of 5)							
CUES:							
EVALUATOR CUES:							
• Provide the candidate with a brief using the JPM Briefing Sheet before starting the JPM. • Provide candidate with the 23 NRC A3 (S) Handouts 1, 2 and 3.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM: 23 NRC A3 (S)

JPM SETUP SHEET

JPM: 23 NRC A3 (S)

IC SET: N/A

INSTRUCTIONS:

Ensure that current procedures are available in hard copy or electronically.

Provide candidates with the following:

- Partially completed GWRP and SOP-119, Att. VA (23 NRC A3 (S) Handout 1)
- Answer sheet (23 NRC A3 (S) Handout 2)
- A screen shot of IPCS METDATA screen (23 NRC A3 (S) Handout 3)

COMMENTS:

None

REVISION HISTORY:

Bank 2021 NRC SRO A3 JPM.

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

- The plant is in MODE 1.
- The AB Ventilation System is operating normally.
- A release of Gas Decay Tank G is to occur during the next shift.
- The DATE and TIME is now 0830, 10/22/23.

INITIATING CUES:

You are to review HPP-0709, ATTACHMENT I, GASEOUS WASTE RELEASE PERMIT (GWRP) and approve the GWRP by signing it, if the release can be commenced.

If the release is not allowed to commence, circle all discrepancies that prevent release and explain them on the worksheet provided.

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.

V.C. SUMMER NUCLEAR STATION
JOB PERFORMANCE MEASURE

JPM NO: **23 NRC A4 (S)**

CANDIDATE: _____

EVALUATOR: _____

JPM: 23 NRC A4 (S)

DESCRIPTION: Classify an emergency event in accordance with VCS-EPP-0001.

TASK: 343-063-03-02 Given several events, determine the Emergency Action level for each event per VCS-EPP-00001.

TASK STANDARD: Candidate classifies a FA1.1 Alert within 15 minutes based on the following:

- An automatic or manual ECCS (SI) actuation required by EITHER:
 - o UNISOLABLE RCS leakage
 - o SG tube RUPTURE

TERMINATING CUE: Candidate has finished classifying the event.

LOCATION:
CLASSROOM

METHOD:
PERFORM

REFERENCES:

VCS-EPP-0001 CLASSIFICATION OF EMERGENCIES.

K/A: 2.4.41 Knowledge of the emergency action level thresholds and classifications (SRO Only). (SRO 4.6)

TOOLS: 23 NRC A4 (S) HO 1 (Answer sheet)
Hardcopies of hardboard EAL Classification Matrices
Electronic or hardcopy station procedures

VALIDATED TIME: 15 Mins. **TIME CRITICAL:** YES **ALTERNATE PATH:** NO

PERFORMANCE RATING: (CIRCLE) SAT UNSAT

TIME START: _____ **TIME FINISH:** _____ **PERFORMANCE TIME:** _____

CANDIDATE: _____

EVALUATOR: _____

INSTRUCTIONS TO OPERATOR

READ TO OPERATOR:

Before starting, I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues.

I will provide the necessary tools with which to perform this task.

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

Given the following plant conditions:

- 100% power initially.
- AOP-112.2, ARG-3, STEAM GENERATOR TUBE LEAK NOT REQUIRING SI was in progress for a small tube leak on the “A” Steam Generator.
- An automatic Reactor Trip and Safety Injection occurred.
- EOP-1.0, E-0 REACTOR TRIP OR SAFETY INJECTION is in progress.
- **RB** Pressure is 35 psig and slowly decreasing.
- **RCS** pressure is 35 psig and slowly decreasing.
- No EFW pumps are running.
- Steam Generator Narrow Range levels are as follows:
 - o “A” SG level is 20% and decreasing.
 - o “B” SG level is 20% and stable.
 - o “C” SG level is 20% and stable.

INITIATING CUES:

You are directed to classify the event based on the above conditions.

- Do not use Shift Manager Judgment as the basis for your classification.
- The start time for classification will be the time that the Evaluator tells you to begin.
- When you have determined the classification, write the classification and the time you completed the classification on Handout 1 and inform the Evaluator.
- This is a **TIME CRITICAL JPM!**

HAND JPM BRIEFING SHEET TO OPERATOR AT THIS TIME!

JPM: 23 NRC A4 (S)

CRITICAL:	<u>YES</u>	SEQUENCED:	YES	SAT		UNSAT	
JPM STEP	1						
Candidate Evaluates plant conditions and the EALs to declare an emergency that is timely and accurate.							
STEP STANDARD:							
Classifies the event as an FA1.1 ALERT based on the following:							
• An automatic or manual ECCS (SI) actuation required by EITHER: - o UNISOLABLE RCS leakage - o SG tube RUPTURE							
CUES:							
EVALUATOR CUE:							
• Ensure that the candidate has the following: - o 23 NRC A4 (S) HO1 (Answer Sheet) - o EAL Classification matrices in hardcopy or hardboards • Instruct the candidates to write their name and the date on Handout 1 prior to providing the initial conditions brief. • Provide the candidate with a brief using the JPM Briefing Sheet before starting the JPM. • Instruct the candidates to write the time of the EAL declaration and the EAL declaration on Handout 1 and raise their hand. - o You will then immediately pick it up. • When ready to begin, announce the start time (T-0) based on the classroom clock. Record this time as T-0 for evaluation of the declaration time.							
EVALUATOR NOTE: Examinee has 15 minutes from T-0 to determine the event classification.							
COMMENTS:							

THE JPM IS TERMINATED AT THIS STEP.

JPM: 23 NRC A4 (S)

JPM SETUP SHEET

JPM: 23 NRC A4 (S)

IC SET: N/A

INSTRUCTIONS:

After the candidate brief, provide copies of 23 NRC A4 (S) Handout1

COMMENTS:

None

REVISION HISTORY:

This is a new JPM for the 2023 NRC Exam.

JPM BRIEFING SHEET

SAFETY CONSIDERATIONS: NONE

INITIAL CONDITIONS:

Given the following plant conditions:

- 100% power initially.
- AOP-112.1, STEAM GENERATOR TUBE LEAK NOT REQUIRING SI was in progress for a small tube leak on the "A" Steam Generator.
- An automatic Reactor Trip and Safety Injection occurred.
- EOP-1.0, E-0 REACTOR TRIP OR SAFETY INJECTION is in progress.
- **RB** Pressure is 35 psig and slowly decreasing.
- **RCS** pressure is 35 psig and slowly decreasing.
- No EFW pumps are running.
- Steam Generator Narrow Range levels are as follows:
- "A" SG level is 20% and decreasing.
- "B" SG level is 20% and stable.
- "C" SG level is 20% and stable.

INITIATING CUES:

You are directed to classify the event based on the above conditions.

- Do not use Shift Manager Judgment as the basis for your classification.
- The start time for classification will be the time that the Evaluator tells you when told to begin.
- When you have determined the classification, write the classification and the time you completed the classification on Handout 1 and inform the Evaluator.
- This is a **TIME CRITICAL JPM!**

Hand this paper back to your Evaluator when you feel that you have satisfactorily completed the assigned task.