Facility:	Sequoyah		Scenario No.:	1	Op Test No.: NRC
Examiners:			Operators:		
Initial Conditions:	100% RTP				
Turnover:	Maintain current conditions; currently in 0-GO-5 Section 5.2, At Power Conditions				
Target CTs:	Isolate Faulted Steam Generator Prior to Exiting E-2				
	Isolate AFW to the faulted SG within 10 minutes after a steamline break.				

Event No.	Malf. No.	Event Type*	Event Description
1 T+0	RX02D1	I-RO SRO-TS	RC Loop #4 T-cold Fails High
2 T+10	MS09	C-BOP	Gland Seal Steam Regulator, 1-PCV-47-183 fails closed
3 T+20	ZAIHIC6281A	I-RO	CVCS Let Down Pressure Control Valve Fails Closed (1-PCV-62-83)
4 T+30	CN09 set yp_cn11b=-1	C-BOP	Loss of Condenser Vacuum- Leak w/ standby Condenser Vacuum Pump failing to start automatically
5 T+30	N/A	R-RO SRO	MT Rapid Load Reduction due to Condenser Vacuum Leak.
6 T+45	TU02A TU02B		Turbine High Vibration (≤14 mills sustained- no trip required)
7 T+45	set yp_tc17d=-1	SRO-TS	#4 MT Stop Valve indication loss
8 T+50	N/A	M-All	Turbine High Vibration (Turbine Trip demand condition)
9 T+50	MS12A	C-BOP	Loop #1 SG Atmospheric Relief Valve sticks open
10 T+50	RP13C [pre-insert]	C-RO	MFW Isolation Fails to Auto Actuate (manual operator action required)

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Scenario 1 Summary

The crew will assume the shift with the unit in MODE 1, 100% RTP. 0-GO-5 Section 5.2, At Power Conditions is the procedure in effect.

Following completion of crew turnover and at the direction of the Lead Examiner, RC Loop #4 T-cold will fail high. The crew will respond using alarm response procedures (ARPs) 1-AR-M6A, A-2 and C-2 directing entry into AOP-I.02, RCS Loop RTD Instrument Malfunction, Section 2.0 and Appendix D for the Loop #4 temperature instrument failure. The crew may enter AOP-C.01, Section 2.1, Uncontrolled Rod Bank Movement for the unexpected rod motion. The SRO will identify Tech Spec actions: 3.3.1.1 Table 3.3-1, functional units 7 and 8 Action 6, and 14c Action 10; 3.3.2.1, functional units 6.c.i.c and 6.c.ii.c both Action 37.

When the plant is stable, at Lead Examiner direction, initiate the next event, Gland Seal Steam Regulator, 1-PCV-47-183 fails closed, challenging condenser vacuum. The standby condenser vacuum pump may be required but will not start automatically, requiring manual action. The crew will respond using ARP 1-AR-M2A A-5 and, as necessary, AOP-S.02, Loss of Condenser Vacuum.

When the plant is stable, at Lead Examiner direction, initiate the next event, CVCS Letdown Pressure Control Valve Fails Closed (1-PCV-62-81). The crew will control letdown pressure manually according to alarm response procedure, 1-AR-M6C, B-4. The crew may decide to isolate Letdown and place Excess Letdown in service.

When Letdown is stable and controlled or Excess Letdown in service, at Lead Examiner direction, initiate Loss of Condenser Vacuum- Leak. If returned to standby, condenser vacuum pump will not start automatically, again requiring manual action. The crew will respond alarms, 1-AR-M2C C-6 and re-enter AOP-S.02, Loss of Condenser Vacuum. At step 9, the crew should implement AOP-C.03, Rapid Shutdown or Load Reduction to mitigate the vacuum loss.

During the vacuum leak/turbine load reduction, Main Turbine High Vibrations will develop, ARP for annunciator 1-AR-M2A D-4 will be applied. Vibration magnitude will temporarily stabilize at less than the turbine trip value. At this time #4 MT Stop Valve indication (RPS input) will be lost. The crew will respond using the ARP 1-AR-M6B E-5 which directs entry into AOP-I.07, Turbine Auto Stop Oil Pressure Instrument or Turbine Stop Valve Limit Switch Malfunction; Sections 2.0 & 2.3 apply and will address the indication failure (while the crew continues in AOP-C.03 for the load reduction). The SRO will identify Tech Spec LCO 3.3.1.1, table 3.3-1, functional unit 18B Action 7 as applicable.

Following TS identification, at the Lead Examiner direction, the turbine vibration severity will increase resulting in a turbine trip demand condition as described in ARP. The crew will manually trip the reactor.

Following the Reactor Trip, #1 SG Atmospheric Relief Valve will stick open causing a steam leak. The crew will enter E-0, Reactor Trip or SI to stabilize the plant. The crew will proceed through to E-2, Faulted SG Isolation, to stabilize the plant by attempting to isolate the steam leak and transition to E-1, Loss of Rx or Secondary Coolant, to determine if SI termination criteria are met.

Additionally, automatic Feedwater Isolation fails requiring manual isolation actions prior to exiting E-2 and isolate AFW to the faulted SG within 10 minutes to meet time critical actions to meet successful scenario completion.

EOP flow: E-0 – E-2 – E-1 (ES-1.1)

The scenario may be terminated as directed by the Lead Examiner upon completion of E-1 Step 7, SI termination determination.

PSA significant task: Isolate Faulted Steam Generator
Isolate AFW to the faulted SG within 10 minutes after a steamline break.
PSA significant component failure: Feedwater Isolation automatic actuation
SG #1 Atmospheric Relief Valve

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
Simulator IC	**IC-30**	**100%, MOL ~8,000 MWD/MTU** **CB 'D' Rods @ 222 steps, all others @ 228 steps;** **[B] = 850 ppm; Ba Blender setting: 21%** **Xe/Sm @ *equilibrium*** ***Console Operator actions: Place simulator in run and perform the following:*** • **Place the MODE 1 sign on 1-M-4** • **Place Train Week A sign**
MFs, RFs, ORs are active when the SCN file is loaded.	**IMF RP13C f:1**	**MFW Isolation Failure**
	set yp_cn11b=-1	**1B Condenser Vacuum Pump failing to start automatically;**
1.	**IMF RX02D1 f:630 r:120 k:1**	**RC Loop #4 T-cold Fails High** *Support staff report: When MSS is contacted to trip bistables, inform the crew that IMs will report to the MCR in ~25 minutes.*
2.	**IMF MS09 f:1 k:2**	**Gland Seal Steam Regulator, 1-PCV-47-183 fails closed;** *Support staff report: If dispatched, after ~5 minutes, the TB AUO reports 1-PCV-47-183 HP Steam Seal Regulator appears to be closed by local observation*
3.	**IOR ZAIHIC6281A f:0 r:60 k:3**	**CVCS LD HX Pressure Controller PCV Fails to control in AUTO (1-PCV-62-81)** *Support staff report: If dispatched, after 5 minute, the AB AUO reports the valve is [position from MCB], no apparent problems or damage identified/observed locally.*
4.	**IMF CN09 f:0.03 r:60 k:4** **set yp_cn11b=-1 [pre-insert]**	**Loss of Condenser Vacuum- Leak** [MMF CN09 f:0.08 r:180; Once Stby CVP is started and MT load reduction initiated, MMF CN09 f:0.03 r:180 to maintain Condenser pressure <2.7 psia, MT Trip stpt] **1B Condenser Vacuum Pump fails to start automatically;** *Support staff report: When personnel are dispatched, wait ~5 minutes and report that the vacuum breaker flange is leaking.* *If requested, report the 1B Condenser Vacuum Pump is running; post start-up checks are as expected; and MT gland sealing steam regulator is closed by local observation.;*

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
5.	**N/A**	**MT Rapid Load Reduction in response to Condenser Vacuum Leak** *Support staff report: If requested, report that the MSS has been contacted to get maintenance support.*
6.	**IMF TU02A f:23 r:60 k:6** **IMF TU02B f:21.5 r:50 k:6**	**Turbine High Vibration** (#1&2 bearings- ≤14 mills sustained- no trip required); *Support staff report: Wait ~5 minutes and report as TB AUO that vibration is evident in the vicinity of the MT HP end; state personnel safety for not approaching MT.*
During the load reduction, MT High Vibrations will develop; Vibration magnitude will temporarily stabilize at less than the turbine trip value and #4 MT Stop Valve indication (RPS input) will be lost; this is a Tech Spec call for the SRO.		
7.	**set yp_tc17d=-1**	**#4 MT Stop Valve indication loss**; *Support staff report: If requested, wait ~2 minutes and report as TB AUO that "Turbine Stop valve #4 is fully open."*
8.	**MMF TU02A f:65 r:30** **MMF TU02B f:62 r:35**	**Modify Turbine High Vibration** (≥15.5 mills sustained- MT trip required) *Support staff report: if previously dispatched, wait ~2-3 minutes (5 minutes if not) and report as TB AUO that vibration is evident in the vicinity of the MT HP end; state personnel safety for not approaching MT.*
9.	**IMF MS12A f:100 d:60 e:1**	**Loop #1 SG Atmospheric Relief Valve fails open;** (*Conditions resulting in SI Actuation-manual)* *Support staff report: If requested by the crew, Security Officer or OS AUO reports steam coming from the top of the West Valve Vault (i.e.: S/Gs #1 or #4).*
10.	**IMF RP13C** **[pre-insert]**	**FW Isolation Fails to Auto Actuate** (manual operator action required); *Support staff report: none*
Termination Criteria:		**Complete E-1 Step 7, MONITOR SI termination criteria at the Lead Examiner direction.**

Op Test No.:	NRC	Scenario #	1	Event #	1	Page	1	of	47
Event Description:	RC Loop #4 T-cold instrument fails high								

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 1		
Indications available: **Annunciators:** • **XA-55-5A Window A-6 "TS-68-2M/N RC LOOPS T AVG /AUCT T AVG DEVN HIGH-LOW"** • **B-6 "TS-68-2A/B REACTOR COOLANT LOOPSΔT DEVN HIGH-LOW** • **E-7 "NARROW RANGE RTD FAILURE LOOP 4"** • **XA-55-6A Window A-2 "TS-68-2D REAC COOL LOOPS OVERTEMP ΔT TRIP ALERT"** • **B-2 "TS-68-2G REAC COOL LOOPS OVERPOWER ΔT TRIP ALERT** • **C-2 "TS-68-2E OVERTEMP ΔT AUTO TURB RNBK BLK C-3 ROD WTD"** • **D-2 "TS-68-2J REACTOR COOLANT LOPS LO LO TAVG"** **1-M-4 indications:** • **1-XI-1-103A/B, Steam Dumps Armed white light illuminated** **1-M-5 indications:** • **RCS Lp 4 Indicator 1-TI-68-67E indicates: varies, goes down then up;** • **1-TI-68-67D indicates: varies, goes down then up;** • **1-TI-68-67A indicates: varies, goes down then up;** • **1-TI-68-67B indicates: varies, goes down then up;** • **1-XX-55-5, Reactor Trip Status Panel "PROT. SET 4 TROUBLE" Status light**		
T = 0	CREW	Respond in accordance with Alarm Response Procedures
	RO	Diagnose failure and place rods in manual to stop rod motion Refer to Annunciator Response Procedure
	SRO	SRO may use or refer to AOP-I.02, RCS Loop RTD Instrument Malfunction
	SRO	Enter and direct action of AOP-C.01 Section 2.1
	RO	1. STOP uncontrolled rod motion: a. PLACE rod control in MAN. b. CHECK rod motion STOPPED.
CAUTION: Control Rods should NOT be manually withdrawn during a plant transient.		
	CREW	2. CHECK for plant transient: a. CHECK reactor power and T-avg STABLE.

Op Test No.: NRC	Scenario # 1	Event # 1	Page 2 of 47
Event Description: RC Loop #4 T-cold instrument fails high			

Time	Position	Applicant's Actions or Behavior
	RO	3. CHECK for instrumentation malfunction: a. CHECK nuclear instrumentation OPERABLE. b. CHECK RCS RTDs OPERABLE. ***(RNO Required)***
	SRO	**RNO:** b. GO TO AOP-I.02, RCS Loop RTD Instrument Malfunction.
	SRO	SRO may use or refer to AOP-I-02, RCS Loop RTD Instrument Malfunction, Section 2.0:
		1. PLACE rod control in MANUAL.
CAUTION: Control Rods should NOT be manually withdrawn during a plant transient.		
NOTE: Tavg must be within 1°F of Tref when restoring automatic rod control.		
	CREW	2. RESTORE Tavg as necessary USING one of the following: • Manual rod control **(normal method selected)** OR • RCS boration OR • Turbine load reduction
	RO	3. CHECK loop 1 temperature channel OPERABLE.
	RO	4. CHECK loop 2 temperature channel OPERABLE.
	RO	5. CHECK loop 3 temperature channel OPERABLE.
	SRO/RO	6. CHECK loop 4 temperature channel OPERABLE. ***(RNO Required)***
	RO	**RNO;** At SRO direction: PERFORM the following: a. PULL-TO-DEFEAT TAVG CHANNEL DEFEAT switch XS-68-2M to LOOP 4 b. PULL-TO-DEFEAT **ΔT** CHANNEL DEFEAT switch XS-68-2D to LOOP 4 c. PLACE LOOP TAVG-**ΔT** REC/SEL switch XS-68-2B in LOOP 1, 2, or 3

Op Test No.: NRC Scenario # 1 Event # 1 Page 3 of 47

Event Description: RC Loop #4 T-cold instrument fails high

Time	Position	Applicant's Actions or Behavior
	SRO	7. EVALUATE the following Tech Specs for applicability: • 3.3.1.1 (3.3.1), Reactor Trip System Instrumentation Action 6 (From Table 3.3-1 Items 7 & 8) Applies – Trip inop Bistables w/i 6 Hrs. AND Action 10 (From Table 3.3-1 Item 14c) Applies – within 6 hours, for the affected protection set, the Trip Time Delays (TS and TM) threshold power level for zero seconds time delay is adjusted to 0% RTP • 3.3.2.1 (3.3.2), Engineered Safety Feature Actuation System Instrumentation Action 37 (From Table 3.3-3 Items 6.c.i.c & 6.c.ii.c) Applies - within 6 hours, for the affected protection set, the Trip Time Delays (TS and TM) threshold power level for zero seconds time delay is adjusted to 0% RTP.
	NOTE: If performing AOP in conjunction with AOP-I.11 for an Eagle LCP failure,...[N/A for this event]	
	SRO/ CREW	8. NOTIFY MIG to remove failed TAVG-Δ**T** loop from service USING appropriate Appendix: RCS LOOP / INSTRUMENT LOOP NUMBER / PROT CH / APPENDIX 1 / T-68-2 (T-411/412) / I / A 2 / T-68-25 (T-421/422) / II / B 3 / T-68-44 (T-431/432) / III / C 4 / T-68-67 (T-441/442) / IV / D *(Appendix D will apply)*
	RO/ SRO	9. IF automatic rod control is available, THEN RESTORE rod control to AUTO USING 0-SO-85-1.
	SRO	10. GO TO appropriate plant procedure.

Op Test No.:	NRC	Scenario #	1	Event #	1	Page	4	of	47
Event Description:	RC Loop #4 T-cold instrument fails high								

Time	Position	Applicant's Actions or Behavior
Evaluator Note: The following CREW Brief and Notification actions are not contained in the procedure.		
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead Examiner may cue next event when Technical Specifications are addressed.		

Op Test No.:	NRC	Scenario #	1	Event #	2	Page	5	of	47
Event Description:	Gland Seal Steam Regulator, 1-PCV-47-183 fails closed								

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 2		
Indications available: • **Annunciator XA-55-2A Window A-5 "PIS-47-196 TURBINE SEAL STEAM PRESS. ABNORMAL"** • **Indicator 1-PI-47-189 indicates ≈0 psig** • **Indicator 1-PI-47-187 indicates150 psig** **Significant Resultant Alarms/Indications:** • **Annunciator XA-55-2C Window C-6 "PS-2-7B CONDENSER VACUUM LOW" @2.7 psia increasing** • **Recorder/Indicator 1-P/TR-2-2 indicates condenser pressure trending up**		
T + 10	BOP	Respond in accordance with Alarm Response Procedures
	BOP	BOP refers to ARP A-5 "PIS-47-196 TURBINE SEAL STEAM PRESS. ABNORMAL" Corrective Actions:
	BOP	[1] CHECK [1-PI-47-187] on 1-M-2 to verify header pressure (normally expected value: ≈125 psig).
	BOP	[2] IF header pressure low, THEN: **OPEN [1-FCV-47-181]** steam seal bypass to restore header pressure USING 1-SO-2-9, *Condenser Vacuum And Turbine* Steam Seal System Operation to Bypass 1-PCV-47-183.
	BOP	BOP identifies low/loss of high pressure sealing steam pressure on MCB indicators; manually controls HP Sealing Steam using bypass FCV, **[1-FCV-47-181]**.
	BOP	[3] IF header pressure is high… **[This step N/A]**
	BOP	[4] IF Header pressure is low… **[This step N/A]**
	BOP/CREW	[5] CHECK operation of PCV-47-183 HP Steam Seal. AUO dispatched for local inspection
	CREW	[6] CHECK plant computer to determine which seal has abnormal pressure.
	CREW	[7] DISPATCH operator to determine steam seal supply pressure to each seal (on local indicator).

Op Test No.: NRC Scenario # 1 Event # 2 Page 6 of 47

Event Description: Gland Seal Steam Regulator, 1-PCV-47-183 fails closed

Time	Position	Applicant's Actions or Behavior
	BOP	[8] ADJUST steam seal supply pressure... **[This step N/A since this step directs local adjustment]**
	BOP/CREW	[9] MONITOR condenser vacuum.
Evaluator Note:		SRO may decide to enter AOP-S.02, Loss of Condenser Vacuum to continue condenser vacuum restoration. Provided prompt action is implemented, this ARP provides adequate instruction to mitigate this event.
	US	US may use or refer to AOP-S.02, Loss of Condenser Vacuum, Section 2.0:
	CAUTION:	Turbine will trip automatically when condenser pressure reaches 3.9 to 5.4 psia.
	NOTE:	Highest reading operable condenser pressure instrument should be used.
	BOP	1. MONITOR condenser pressure for turbine trip criteria. a. CHECK turbine load greater than or equal to 30%.
		b. CHECK condenser pressure less than or equal to 2.7 psia.
	BOP	2. ENSURE condenser vacuum pumps RUNNING.
Evaluator Note:		The standby Condenser Vacuum Pump will fail to start automatically; manual start is available and could be manually started in response to this event.
	BOP	3. ENSURE condenser vacuum breaker CLOSED.
	BOP	4. CHECK required CCW Pumps RUNNING [M-15].
	BOP	5. CHECK turbine gland seal steam supply pressure between 120 psig and 130 psig [M-2, PI-47-187]. ***(RNO Required)***
	BOP	**RNO:** MAINTAIN turbine gland seal supply pressure between 120 and 130 psig USING PCV-47-181, HP Steam Seal Supply Bypass Isol.

Op Test No.: NRC Scenario # 1 Event # 2 Page 7 of 47

Event Description: Gland Seal Steam Regulator, 1-PCV-47-183 fails closed

Time	Position	Applicant's Actions or Behavior
	BOP	6. CHECK HP steam seal steam supply between 16 psia and 20 psia [M-2, PI-47-189].
	BOP	7. CHECK annunciator PIS-47-196 TURBINE SEAL STEAM PRESS. ABNORMAL, DARK. [M-2A, window A5].
	BOP/ CREW	8. DISPATCH an operator to perform the following:
		a. CHECK loop seal on vacuum breaker [Turbine Bldg, 706' elev].
		b. CHECK the following components: • Main Turbine rupture discs intact • Condenser shell intact • Main Feedwater Pump rupture discs intact • Main Turbine exhaust hoods
		c. VERIFY Main Steam Dump Drain Tank level control operating properly.
	BOP	9. CHECK condenser pressure STABLE or DROPPING.
	RO	10. ENSURE control rods controlling in AUTO.
	NOTE: Steam dumps will be unavailable due to loss of C-9 interlock if condenser pressure reaches approx. 2.9 - 3.4 psia.	
	BOP/ RO	11. MONITOR annunciator C-9 CONDENSER INTERLOCK, LIT [M-4A, window E6].
	BOP	12. DETERMINE volume of condenser inleakage USING the following plant computer points: • F2700A • F2263A • F2260A
	BOP	13. VERIFY inleakage value less than 45 cfm as indicated by both F2700A and F2263A. ***(RNO May Be Required)***
		RNO: **PERFORM** the following: a. **ENSURE** FCV-2-255, Condenser Vacuum Exhaust Bypass, is OPEN. b. **IF** reactor power greater than 5%, **THEN NOTIFY** Chem Lab to reevaluate Vent Flow Rate Monitor setpoint in accordance with 0-SI-CEM-030-415.0.

Op Test No.:	NRC	Scenario #	1	Event #	2	Page	8	of	47
Event Description:	Gland Seal Steam Regulator, 1-PCV-47-183 fails closed								

Time	Position	Applicant's Actions or Behavior
	BOP/ RO	14. MONITOR condenser pressure USING the following computer points: • P2270A • P2271A
	BOP	15. CHECK condenser waterbox ΔP annunciator windows DARK [M-15A]: • PdIS-27-95 CCW TO COND 1(2)A WEST SIDE DIFF PRESS HI [D-1] • PdIS-27-74 CCW TO COND 1(2)B WEST SIDE DIFF PRESS HI [D-2] • PdIS-27-54 CCW TO COND 1(2)C WEST SIDE DIFF PRESS HI [D-3] • PdIS-27-104 CCW TO COND 1(2)A EAST SIDE DIFF PRESS HI [E-1] • PdIS-27-83 CCW TO COND 1(2)B EAST SIDE DIFF PRESS HI [E-2] • PdIS-27-65 CCW TO COND 1(2)C EAST SIDE DIFF PRESS HI [E-3]
	BOP/ RO	16. CHECK annunciator PdS-27-13B TRAV SCREEN 1B DIFF PRESS HI, DARK. [M-15A, window A4].
	BOP	17. CHECK annunciator TS-47-218, EXHAUST HOOD TEMPERATURE HIGH-VERY HIGH, DARK. [M-2A, window E5]
	BOP	18. CHECK condenser water box ΔT less than or equal to 30°F USING the following computer points:
		• T2430A, Cond A Inlet (West) • T2431A, Cond A Inlet (East) • T2434A, Cond B Inlet (West) • T2435A, Cond B Inlet (East) • T2438A, Cond C Inlet (West) • T2439A, Cond C Inlet (East) • T2432A, Cond A Outlet (West) • T2433A, Cond A Outlet (East) • T2436A, Cond B Outlet (West) • T2437A, Cond B Outlet (East) • T2440A, Cond C Outlet (West) • T2441A, Cond C Outlet (East)
NOTE	Condenser water box differential temperature is a turbine load dependent parameter. At low turbine loads, it may be less than 20°F.	
	BOP	19. CHECK condenser water box ΔT greater than 20°F USING computer points in previous step.

Op Test No.: NRC	Scenario # 1	Event # 2	Page 9 of 47
Event Description:	Gland Seal Steam Regulator, 1-PCV-47-183 fails closed		

Time	Position	Applicant's Actions or Behavior
	CREW	20. DISPATCH an operator to verify Seal Water level NORMAL (middle of sight glass) on the condenser vacuum pumps [Turbine Bldg, 662' elev.]
		21. VERIFY condenser vacuum RESTORED TO NORMAL.
		22. GO TO appropriate plant procedure.
Evaluator Note:		The following CREW Brief and Notification actions are not contained in the procedure.
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead Examiner may cue next event when condenser vacuum has stabilized.		

Op Test No.:	NRC	Scenario #	1	Event #	3	Page	10	of	47
Event Description:	CVCS Letdown Pressure Control Valve Fails Closed (1-PCV-62-81)								

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 3		
Indications available: **Annunciator XA-55-6C Window B-4 "FS-62-82 LOW PRESS LTDN FLOW HIGH PRESSURE HIGH"** • **Indicator 1-FI-62-82 indicates ≈70-75 gpm [M-6]** • **Indicator 1-PI-62-81 indicates pressure rising from ~325 to ~500-550 psig [M-6]**		
T = 20	CREW	Respond in accordance with Alarm Response Procedures
	RO	Diagnose failure and place 1-PCV62-81 in MANUAL Refer to Annunciator Response Procedure
Evaluator Note: There are several notes in the alarm response that do not apply to this failure. The notes listed are the ones that do apply. There are several sections of procedure steps. ONLY the applicable steps are included below in this guide.		
	RO	RO refers to ARP B-4 "FS-62-82 LOW PRESS LTDN FLOW HIGH PRESSURE HIGH" Corrective Actions:
	RO	[1] CHECK CRT SER point number to determine flow or pressure high.
	RO	[2] CHECK letdown flow [1-FI-62-82] and letdown pressure [1-PI-62-81] on M-6.
	RO	[3] IF RHR not in service, THEN ADJUST [1-PCV-62-81] USING [1-HIC-62-81A] and/or orifice isolation valves to control pressure and flow (Max. 120 gpm).
	SRO	[7] IF Unit SRO deems it necessary, THEN [a] REMOVE normal letdown from service in accordance with1-SO-62-1, Chemical and Volume Control System. [b] PLACE excess letdown in service in accordance with 1-SO-62-6, Excess Letdown.
		[8] RESTORE conditions to normal as soon as possible.

Op Test No.:	NRC	Scenario #	1	Event #	3	Page	11	of	47
Event Description:	CVCS Letdown Pressure Control Valve Fails Closed (1-PCV-62-81)								

Time	Position	Applicant's Actions or Behavior
Evaluator Note: The CREW may decide to isolate Letdown and place Excess Letdown in service. If normal letdown flowpath remains in service, PCV-62-81 will remain in manual control for the remainder of the scenario; and, the RO is expected to manually control letdown pressure.		
	RO/ CREW	1-SO-62-6, Excess Letdown Section 5.0 Startup/Standby Readiness
NOTE 1	When excess letdown is placed in service the containment radiation monitors may show some changes in particulate reading.	
NOTE 2	Coordinate the following steps with AUO stationed at 0-L-2 to monitor RCDT for pump operation as required during the 50 gallon flush.	
	RO	[1] ENSURE [1-FCV-62-93] is in MANUAL and [a] OPERATE [1-FCV-62-93] USING [1-HIC-62-93A] as required to regulate charging flow to keep pressurizer level on program. [b] OPERATE [1-FCV-62-89] USING [1-HIC-62-89A] as required to maintain RCP seal flows in limits.
	CREW	[2] NOTIFY RADCON that Excess Letdown is being placed in service.
Evaluator Note: The following valves/indications in steps 3-5 are located on 0-M27B, CCS System Panel		
	BOP	[3] ENSURE [1-FCV-70-143] CCS water to the excess letdown heat exchanger is OPEN.
	BOP	[4] ENSURE [1-FCV-70-85] Excess Letdown Heat Exchanger CCS flow control valve is OPEN.
	NOTE: Step [5] will prevent subjecting the CVCS piping downstream of the Excess Letdown HX to a temperature above the design value.	
	BOP	[5] ENSURE [1-FI-70-84] is indicating greater than 230 gpm.
	RO	[6] PLACE [1-FCV-62-59] Excess Letdown 3-way Divert Valve in DIVERT.

Op Test No.: NRC	Scenario # 1	Event # 3	Page 12 of 47
Event Description: CVCS Letdown Pressure Control Valve Fails Closed (1-PCV-62-81)			

Time	Position	Applicant's Actions or Behavior
	CAUTION:	FCV 62-63 has replaced RCP seal leak-off isolation valves as the primary means for isolating seal flow. The normal letdown path for excess letdown will not be available if FCV-62-63 is CLOSED.
	NOTE:	Back flow through the RCP seals will occur should the RCP seal leakoff isolation valves fail to their OPEN position on loss of air or electrical power.
	RO	[7] IF less than 100 psig in RCS … **[This step N/A]**
	RO	[8] OPEN [1-FCV-62-54] Cold Leg Loop #3 Excess Letdown isolation valve.
	RO	[9] OPEN [1-FCV-62-55] Excess Letdown containment isolation valve
	NOTE:	ICS point 1L2400A or the AUO stationed at 0-L-2 can be used to monitor RCDT for level increase during the 50 gallon flush. Reference the RCDT Level vs. Volume table in TI-28.
	RO	[10] OPEN [1-FCV-62-56] slowly to flush piping to RCDT.
	RO	[11] WHEN approximately 50 gallons have flushed, THEN CLOSE [1-FCV-62-56], Excess Letdown Flow Control Valve. (Designed flowrate is 20-25 gpm; flush time should be ≈2-3 minutes.)
	RO	[12] PLACE [1-FCV-62-59] Excess Letdown 3-way Divert Valve in NORMAL.
	NOTE 1	Normally the temperature read on 1-TI-62-58 should be less than 200°F. If operation requires temperatures greater than 200°F, the pressure at 1-PI-62-64 (local indicator El. 690 Pnl L-46) should be less than 100 psig to protect the Grinnell valves.
	NOTE 2	Operation above 200°F will require that Systems Engineering be notified to allow an evaluation of the need for valve maintenance.
	RO	[13] OPEN [1-FCV-62-56] slowly to increase excess letdown flow to desired amount, not to exceed 240°F heat exchanger outlet temperature, as indicated on 1-TI-62-58.

Op Test No.:	NRC	Scenario #	1	Event #	3	Page	13	of	47
Event Description:	CVCS Letdown Pressure Control Valve Fails Closed (1-PCV-62-81)								

Time	Position	Applicant's Actions or Behavior
	NOTE: Placing Excess Letdown in service causes increased activity in various areas of the Auxiliary Building.	
	RO	[14] NOTIFY RADCON that Excess Letdown has been placed in service.
Evaluator Note: Due to reduced letdown flow, ~20-25 gpm, reduced manual charging flow is required; expected flow rate 40-50 gpm to retard Pzr fill rate. Annunciator 1-XA-55-6C, D-3, FS-62-93A/B CHARGING LINE FLOW ABNORMAL is an expected continuous alarm condition (setpoint: ≤55 gpm;). The RO should re-establish/maintain 6-10 gpm/RCP stable supply flow conditions. Annunciators 1-XA-55-5B, A-3, B-3, C-3, D-3 FS-62-XX REAC COOL PMPS SEAL LEAKOFF LOW FLOW may be actuated during transient conditions; operator response is to clear the condition.		
	RO	Establishes/maintains reduced charging flow rate iaw 1-SO-62-1, Chemical and Volume Control System and 0-GO-14, MCR Rounds
Evaluator Note: The following CREW Brief and Notification actions are not contained in the procedure.		
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead Examiner may cue the next event when charging flow is controlled.		

Op Test No.:	NRC	Scenario #	1	Event #	4, 5	Page	14	of	47
Event Description:	Loss of Condenser Vacuum w/ Cond Vac Pp auto start failure / MT Rapid Load Reduction due to Condenser Vacuum Leak								

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 4, 5		
Indications available: • **0-M-12A, C-2, 1-RA-90-119B COND VAC PMP LO RNG AIR EXH MON INSTR MALFUNC** • **1-AR-M2-C, C6, CONDENSER VACUUM LOW** • **Condenser Vacuum degrading (Monitored on recorder or ICS), Air in leakage increasing**		
T = 30	CREW	Refer to alarm response procedure
Evaluator Note: CREW may recognize vacuum leak early and enter abnormal procedure AOP-S.02, *Loss Of Condenser Vacuum,* prior to alarm.		
	BOP	**VERIFY** alarm via **[1-P/TR-2-2]** recorder.
	BOP	**VERIFY** required number of CCW pumps are in service.
	BOP	**CHECK** condenser vacuum exhaust on ICS using either: a. 1F2700A if 1-FCV-2-255 is closed b. 1F2263A if 1-FCV-2-255 is open.
	BOP	**IF** condenser vacuum exhaust flow > 45 CFM, **THEN ENSURE** 1-FCV-2-255 **OPEN**.
	BOP	**IF** alarm is valid, **THEN GO TO** AOP-S.02, *Loss of Condenser Vacuum.*
	SRO	Directs entry into AOP-S.02
	NOTE: Use of the highest reading operable condenser pressure instrument is conservative and recommended by engineering.	
	BOP	**MONITOR** condenser pressure for turbine trip criteria. • **CHECK** turbine load greater than or equal to 30%. (MT Low Condenser Vacuum Trip @ 3.9 psia increasing)

Op Test No.:	NRC	Scenario #	1	Event #	4, 5	Page	15	of	47
Event Description:	Loss of Condenser Vacuum w/ Cond Vac Pp auto start failure / MT Rapid Load Reduction due to Condenser Vacuum Leak								

Time	Position	Applicant's Actions or Behavior
	BOP	**CHECK** condenser pressure less than or equal to 2.7 psia. **(1-AR-M2-C, C-6, CONDENSER VACUUM LOW** @ 2.7 psia increasing.)
	BOP	**ENSURE** condenser vacuum pumps RUNNING. (Stby 1B Condenser Vacuum Pump fails to start automatically @ 2.1 psia; BOP manually starts 1B CVP.)
	BOP	**ENSURE** condenser vacuum breaker CLOSED.
	BOP	**CHECK** required CCW Pumps RUNNING [M-15].
Evaluator Note:	AOP-S.02 Section 2.0 Step 1.b RNO contains Turbine Trip criteria (stated below).	
	CAUTION: Turbine will trip automatically when condenser pressure reaches 3.9 to 5.4 psia.	
	NOTE: Highest reading operable condenser pressure instrument should be used.	
	BOP	1. MONITOR condenser pressure for turbine trip criteria. a. CHECK turbine load greater than or equal to 30%.
		b. CHECK condenser pressure less than or equal to 2.7 psia.
		1.b. RNO: **IF** condenser pressure: • exceeds 3.5 psia **OR** • pressure CANNOT be restored to less than 2.7 psia within 5 minutes, **THEN TRIP** the reactor and **GO TO** E 0, Reactor Trip or Safety Injection.
	BOP	2. ENSURE condenser vacuum pumps RUNNING. (BOP manually starts 1B CVP if not started previously.)
	BOP	3. ENSURE condenser vacuum breaker CLOSED.
		4. **CHECK** required CCW Pumps RUNNING[M-15]. **[C.1]**

Op Test No.:	NRC	Scenario #	1	Event #	4, 5	Page	16	of	47

Event Description: Loss of Condenser Vacuum w/ Cond Vac Pp auto start failure / MT Rapid Load Reduction due to Condenser Vacuum Leak

Time	Position	Applicant's Actions or Behavior
Evaluator Note: During the course of the power reduction, **Lead Evaluator** will initiate the MT Vibration condition. MT Vibration Event Guide is included at the end of AOP-C.03 Event Guide		
Evaluator Note: The standby Condenser Vacuum Pump will fail to start automatically; manual start is available and should be manually started in response to this event.		
	BOP	5. CHECK turbine gland seal steam supply pressure between 120 psig and 130 psig [M-2, PI-47-187].
Evaluator Note: BOP is manually controlling Gland Seal Steam from previous malfunction.		
	BOP	**RNO:** (from Event 1) MAINTAIN turbine gland seal supply pressure between 120 and 130 psig USING PCV-47-181, HP Steam Seal Supply Bypass Isol.
	BOP	6. CHECK HP steam seal steam supply between 16 psia and 20 psia [M-2, PI-47-189].
	BOP	7. CHECK annunciator PIS-47-196 TURBINE SEAL STEAM PRESS. ABNORMAL, DARK. [M-2A, window A5].
	BOP/ CREW	8. DISPATCH an operator to perform the following:
		a. CHECK loop seal on vacuum breaker [Turbine Bldg, 706' elev].
		b. CHECK the following components: • Main Turbine rupture discs intact • Condenser shell intact • Main Feedwater Pump rupture discs intact • Main Turbine exhaust hoods
		c. VERIFY Main Steam Dump Drain Tank level control operating properly.
	BOP	9. CHECK condenser pressure STABLE or DROPPING. ***(RNO Required)***
	BOP	**RNO:** REDUCE turbine load as necessary to maintain condenser vacuum USING one of the following:

Op Test No.:	NRC	Scenario #	1	Event #	4, 5	Page	17	of	47
Event Description:	Loss of Condenser Vacuum w/ Cond Vac Pp auto start failure / MT Rapid Load Reduction due to Condenser Vacuum Leak								

Time	Position	Applicant's Actions or Behavior
		• AOP-C.03, Rapid Shutdown or Load Reduction (preferred) OR • Valve Position Limiter.
Evaluator Note: AOP-C.03, Rapid Shutdown or Load Reduction event guide is included at the end of this event.		
Evaluator Note: SRO should decide to implement AOP-C.03, Rapid Shutdown or Load Reduction and initiate a load reduction specifying a rate and reduced power level (include a reactivity brief using AOP-C.03 Appx E, Reactivity Management Briefing). Plant power reduction will be adequate along with the standby vacuum pump capacity to stabilize condenser vacuum adequately to stop the power reduction.		
	RO	10. ENSURE control rods controlling in AUTO.
	NOTE: Steam dumps will be unavailable due to loss of C-9 interlock if condenser pressure reaches approx. 2.9 - 3.4 psia.	
	BOP/ RO	11. MONITOR annunciator C-9 CONDENSER INTERLOCK, LIT [M-4A, window E-6].
	BOP	12. DETERMINE volume of condenser inleakage USING the following plant computer points: • F2700A • F2263A • F2260A
	BOP	13. VERIFY inleakage value less than 45 cfm as indicated by both F2700A and F2263A.
	BOP/ RO	14. MONITOR condenser pressure USING the following computer points: • P2270A • P2271A
	BOP	15. CHECK condenser waterbox ΔP annunciator windows DARK [M-15A]: • PdIS-27-95 CCW TO COND 1(2)A WEST SIDE DIFF PRESS HI [D-1] • PdIS-27-74 CCW TO COND 1(2)B WEST SIDE DIFF PRESS HI [D-2]

Op Test No.: NRC Scenario # 1 Event # 4, 5 Page 18 of 47

Event Description: Loss of Condenser Vacuum w/ Cond Vac Pp auto start failure / MT Rapid Load Reduction due to Condenser Vacuum Leak

Time	Position	Applicant's Actions or Behavior
		• PdIS-27-54 CCW TO COND 1(2)C WEST SIDE DIFF PRESS HI [D-3] • PdIS-27-104 CCW TO COND 1(2)A EAST SIDE DIFF PRESS HI [E-1] • PdIS-27-83 CCW TO COND 1(2)B EAST SIDE DIFF PRESS HI [E-2] • PdIS-27-65 CCW TO COND 1(2)C EAST SIDE DIFF PRESS HI [E-3]
	BOP/ RO	16. CHECK annunciator PdS-27-13B TRAV SCREEN 1B DIFF PRESS HI, DARK. [M-15A, window A4].
	BOP	17. CHECK annunciator TS-47-218, EXHAUST HOOD TEMPERATURE HIGH-VERY HIGH, DARK. [M-2A, window E5]
	BOP	18. CHECK condenser water box ΔT less than or equal to 30°F USING the following computer points:
		• T2430A, Cond A Inlet (West) • T2431A, Cond A Inlet (East) • T2434A, Cond B Inlet (West) • T2435A, Cond B Inlet (East) • T2438A, Cond C Inlet (West) • T2439A, Cond C Inlet (East) • T2432A, Cond A Outlet (West) • T2433A, Cond A Outlet (East) • T2436A, Cond B Outlet (West) • T2437A, Cond B Outlet (East) • T2440A, Cond C Outlet (West) • T2441A, Cond C Outlet (East)
NOTE	Condenser water box differential temperature is a turbine load dependent parameter. At low turbine loads it may be less than 20°F.	
	BOP	19. CHECK condenser water box ΔT greater than 20°F USING computer points in previous step.
	CREW	20. DISPATCH an operator to verify Seal Water level NORMAL (middle of sight glass) on the condenser vacuum pumps [Turbine Bldg, 662' elev.]
	SRO	21. VERIFY condenser vacuum RESTORED TO NORMAL.
	SRO	22. GO TO appropriate plant procedure.

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Event Description: Loss of Condenser Vacuum w/ Cond Vac Pp auto start failure / MT Rapid Load Reduction due to Condenser Vacuum Leak

Time	Position	Applicant's Actions or Behavior
AOP-C.03, Rapid Shutdown or Load Reduction (from AOP-S.02, Loss of Condenser Vacuum step 9 RNO)		
Evaluator Note: During the course of the power reduction, **Lead Evaluator** will initiate the MT Vibration condition. MT Vibration Event Guide is included at the end of AOP-C.03 Event Guide		
	SRO	1. ENSURE CREW has been briefed on reactivity management expectations USING Appendix E. (SRO determines plant power reduction rate. According to AOP-C.03, that rate may be 1-4%/minute; and may be varied during the power reduction/ shutdown based on SRO determination/direction.)
c		
	CREW	2. NOTIFY following personnel of rapid shutdown or load reduction: • Load Coordinator • Chemistry • RADCON • Plant Management
	CREW	3. MONITOR reactor/turbine trip NOT required USING Appendix A, Reactor and Turbine Trip Criteria.
	BOP	4. CHECK VALVE POSITION LIMIT light DARK on EHC panel. [M-2]
	NOTE: BAT is preferred boration source. Boration volume and flowrates listed in following step are recommendations and may be adjusted as necessary.	
	RO	5. IF borating from BAT, THEN PERFORM the following:
		a. DETERMINE recommended boration volume:
		• ~800 gal to reduce power from 100% to 20% OR • 10 gal for each 1% power reduction OR • volume recommended by Reactor Engineering

Op Test No.: NRC Scenario # 1 Event # 4, 5 Page 20 of 47

Event Description: Loss of Condenser Vacuum w/ Cond Vac Pp auto start failure / MT Rapid Load Reduction due to Condenser Vacuum Leak

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Actions or Behavior</th></tr>
<tr><td></td><td>RO/
SRO</td><td>b. DETERMINE recommended boration flowrate from table below or from Reactor Engineering:

<table><tr><th>TURBINE LOAD REDUCTION RATE (%/min)</th><th>BORATION FLOWRATE</th></tr><tr><td>1%</td><td>~15 gpm</td></tr><tr><td>2%</td><td>~30 gpm</td></tr><tr><td>3%</td><td>~45 gpm</td></tr><tr><td>4%</td><td>~70 gpm</td></tr></table></td></tr>
<tr><td></td><td>SRO</td><td>c. ENSURE concurrence obtained from US and STA for boration volume and flowrate.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>RO</td><td>d. PLACE boric acid transfer pump aligned to blender in FAST speed.</td></tr>
<tr><td></td><td>RO</td><td>e. ADJUST FCV-62-138 to establish desired flow rate.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>RO</td><td>g. GO TO Step 7.</td></tr>
<tr><td></td><td>SRO</td><td>7. INITIATE load reduction as follows:</td></tr>
<tr><td></td><td>BOP</td><td>a. ADJUST load rate to desired value:
• between 1% and 4% per minute if borating via FCV-62-138
OR
• between 1% and 3% per minute if borating via normal boration (App. D)
OR
• 2% or 3% per minute if borating from RWST.</td></tr>
<tr><td></td><td>BOP</td><td>b. ADJUST setter for desired power level:

<table><tr><th>DESIRED RX POWER LEVEL</th><th>RECOMMENDED SETTER VALUE</th></tr><tr><td>90%</td><td>76</td></tr><tr><td>80%</td><td>56</td></tr><tr><td>70%</td><td>46</td></tr><tr><td>60%</td><td>40</td></tr><tr><td>50%</td><td>35</td></tr><tr><td>40%</td><td>30</td></tr><tr><td>30%</td><td>25</td></tr><tr><td>20% or less</td><td>15</td></tr></table></td></tr>
</table>

Op Test No.:	NRC	Scenario #	1	Event #	4, 5	Page	21	of	47
Event Description:	Loss of Condenser Vacuum w/ Cond Vac Pp auto start failure / MT Rapid Load Reduction due to Condenser Vacuum Leak								

Time	Position	Applicant's Actions or Behavior
Evaluator Note: Main Turbine vibration malfunction will start ramping in when turbine load reduction is initiated.		
	BOP	c. INITIATE turbine load reduction by depressing GO pushbutton.
	SRO/ BOP	d. CONTROL turbine load reduction as necessary to reduce power to desired level.
	RO	8. MONITOR T-avg/T-ref mismatch: a. CHECK T-ref indication AVAILABLE. b. MONITOR automatic rod control maintaining T-avg/T-ref mismatch less than 3°F.
	BOP	9. MONITOR automatic control of MFW pump speed AVAILABLE.
	BOP	10. STOP secondary plant equipment USING Appendix B, Secondary Plant Equipment.
	NOTE: If LEFM thermal power (U2118) is inoperable, rod insertion limit curve must be raised by 3 steps. Rod insertion limit alarms and ICS display are NOT automatically adjusted when LEFM is inoperable.	
	RO	11. MONITOR control rods above low-low insertion limit USING ICS or COLR.
	NOTE: Initiating plant shutdown required by Tech Specs requires 4-hour NRC notification per SPP-3.5, Regulatory Reporting Requirements.	
	SRO	12. EVALUATE Tech Specs/TRM for applicability: • 3.2.1, Axial Flux Difference • 3.1.1.1, Shutdown Margin • 3.1.3.6, Rod Insertion Limits • TRM 3.1.2.2, Boration Flowpaths

Op Test No.: NRC Scenario # 1 Event # 4, 5 Page 22 of 47

Event Description: Loss of Condenser Vacuum w/ Cond Vac Pp auto start failure / MT Rapid Load Reduction due to Condenser Vacuum Leak

Time	Position	Applicant's Actions or Behavior
	SRO	13. EVALUATE EPIP-1, Emergency Plan Initiating Conditions Matrix.
	RO	14. PERFORM the following to reduce boron concentration difference between Pzr and RCS loops:
	RO	a. CHECK at least one normal spray valve AVAILABLE.
	RO	b. ENSURE at least one backup heater group ENERGIZED.
	RO	c. ENSURE spray valve(s) responds to control RCS pressure.
	CREW	15. WHEN reactor power change exceeds 15% within one hour, THEN NOTIFY Chemistry to initiate sampling as required by 0-SI-CEM-000-050.0, 0-SI-CEM-030-407.2 and 0-SI-CEM-030-415.0.
	CREW	16. MONITOR if turbine load reduction can be stopped:
	SRO	a. CHECK the following conditions met:
		• reactor shutdown is NOT needed • turbine shutdown is NOT needed • turbine load at desired power level (further load reduction NOT needed)
	BOP	b. STOP turbine load reduction by depressing HOLD.
	RO	c. WHEN control rods are above the low-low insertion limit, THEN STOP boration flow.
	CREW	d. NOTIFY Chem Lab to sample RCS for boron concentration.
		e. T-avg within 3°F of T-ref USING one of the following: • AUTO or MANUAL rod control • dilution or boration USING 0-SO-62-7.

Op Test No.: NRC Scenario # 1 Event # 4, 5 Page 23 of 47

Event Description: Loss of Condenser Vacuum w/ Cond Vac Pp auto start failure / MT Rapid Load Reduction due to Condenser Vacuum Leak

Time	Position	Applicant's Actions or Behavior
	RO	f. CHECK reactor power greater than 50%.
	RO/ SRO	g. DETERMINE Tech Spec AFD limits for current power level USING ICS (Primary Mimics, Doghouse Display) or COLR.
	RO	h. CHECK AFD within Tech Spec limits on at least three operable power range NIS channels.
	RO/ SRO	I. IF AFD is outside target band, THEN INITIATE 0-SI-NUC-000-044.0,Axial Flux Difference.
	SRO	J. INITIATE performance of 0-SI-OPS-092-078.0, Power Range Neutron Flux Channel Calibration By Heat Balance Comparison.
	BOP	k. CHECK C-7 LOSS OF LOAD INTERLOCK [M-4A window E-5] DARK.
	NOTE: Time in core life, expected Xenon changes, and planned power changes should be considered when evaluating need for boration or dilution.	
	SRO	L. CONSULT Reactor Engineering and STA regarding ΔI control and compensating for Xe changes.
	SRO/ RO	m. PERFORM the following as necessary to control ΔI and maintain T-avg on program: • INITIATE boration or dilution as necessary USING 0-SO-62-7, Boron Concentration Control OR • OPERATE control rods as necessary.
	RO	n. CHECK at least one normal Pzr spray valve OPERABLE.
	SRO	o. DETERMINE appropriate procedure based upon power level and cause of rapid shutdown:
		• Other applicable AOP

Op Test No.:	NRC	Scenario #	1	Event #	4, 5	Page	24	of	47
Event Description:	Loss of Condenser Vacuum w/ Cond Vac Pp auto start failure / MT Rapid Load Reduction due to Condenser Vacuum Leak								

Time	Position	Applicant's Actions or Behavior
		OR • 0-GO-5, Normal Power Operation (if greater than approximately 30% power) OR • 0-GO-4, Power Ascension from Less than 5% to 30% Power (if less than approximately 30%)
	SRO	p. GO TO appropriate plant instruction.
Evaluator Note: SRO/CREW may conduct a brief at this time and should return/insure actions of AOP-S.02, Loss of Condenser Vacuum are completed.		
Evaluator Note: The following CREW Brief and Notification actions are not contained in the procedure.		
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Evaluator Note: During the course of the power reduction, **Lead Evaluator** will initiate the MT Vibration condition. MT Vibration Event Guide is included at the end of AOP-C.03 Event Guide		
Lead Examiner may cue next event when the CREW has stabilized plant power and condenser vacuum.		

Op Test No.: NRC Scenario # 1 Event # 6, 7 Page 25 of 47

Event Description: Turbine High Vibration (≤14 mills sustained- no trip required) / #4 MT Stop Valve indication loss

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 6, 7		
Indications available: • **1-AR-M2A D-4, VA-47-120 TURBINE HIGH VIBRATION indicates >7 mils** • **1-M-11-XR-47-2, Main Turbine Vibration Recorder indicates elevated vibration on #s 1 & 2 bearings (≈9-10 mils).**		
T = 45	CREW	Refer to alarm response procedures and carries the following actions:
Evaluator Note: BOP operator is expected to maintain sealing steam pressure manually during the rapid power reduction (Gland Seal Steam Regulator failure, Event 2).		
	NOTE: Vendor recommends turbine trip at 14 mils.	
	BOP	[1] MONITOR recorder [1-XR-47-2] to determine which bearing has possible vibration problems and establish trend.
	CAUTION:	Dispatching personnel locally could place personnel in serious danger if a catastrophic turbine failure occurs. Local verification should NOT be performed when adequate MCR indications exist.
		[2] IF bearing vibration ≥14 mils AND any of the following conditions are met: • High vibration is present on multiple bearings OR • Abnormal noise or vibration locally or from MCR.
		THEN PERFORM the following: [a] IF reactor power is above 50%, THEN TRIP the reactor and GO TO E-0. [b] IF reactor power is less than 50%. THEN TRIP the turbine AND GO TO AOP-S.06.
Evaluator Note: SRO/CREW determines vibration is stabilizing at ~10 mils, should decide not to trip the Reactor/Main Turbine; continues in current ARP.		
	BOP/ CREW	[3] DISPATCH operator to sound out turbine to verify alarm and 1-XR-47-2 indications.

Op Test No.: NRC Scenario # 1 Event # 6, 7 Page 26 of 47

Event Description: Turbine High Vibration (≤14 mills sustained- no trip required) / #4 MT Stop Valve indication loss

Time	Position	Applicant's Actions or Behavior
	BOP	[4] CHECK the following conditions for potential root cause. a. Oil temperature. b. Critical speed. c. Sealing steam pressure. d. Condenser vacuum. e. Exhaust shell temperature.
	CREW	[5] CORRECT parameter values within applicable plant procedures' limits.
	SRO	[6] IF vibration remains high (greater than setpoint 7 mils), THEN CONSULT with SRO/SM AND EVALUATE starting unit shutdown
	BOP	[a] DETERMINE rate of rise if possible
	CREW	[b] CONTACT System Predictive Maintenance and System Engineer.
	SRO	[7] IF vibration remains high >7 mills, THEN CONSULT with SRO/SM, AND EVALUATE starting unit shutdown.
Lead Examiner:		After ARP 1-AR-M2A D-4 is performed to this point (i.e.: vibration magnitude stabilized at ~10 mils), initiate **EVENT 7,** #4 MT Stop Valve indication loss (RPS input)
Evaluator Note:		Annunciator 1-XX-55-6B E-5; its ARP directs entry into AOP-I.07, Turbine Auto Stop Oil Pressure Instrument or Turbine Stop Valve Limit Switch Malfunction; Sections 2.0 & 2.2 apply to address the indication failure which is included at the end of this event guide.
		[8] IF vibration continues to increase, THEN CONSULT SM, AND EVALUATE tripping the turbine prior to exceeding 14 mils verified vibration USING the guidance provided in Step 2. **[This step currently N/A]**
		[9] IF reactor trip, THEN GO TO E-0, *Reactor Trip or Safety Injection.* **[This step currently N/A]**

Op Test No.: NRC Scenario # 1 Event # 6, 7 Page 27 of 47

Event Description: Turbine High Vibration (≤14 mills sustained- no trip required) / #4 MT Stop Valve indication loss

Time	Position	Applicant's Actions or Behavior
		[10] IF turbine trips and no reactor trip, THEN GO TO AOP-S.06, *Turbine Trip.* **[This step N/A; reactor power >P-9, 49% RTP]**
Booth Instructor: When directed, initiate Event, 7 **Indications available:** • **1-XA-55-6B E-5, "TURBINE STEAMLINE STOP VALVES CLOSED"** • **1-XX-55-6A Trip Status Light "TURB STOP VLV 4 CLOSED"**		
	CREW	Refer to alarm response procedures and carries out the following actions:
	NOTE: If failure of main turbine throttle valve bistable is suspected, refer to Tech Spec L.C.O. 3.3.1.1, table 3.3:-1, item 18B.	
	BOP	[1] CHECK turbine throttle valves position on turbine EH control panel, M-2.
	BOP/ CREW	[2] IF all four stop valves closed and below 50% power, THEN GO TO AOP-S.06, *Turbine Trip.*
	SRO	[3] IF all four stop valves closed and above 50% power, THEN ENSURE reactor trip, AND GO TO E-0, *Reactor Trip or Safety Injection.*
	RO/ SRO	[4] IF any turbine stop valve status light is lit AND the valve is OPEN, OR status light is NOT lit with valve CLOSED, THEN GO TO AOP-I.07, *Turbine Auto Stop Oil Pressure Instrument or Turbine Stop Valve Limit Switch Malfunction.*
	SRO	Transitions to AOP-I.07, *Turbine Auto Stop Oil Pressure Instrument or Turbine Stop Valve Limit Switch Malfunction.*
		AOP-I.07, Section 2.0:
	SRO **TS Evaluation**	1. EVALUATE the following Tech Specs for applicability: • 3.3.1.1 (3.3.1), Reactor Trip System Instrumentation Action 7 (From Table 3.3-1 Item 18.b) Applies – Trip inoperable channel w/i 6 hrs. or THERMAL: POWER is reduced to less than P-9 w/i 10 hours

Op Test No.: NRC Scenario # 1 Event # 6, 7 Page 28 of 47

Event Description: Turbine High Vibration (≤14 mills sustained- no trip required) / #4 MT Stop Valve indication loss

Time	Position	Applicant's Actions or Behavior
	SRO	2. IF Turbine auto stop oil… **[This step N/A]**
	SRO	3. IF Turbine stop valve limit switch has malfunctioned, THEN GO TO Section 2.2.
	SRO	SRO, RO determines MT SV FCV-1-70 is the affected indication; SRO decides Section 2.2 is applicable.
		Section 2.2 Turbine Stop Valve Limit Switch Malfunction:
	NOTE:	Computer points require a prefix 0, 1, or 2 be placed in front of the point number; for example, 2Y0391D. Parenthetical points are for Unit 2.
	RO/ SRO	1. DETERMINE affected channel USING either of the following: Trip status lights [XX-55-6A] OR Computer Points:

TURBINE STOP VALVE	PROT CH	PLANT COMPUTER POINT NUMBER	CRT SER POINT NUMBER
FCV-1-61	I	Y0391D	518 (518)
FCV-1-64	II	Y0392D	552 (726)
FCV-1-67	III	Y0393D	553 (727)
FCV-1-70	IV	Y0394D	557 (728)

	SRO/ CREW	2. NOTIFY MIG to remove failed stop valve limit switch from service USING appropriate Appendix::

TURBINE STOP VALVE	PROT CH	APPENDIX
FCV-1-61	I	D
FCV-1-64	II	E
FCV-1-67	III	F
FCV-1-70	IV	G

	SRO/CREW	Determines MT SV FCV-1-70 is the affected valve indication
	SRO	3. GO TO appropriate plant procedure.

Op Test No.: NRC Scenario # 1 Event # 6, 7 Page 29 of 47

Event Description: Turbine High Vibration (≤14 mills sustained- no trip required) / #4 MT Stop Valve indication loss

Time	Position	Applicant's Actions or Behavior
	SRO	Determines 1-AR-M2A D-4, Step 8 is correct procedure, step in effect and returns to complete ARP.
LEAD EXAMINER may cue next event once TS evaluation is complete in AOP-I.07.		

Op Test No.:	NRC	Scenario #	1	Event #	8, 9, 10	Page	30	of	47
Event Description:	Turbine High Vibration (Turbine Trip demand condition) EOP TRIP SEQUENCE								

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event, 8		
Indications available: • **1-AR-M2A D-4, VA-47-120 TURBINE HIGH VIBRATION** • **1-M-11-XR-47-2, Main Turbine Vibration Recorder**		
Evaluator Note: the turbine vibration severity will increase (>14 mils) resulting in a turbine trip demand condition as described in ARP. Annunciator **1-AR-M2A D-4, VA-47-120 TURBINE HIGH VIBRATION** has **NO** reflash function; the increased vibration condition will be identified by operator control board monitoring and/or AUO local observation providing feedback to the MCR crew. The crew will manually trip the reactor.		
T = 50	SRO	[8] IF vibration continues to increase, THEN CONSULT SM, AND EVALUATE tripping the turbine prior to exceeding 14 mils verified vibration USING the guidance provided in Step 2.
	SRO	[9] IF reactor trip, THEN GO TO E-0, *Reactor Trip or Safety Injection.*
	SRO	Direct Manual Rx Trip
	SRO	Enter and Direct E-0 Immediate Operator Actions (IOAs)
Evaluator Note: following IOA performance, prior to Steps 1-4 immediate action verification, RO/BOP surveys MCBs for any expected automatic system response that failed to occur. Upon discovery, they may take manual action(s) to align plant systems as expected for the event in progress. (Ref. EPM-4, Prudent Operator Actions)		
E-0, *Reactor Trip or Safety Injection*		
	Note 1 Steps 1 through 4 are immediate action steps	
	Note 2 This procedure has a foldout page	
	RO	1. VERIFY reactor TRIPPED: • Reactor trip breakers OPEN • Reactor trip bypass breakers DISCONNECTED or OPEN • Neutron flux DROPPING • Rod bottom lights LIT • Rod position indicators less than or equal to 12 steps.

Op Test No.: NRC	Scenario # 1	Event # 8, 9, 10	Page 31 of 47
Event Description:	Turbine High Vibration (Turbine Trip demand condition) EOP TRIP SEQUENCE		

Time	Position	Applicant's Actions or Behavior
	BOP	2. VERIFY turbine TRIPPED: • Turbine stop valves CLOSED.
	BOP	3. VERIFY at least one train of shutdown boards ENERGIZED. • Attempt to restore power to at least ONE train of shutdown boards • Place DG 1A-A control switch in START • Verify Train A Shutdown Boards ENERGIZED
	RO	4. DETERMINE if SI actuated: • ECCS pumps RUNNING. • Any SI alarm LIT [M-4D] (SI will be actuated) ***(RNO Required)***
	RO	**RNO:** DETERMINE if SI required: a. IF any of the following conditions exists: • S/G pressure less than 600 psig, OR • RCS pressure less than 1870 psig, OR • Containment pressure greater than 1.5 psig, THEN ACTUATE SI.
	SRO	b. IF SI is NOT required, THEN PERFORM the following: 1) MONITOR status trees. 2) GO TO ES-0.1, Reactor Trip Response.
	SRO	SRO determines SI not required; SRO implements status tree monitoring and transitions to ES-0.1, Reactor Trip Response.

Op Test No.:	NRC	Scenario #	1	Event #	8, 9, 10	Page	32	of	47
Event Description:	Turbine High Vibration (Turbine Trip demand condition) EOP TRIP SEQUENCE								

Time	Position	Applicant's Actions or Behavior
		ES-0.1, Reactor Trip Response
Evaluator Note: Event 9, Lp #1 SG Atmospheric Relief Valve sticks open shortly after the reactor trip resulting in SI actuation conditions; the crew should re-enter E-0 from ES-0.1. Expected indications and operator actions contained at end of this guide.		
Evaluator Note: Event 10, MFW Isolation Fails to Auto Actuate will manifest itself during Event 9 cooldown and subsequent SI actuation. Identification and corrective action may occur during E-0 re-entry.		
Note: This procedure has a foldout page.		
	RO	1. MONITOR SI NOT actuated: • SI ACTUATED permissive DARK[M-4A, D4]
	BOP	2. VERIFY generator breakers OPEN.
	RO	3. MONITOR RCS temperatures: • IF any RCP running, THEN CHECK T-avg stable at or trending to between 547°F and 552°F. OR • IF RCPs stopped, THEN CHECK T-cold stable at or trending to between 547°F and 552°F.
	BOP	4. **CHECK** feedwater status: a. T-avg less than 550°F.
		b. MFW pumps TRIPPED.
		c. MFW regulating valves CLOSED.
		d. MFW regulating bypass valve controller outputs ZERO.
		e. MFW isolation valves CLOSED.
	BOP	5. **CHECK** total feed flow to S/Gs greater than 440 gpm.
	RO	6. **CHECK** if emergency boration is required:

Op Test No.: NRC Scenario # 1 Event # 8, 9, 10 Page 33 of 47

Event Description: Turbine High Vibration (Turbine Trip demand condition) EOP TRIP SEQUENCE

Time	Position	Applicant's Actions or Behavior
		a. **VERIFY** all control rods fully inserted: • Rod bottom lights LIT • Rod position indicators less than or equal to 12 steps.
		b. **MONITOR** RCS temperature: • T-avg greater than 540°F if any RCP running OR • T-cold greater than 540°F if all RCPs stopped.
	CREW	7. **ANNOUNCE** reactor trip **USING** PA system.
	RO	8. **MONITOR** pressurizer level control: a. **CHECK** pressurizer level greater than 17%.
	RO	b. **CHECK** non-essential control air established to containment: • Unit 1 Only: 1-FCV-32-110 OPEN. [Pnl 6K] • Unit 2 Only: 2-FCV-32-111 OPEN. [Pnl 6L]
	RO	c. **VERIFY** charging IN SERVICE.
	RO	d. **VERIFY** letdown IN SERVICE.
	RO	e. **CHECK** pressurizer level trending to 25% (normal range 20% to 30%).
	RO	9. **MONITOR** pressurizer pressure control:
		a. Pressurizer pressure greater than 1870 psig.
		b. Pressurizer pressure stable at or trending to 2235 psig (normal range 2210 psig to 2260 psig).
	BOP	10. **MAINTAIN** S/G narrow range levels:
		a. Greater than 10%.
		b. Between 10% and 50%.
	BOP	11. **VERIFY** AC busses ENERGIZED from start busses.

Op Test No.:	NRC	Scenario #	1	Event #	8, 9, 10	Page	34	of	47
Event Description:	Turbine High Vibration (Turbine Trip demand condition) EOP TRIP SEQUENCE								

Time	Position	Applicant's Actions or Behavior
	CAUTION: Arming steam dumps in pressure mode with demand signal present could result in rapid RCS cooldown.	
	BOP	12. **DETERMINE** if steam dump to condenser available:
		a. **CHECK** condenser AVAILABLE:
		• C-9 CONDENSER INTERLOCK permissive LIT [M-4A, E6] • At least one Intact S/G MSIV OPEN.
		b. **PLACE** steam dumps in STEAM PRESS mode:
		1) **PLACE** steam dumps in OFF. 2) **ENSURE** steam dumps in steam pressure mode. 3) **ENSURE** zero output (demand). 4) **PLACE** steam dumps in ON. 5) **ENSURE** steam dump controller setpoint at 1005 psig. 6) **ADJUST** steam dump controller as necessary to maintain S/G pressure at approx. 1005 psig.
		NOTE Loop 2 RCP and associated spray valve will provide adequate spray flow for RCS pressure control. If Loop 2 is not available, all three remaining RCPs may be required to ensure adequate spray flow.
	RO	13. **CHECK** RCP #2 RUNNING.
	RO	14. **MONITOR** if source range channels should be reinstated:
		a. **CHECK** intermediate range flux less than 10- 4 % power on operable channels.
		b. **CHECK** source range channels REINSTATED.
		c. **ENSURE** at least one SRM and IRM displayed on NR-45 recorder.
		d. **ENSURE** audio count rate operation.
		e. **RESET** shutdown monitor alarm setpoints. [M-13]
		f. **WHEN** shutdown monitor ALARM LEDs dark **AND** HIGH FLUX AT SHUTDOWN bistable lights dark, **THEN** **PLACE** HIGH FLUX AT SHUTDOWN alarm block switches in NORMAL. [M-13]

Op Test No.: NRC	Scenario # 1	Event # 8, 9, 10	Page 35 of 47
Event Description: Turbine High Vibration (Turbine Trip demand condition) EOP TRIP SEQUENCE			

Time	Position	Applicant's Actions or Behavior
	BOP	15. **SHUT DOWN** unnecessary plant equipment: • **REFER TO** 0-GO-12, Realignment Of Secondary Equipment Following Reactor/Turbine Trip.
	CREW	16. **MAINTAIN** stable plant conditions:
		a. Pressurizer pressure at 2235 psig (normal range 2210 psig to 2260 psig) b. Pressurizer level at 25% (normal range 20% to 30%) c. S/G narrow range levels between 10% and 50% d. RCS temperature at 547°F (between 540°F and 550°F): • T-avg if any RCP running OR • T-cold if all RCPs stopped.
		17. **PERFORM** EA-0-9, Post Trip Administrative Requirements and Recovery Actions.
	RO/SRO	18. **DETERMINE** if natural circulation cooldown is required:
		a. **CHECK** at least one RCP RUNNING.
		b. **CHECK** at least one AFW pump AVAILABLE.
		c. **SELECT** appropriate procedure:
		• 0-GO-6, Power Reduction from 30% Reactor Power to Hot Standby (if maintaining hot standby) OR • 0-GO-7, Unit Shutdown from Hot Standby to Cold Shutdown OR • other appropriate procedure as determined by Shift Manager or TSC (if manned).
	SRO	d. **GO TO** appropriate plant procedure.

Op Test No.:	NRC	Scenario #	1	Event #	8, 9, 10	Page	36	of	47
Event Description:	Turbine High Vibration (Turbine Trip demand condition) EOP TRIP SEQUENCE								

Time	Position	Applicant's Actions or Behavior
		E-0, *Reactor Trip or Safety Injection*
		Indications available: **1-M-1:** • **1-M-11-XR-47-2, Main Turbine Vibration Recorder indicating >15 mils for #s 1 & 2 bearings** **1-M-4:** • **Lp #1 SG Atm Relief Valve indicates open** • **1-XI-94-101/102, Core Exit Temp Margin to Saturation (exo sensors Trn A & B) pressure indications trending to SI actuation pressure value.** **1-M-5:** • **1-PI-68-340A, 1-PI-68-334, 1-PI-68-323, 1-PI-68-322, RCS PZR PRESS narrow range indicators trending to actuation pressure value.** • **1-PR-68-69, RCS LOOP 1 HL WIDE RANGE PRESS indicator trending to actuation pressure value.** • **Loop 1 TAVG indicator 1-TI-68-2E indicates lower temperature than adjacent Loops 2, 3, 4.** • **1-TI-68-18, Loop 1 RCS CL Temp and 1-TI-68-1, Loop 1 RCS HL Temp (WR indicators) shows a larger ΔT than adjacent Loops 2, 3, 4 indicators.** • **1-TR-68-1, HL-CL TEMP recorder indicates excessive cooldown compared to adjacent Loops 2, 3, 4 recorders.** **1-M-6:** • **1-PI-68-66A, HL Pressure LOOP 3 indicator trending to actuation pressure value.** • **1-PI-68-62, RCS HL Press WR indicator trending to actuation pressure value.** • **1-PI-68-69, RCS HL Press WR indicator trending to actuation pressure value.**
		Evaluator Note: Crew performs high-level actions only for steps 1-4 on re-entry at this time.
	Note 1 Steps 1 through 4 are immediate action steps	
	Note 2 This procedure has a foldout page	
	RO	1. VERIFY reactor TRIPPED:
	BOP	2. VERIFY turbine TRIPPED:
	BOP	3. VERIFY at least one train of shutdown boards ENERGIZED.
	RO	4. DETERMINE if SI actuated:

Op Test No.:	NRC	Scenario #	1	Event #	8, 9, 10	Page	37	of	47
Event Description:	Turbine High Vibration (Turbine Trip demand condition) EOP TRIP SEQUENCE								

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**Critical Task is manually actuate Feedwater Isolation, ES-0.5 Step 8, VERIFY MFW Isolation.** (If recognized, may be completed during Prudent Operator Actions (POAs) following completion of E-0 Immediate Operator Actions (IOAs). (ES-0.5 directs completion by BOP during performance.)
Evaluator Note:		**Critical Task to manually isolate ALL Auxiliary Feedwater Flow within 10 minutes after a steamline break:** _____ Isolation Time Malf. Init time: _____; AFW isolation time: _____ **Time:** _____ (If recognized, may be completed during Prudent Operator Actions (POAs) following completion of E-0 Immediate Operator Actions (IOAs). (Normally be completed by BOP during POAs.)
Evaluator Note:		[(Actions for ES-0.5 are contained in attachment at back of scenario guide)]
	BOP	5. PERFORM ES-0.5, Equipment Verifications WHILE continuing in this procedure.
	RO	6. DETERMINE if secondary heat sink available: a. CHECK total AFW flow greater than 440 gpm. b. CHECK narrow range level greater than 10% [25 ADV] in at least one S/G. c. CONTROL feed flow to maintain narrow range level between 10% [25% ADV] and 50% in all S/Gs. (Heat Sink is available from AFW:>440 gpm available.)
	RO	7. CHECK if main steam lines should be isolated:
		a. CHECK if any of the following conditions have occurred:
		• Any S/G pressure less than 600 psig AND STEAMLINE PRESS ISOL SI BLOCK RATE ISOL ENABLE permissive DARK [M-4A, A4] OR
		• Any S/G pressure dropping UNCONTROLLED. OR • Phase B actuation

Op Test No.:	NRC	Scenario #	1	Event #	8, 9, 10	Page	38	of	47
Event Description:	Turbine High Vibration (Turbine Trip demand condition) EOP TRIP SEQUENCE								

Time	Position	Applicant's Actions or Behavior
		b. ENSURE MSIVs and MSIV bypass valves CLOSED
		c. ENSURE applicable Foldout Page actions COMPLETED
	RO	8. CHECK RCP trip criteria: a. CHECK the following: • RCS pressure less than 1250 psig. AND • At least one CCP OR SI pump RUNNING b. STOP RCPs
	RO	9. MONITOR RCS temperatures: • IF any RCP running, THEN CHECK T-avg stable at or trending between 547 degrees F and 552 degrees F. OR • IF RCPs stopped, THEN CHECK T-cold stable or trending to between 547°F and 552°F.
	RO	10. CHECK pressurizer PORVs, safeties, and spray valves: a. Pressurizer PORVs CLOSED. b. Pressurizer safety valves CLOSED. c. Normal spray valves CLOSED. d. Power to at least one block valve AVAILABLE. e. At least one block valve OPEN.
	CREW	11. DETERMINE S/G secondary pressure boundaries are INTACT: • CHECK all S/G pressures CONTROLLED or RISING. • CHECK all S/G pressures greater than 140 psig. ***(RNO Required)***
	SRO	**RNO:** **PERFORM** the following:

Op Test No.: NRC	Scenario # 1	Event # 8, 9, 10	Page 39 of 47
Event Description:	Turbine High Vibration (Turbine Trip demand condition) EOP TRIP SEQUENCE		

Time	Position	Applicant's Actions or Behavior
		a. **MONITOR** status trees.
		b. **GO TO** E-2, Faulted Steam Generator Isolation.
		Crew transitions to E-2, FAULTED STEAM GENERATOR ISOLATION
		E-2, FAULTED STEAM GENERATOR ISOLATION
	CAUTION:	Unisolating a faulted S/G or secondary break should NOT be considered UNLESS needed for RCS cooldown.
		1. **CHECK** MSIVs and MSIV bypass valves CLOSED.
		2. **CHECK** ANY S/G secondary pressure boundary INTACT: • Any S/G pressure CONTROLLED or RISING.
		3. **IDENTIFY** Faulted S/G(s):
		a. **CHECK** S/G pressures: • Any S/G pressure DROPPING in an uncontrolled manner. **OR** • Any S/G pressure less than 140 psig.
CAUTIONS:	• Secondary heat sink requires at least one S/G available. • Isolating both steam supplies to the TD AFW pump when it is the only source of feed flow will result in loss of secondary heat sink.	
Evaluator Note:	**Critical Task to manually isolate ALL Auxiliary Feedwater Flow within 10 minutes after a steamline break:** _____ (Isolation Time) (If recognized, may be completed during Prudent Operator Actions (POAs) following completion of E-0 Immediate Operator Actions (IOAs). (Normally be completed by BOP during POAs.)	
	RO	4. **ISOLATE** Faulted S/G(s):
		• ISOLATE MFW. • ISOLATE AFW. • CLOSE TD AFW pump steam supply from faulted S/G FCV-1-15 (S/G #1) or FCV-1-16 (S/G #4). • VERIFY S/G blowdown valves CLOSED.

Op Test No.:	NRC	Scenario #	1	Event #	8, 9, 10	Page	40	of	47
Event Description:	Turbine High Vibration (Turbine Trip demand condition) EOP TRIP SEQUENCE								

Time	Position	Applicant's Actions or Behavior
		• VERIFY atmospheric relief CLOSED.
		5. **CHECK** CST level greater than 5%.
		6. **VERIFY** secondary radiation NORMAL:
		a. **CHECK** secondary radiation NORMAL**USING** Appendix A, Secondary Rad Monitors. (App. A also contained in ES-0.5)
		b. **NOTIFY** Chem Lab to take S/G activity samples.
		c. **WHEN** Chem Lab is ready to sample S/Gs, **THEN PERFORM** the following:
		1) **ENSURE** FCV-15-43 Blowdown Flow Control valve CLOSED.
		2) **ENSURE** Phase A signal RESET.
		3) **OPEN** blowdown isolation valves.
		d. **NOTIFY** RADCON to survey main steam lines and S/G blowdown.
		e. **WHEN** S/G samples completed, **THEN CLOSE** blowdown isolation valves.
	RO	7. **CHECK** SI termination criteria:
		a. RCS subcooling based on core exit T/Cs greater than 40°F.
		b. Secondary heat sink:
		• Narrow range level in at least one Intact S/G greater than 10% [25%ADV] OR • Total feed flow to Intact S/Gs greater than 440 gpm.
		c. RCS pressure stable or rising.
		d. Pressurizer level greater than 10% [20% ADV].
	SRO	e. **GO TO** ES-1.1, SI Termination.
		SRO determines transition to ES-1.1 is appropriate.
Scenario may be terminated upon transition to ES-1.1, SI Termination		

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Event Description: **Equipment Verifications**

Time	Position	Applicant's Actions or Behavior
		ES-0.5, EQUIPMENT VERIFICATIONS
		Evaluator Note: BOP completes ES-0.5 including Appendices A & B and reports completion (including any discrepancies and actions taken, i.e.: manual Feedwater Isolation per ES-0.5 Step 8) to SRO.
	BOP	1. **VERIFY** D/G ERCW supply valves OPEN.
	BOP	2. **VERIFY** at least four ERCW pumps RUNNING
	BOP	3. **VERIFY** CCS pumps RUNNING
		1. Pump 1A-A (2A-A) Must Manually Start 2. Pump 1B-B (2B-B) 3. Pump C-S.
	BOP	4. **VERIFY** EGTS fans RUNNING.
	BOP	5. **VERIFY** generator breakers OPEN.
	BOP	6. **VERIFY** AFW pumps RUNNING: • MD AFW pumps • TD AFW pump.
		NOTE AFW level control valves should NOT be repositioned if manual action has been taken to control S/G levels, to establish flow due to failure, or to isolate a faulted S/G.

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Event Description: **Equipment Verifications**

Time	Position	Applicant's Actions or Behavior
	BOP	7. CHECK AFW valve alignment: a. VERIFY MD AFW LCVs in AUTO. b. VERIFY TD AFW LCVs OPEN. c. VERIFY MD AFW pump recirculation valves FCV-3-400 and FCV-3-401 CLOSED.
Evaluator Note:		**Critical Task is manually actuate Feedwater Isolation, ES-0.5 Step 8, VERIFY MFW Isolation.** (If recognized, may be completed during Prudent Operator Actions (POAs) following completion of E-0 Immediate Operator Actions (IOAs). (ES-0.5 Step 8 directs completion by BOP during performance.)
Critical Task	BOP	8. **VERIFY MFW Isolation:** **a. MFW pumps TRIPPED** • **MFW regulating valves CLOSED** • **MFW regulating bypass valve controller outputs ZERO** • **MFW isolation valves CLOSED**
	BOP	9. **MONITOR** ECCS operation:
		a. **VERIFY** ECCS pumps RUNNING: • CCPs: • RHR pumps • SI pumps
		b. **VERIFY** CCP flow through CCPIT.
		c. **CHECK** RCS pressure less than 1500 psig.
		d. **VERIFY** SI pump flow.
		e. **CHECK** RCS pressure less than 300 psig.
		f. **VERIFY** RHR pump flow.
	BOP	10. **VERIFY** ESF systems ALIGNED:
		a. Phase A ACTUATED: • PHASE A TRAIN A alarm LIT [M-6C, B5]. • PHASE A TRAIN B alarm LIT [M-6C, B6].

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Event Description: **Equipment Verifications**

Time	Position	Applicant's Actions or Behavior
		b. Cntmt Vent Isolation ACTUATED: • CNTMT VENT ISOLATION TRAIN A alarm LIT [M-6C, C5]. • CNTMT VENT ISOLATION TRAIN B alarm LIT [M-6C, C6].
		c. Status monitor panels: • 6C DARK • 6D DARK • 6E LIT OUTSIDE outlined area • 6H DARK • 6J LIT.
		d. Train A status panel 6K: • CNTMT VENT GREEN • PHASE A GREEN
		e. Train B status panel 6L: • CNTMT VENT GREEN • PHASE A GREEN
	BOP	11. **MONITOR** for containment spray and Phase B actuation:
		a. **CHECK** for any of the following: • Phase B ACTUATED **OR** • Containment pressure greater than 2.8 psig.
		b. **VERIFY** containment spray INITIATED:
		1) Containment spray pumps RUNNING. 2) Containment spray header isolation valves FCV-72-39 and FCV-72-2 OPEN. 3) Containment spray recirculation valves to RWST FCV-72-34 and FCV-72-13 CLOSED. 4) Containment spray header flow greater than 4750 gpm per train. 5) Panel 6E LIT.

Op Test No.: NRC Scenario # 1 Event # ES-0.5 Page 44 of 47

Event Description: **Equipment Verifications**

Time	Position	Applicant's Actions or Behavior
		c. **VERIFY** Phase B ACTUATED: • PHASE B TRAIN A alarm LIT [M-6C, A5]. • PHASE B TRAIN B alarm LIT [M-6C, A6].
		d. **ENSURE** RCPs STOPPED.
		e. **VERIFY** Phase B valves CLOSED: • Panel 6K PHASE B GREEN. • Panel 6L PHASE B GREEN.
		f. **CHECK** cntmnt vacuum relief isolation valves CLOSED: [Pnl 6K MANUAL] • FCV-30-46 • FCV-30-47 • FCV-30-48.
		WHEN 10 minutes have elapsed, **THEN ENSURE** containment air return fans RUNNING.
	BOP	12. **CHECK** secondary and containment rad monitors **USING** the following: • Appendix A, Secondary Rad Monitors (attached) • Appendix B, Containment Rad Monitors. (attached)
	BOP	13. **CHECK** pocket sump pumps STOPPED: [M-15, upper left corner] • HS-77-410, Rx Bldg Aux Floor and Equipment Drain Sump pump A • HS-77-411, Rx Bldg Aux Floor and Equipment Drain Sump pump B.

Op Test No.:	NRC	Scenario #	1	Event #	ES-0.5	Page	45	of	47
Event Description:	**Equipment Verifications**								

Time	Position	Applicant's Actions or Behavior
	BOP	14. **DISPATCH** personnel to perform EA-0-1, Equipment Checks Following ESF Actuation.
	BOP	15. **ENSURE** plant announcement has been made regarding Reactor Trip and SI.
Evaluator Note:	**BOP completes ES-0.5 including Appendices A & B and reports completion (including any discrepancies and actions taken, i.e.: manual Feedwater Isolation per ES-0.5 Step 8) to SRO.**	
END (ES-0.5, EQUIPMENT VERIFICATIONS)		

Op Test No.:	NRC	Scenario #	1	Event #	ES-0.5	Page	46	of	47
Event Description:	**Equipment Verifications**								

(ES-0.5, EQUIPMENT VERIFICATIONS)		
APPENDIX A **SECONDARY RAD MONITORS**		
	BOP	1. **CHECK** following rad monitors including available trends prior to isolation: • Condenser exhaust recorder RR-90-119 • S/G blowdown recorder RR-90-120 • Main steam line rad monitors • Post-Accident Main Steam Line rad recorder RR-90-268B points 3 (blue), 4 (violet), 5 (black), and 6 (brown). [M-31 (back of M-30)]
	BOP	2. **IF** secondary radiation is HIGH, **THEN** **ENSURE** Unit Supervisor notified.
END OF TEXT		

Op Test No.:	NRC	Scenario #	1	Event #	ES-0.5	Page	47	of	47
Event Description:	**Equipment Verifications**								

APPENDIX B **CONTAINMENT RAD MONITORS**		
	BOP	1. **CHECK** following rad monitors: • Upper containment high range rad monitors RM-90-271 and RM-90-272 NORMAL [M-30] • Lower containment high range rad monitors RM-90-273 and RM-90-274 NORMAL [M-30] • Containment rad recorders RR-90-112 and RR-90-106 NORMAL [M-12] (prior to isolation).
	BOP	2. **IF** secondary radiation is HIGH, **THEN** **ENSURE** Unit Supervisor notified.
END OF TEXT		

APPENDIX C

Time: Now Date: Today

Unit 1 MCR Checklist

Part 1 - Completed by Off-going Shift / Reviewed by On-coming Shift

Mode 1, 100% Power 1200 MWe
PSA Risk: Green
Grid Risk: Green
RCS Leakage ID .02 gpm, UNID .01 gpm

NRC phone Authentication Code

Until 0800 XXXX
After 0800 XXXX

Common Tech Spec Actions

LCO/TRM	Equipment INOP	Time INOP	Owner	RTS
None	None	- - - -	- - - -	- - -

U-1 Tech Spec Actions

LCO/TRM	Equipment INOP	Time INOP	Owner	RTS
None	None	- - - -	- - - -	- - -

Protected Equipment

- ***None***

Shift Priorities

- ***None***

Part 2 – Performed by on-coming shift

☐ Verify your current qualifications (re: OPDP-1 Section 7.3 F.)

☐ Review Operating Log since last held shift or 3 days, whichever is less.

Review the following for changes since last shift turnover:

☐ ODMIs/Standing Orders/ Shift Orders ☐ LCO actions ☐ PERs (applicable to unit)

☐ TACFs ☐ Operator workarounds, burdens, and challenges ☐ Immediate required reading

Part 3 – Performed by both off-going and on-coming shift

☐ Walk down of MCR Control Boards

Time: Now Date: Today

MCR Red Dot List

UNID And Noun Name	Panel	Problem Description	WO / PER Number	Date Scheduled

MCR WO List

ID And Noun Name	Panel	Problem Description	WO/PER Number	Date Scheduled

UNIT ONE REACTIVITY BRIEF

Date: Today Time: Now

General Information

RCS Boron: **850** ppm Today		BA Controller Setpoint: **21%** *	RCS B-10 Depletion: **52** ppm
Operable BAT: **A**	BAT A Boron: **6850** ppm	BAT C Boron: **6850** ppm	RWST Boron: **2601** ppm
Nominal Gallons per rod step from 219: **7** gallons of acid, **42** gallons of water			

* Verify boric acid flow controller is set at Adjusted BA Controller Setting iaw 0-SO-62-7 section 5.1

Estimated values for a 1° Change in Tave **

Gallons of acid: **32**	Gallons of water: **227**	Rod Steps: **5**

Estimated rods/boron for emergency step power reduction **

(Assuming Xenon equilibrium and no reactivity effects due to Xenon. 2/3 total reactivity from rods, 1/3 from boron)

Power reduction amount	Estimated Final Rod Position	Estimated boron addition
10%	**198** Steps on bank D	**107** gallons
30%	**175** Steps on bank D	**312** gallons
50%	**156** Steps on bank D	**506** gallons

** These values are approximations and not intended nor expected to be exact. The values may be superseded by Rx Engineering or SO-62-7 calculated values. These values are calculated assuming 100% steady state power operation only. Engineering data last updated **one week ago**. Data Valid until **one week from now**.

Previous Shift Reactivity Manipulations

Number of dilutions: 3	Number of borations: 0	Rod steps in: 0
Gallons per dilution: 40	Gallons per boration: 0	Rod steps out: 0
Total amount diluted: 120	Total amount borated: 0	Net change: 0 IN/Out

Current Shift Estimated Reactivity Manipulations

Number of dilutions: 3	Number of borations: 0	Rod steps in: 0
Gallons per dilution: 40	Gallons per boration: 0	Rod steps out: 0
Total expected dilution: 120	Total expected boration: 0	Net change: 0 In/Out

Remarks:

Rx Power: 100%
Xenon: 2729 pcm, equilibrium
Last Dilution Completed: ~1 hour ago

Burnup: 10,000 Mwd/mtU
Samarium: 926 pcm

Next Unit 1 Flux Map is scheduled - three weeks from now
Unit 1 M-P is 0 PPM

Unit Supervisor: _____
Name/Date

Operations Chemistry Information

Boron Results					
Sample Point	**Units**	**Boron**	**Date / Time**	**Goal**	**Limit**
U1 RCS	ppm	850	Today / Now	Variable	Variable
U2 RCS	ppm	1120	Today / Now	Variable	Variable
U1 RWST	ppm	2601	Today / Now	2550 - 2650	2500 - 2700
U2 RWST	ppm	2569	Today / Now	2550 - 2650	2500 - 2700
BAT A	ppm	6850	Today / Now	Variable	Variable
BAT B	ppm	6850	Today / Now	Variable	Variable
BAT C	ppm	6850	Today / Now	Variable	Variable
U1 CLA #1	ppm	2556	Today / Now	2470-2630	2400-2700
U1 CLA #2	ppm	2575	Today / Now	2470-2630	2400-2700
U1 CLA #3	ppm	2591	Today / Now	2470-2630	2400-2700
U1 CLA #4	ppm	2589	Today / Now	2470-2630	2400-2700
U2 CLA #1	ppm	2531	Today / Now	2470-2630	2400-2700
U2 CLA #2	ppm	2650	Today / Now	2470-2630	2400-2700
U2 CLA #3	ppm	2522	Today / Now	2470-2630	2400-2700
U2 CLA #4	ppm	2526	Today / Now	2470-2630	2400-2700
Spent Fuel Pool	ppm	2547	Today / Now	$\geq$ 2050	$\geq$ 2000
Lithium Results				**Goal**	**Midpoint**
U1 RCS Lithium	ppm	1.1	Today / Now	>1	>1
U2 RCS Lithium	ppm	2.43	Today / Now	2.18-2.48	2.33

Primary to Secondary Leakrate Information (Total CPM RM-90-99/119)					
Indicator	**Units**	**U1**	**Date / Time**	**U2**	**Date/Time**
SI 50 S/G Leakage?	Yes/No	No	Today / Now	No	Today / Now
SI 137.5 CVE Leakrate	gpd	< 0.1	Today / Now	< 0.1	Today / Now
5 gpd leak equivalent	cpm	115	Today / Now	111	Today / Now
30 gpd leak equivalent	cpm	492	Today / Now	464	Today / Now
50 gpd leak equivalent	cpm	793	Today / Now	747	Today / Now
75 gpd leak equivalent	cpm	1170	Today / Now	1100	Today / Now
CVE Air Inleakage	cfm	10	Today / Now	12.5	Today / Now
Bkgd on 99/119	cpm	50	Today / Now	40	Today / Now
Correction Factor 99/119	cpm/gpd	15	Today / Now	14.13	Today / Now

Steady state conditions are necessary for an accurate determination of leak rate using the CVE Rad Monitor

Facility:	Sequoyah	Scenario No.:	2	Op Test No.:	NRC
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		

Initial Conditions: ≈ 85% RTP w/ 1A-A MDAFW Pump out of service for maintenance.

Turnover: Raise plant power to 100% according to 0-GO-5 Section 5.1

Target CTs: Manually start at least 1 EDG prior to placing safeguards loads P-T-L in ECA-0.0 including opening EDG ERCW Cooling water Valve.

Establish feedwater flow into at least one SG before RCS feed and bleed is required.

Event No.	Malf. No.	Event Type*	Event Description
1 T+0		R-RO N-SRO/BOP	Raise plant power to 100% RTP
2 T+10	RX06A	I-RO TS-SRO	Pressurizer Level Transmitter 68-339 Fails Low
3 T+20	ED08A CC09B	C-BOP TS-SRO	Loss of 1A1-A 480 VAC SDBd and 1B-B CCS Pump fail to auto start
4 T+30	HD06A HD03B set yp_rd17=-1 FW29C	N-Crew C-RO C-BOP	1-LCV-6-105A Fails to Variable Position #3 HDT Pump 1B Trip results in MT runback Rod Control failure resulting in continuous CB 'D' rod insertion Loop #3 FRV (1-LCV-3-90) Fails to operate in Automatic
5 T+40	FW16C	M-All	Loop #3 FRV (1-LCV-3-90) Fails closed resulting in a Reactor Trip demand
6 T+40	ED01 [pre-insert]	M-All	Loss of Offsite AC Power
7 T+40	EG08A EG08B RW19A [pre-insert]	C-BOP	1A-A EDG fails to automatically start 1B-B EDG fails to automatically start 1-FCV-67-66, ERCW to 1A-A EDG fails to open automatically
8 T+40	FW22B [pre-insert]	C-BOP	1B-B AFW Pump Airbound
9 T+40	FW07C [pre-insert]	C-BOP	U1 TDAFW Pump Mechanical over speed trip actuates

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Scenario 2 Summary

The crew will assume the shift with the unit in Mode 1 ≈ 85% RTP with 1A-A MDAFW Pump out of service; plant power reduction was completed 72 hours ago to repair 1B Condensate Booster Pump. 1B Pump PMT was successfully completed on the previous shift; current direction is to raise plant power to 100% according to 0-GO-5 Section 5.1 Step 58. Additionally, 1C Con DI Bstr Pump is in service in preparation for power escalation to 100%.

After the RO raises power, at Lead Examiner direction, the Pressurizer Level Transmitter controlling channel fails low; Pzr heaters de-energize and letdown isolation occurs. The crew will respond using alarm response procedures, (ARPs) and AOP-I.04, Pressurizer Instrument and Control Malfunctions Section 2.4. SRO will refer to Technical Specifications 3.3.1.1 Table 3.3-1 unit 11 Action 6; TS 3.3.3.5 Table 3.3-9 Instrument 7; TS 3.3.3.7 Table 3.3-10 unit 7 Action 2 and 3.4.4 Action a.

Following letdown restoration, at the Lead Examiner direction, 1A1-A 480 VAC Shutdown Board is de-energized due to normal feeder breaker over current trip-out. 1A-A Component Cooling Pump is de-energized, 1B-B CCS Pump fails to start automatically. The crew will respond according to ARPs, AOP-P.05, Loss of Unit 1 Shutdown Boards, Section 2.3 and AOP-M-03, Component Cooling System Malfunction, Section 2.1. SRO will refer to Technical Specifications 3.7.3, 3.8.1.1 Action b (dependent on EDG LO temperature) & TS 3.8.2.1 Action a.

When the plant is stable, at the Lead Examiner direction, 1B #3 HDT Pump trip and 1-LCV-6-105A fails partially open compounding the low HDT system flow resulting in a runback condition. As the transient stabilizes, Rod Control will fail resulting in a continuous CB 'D' rod insertion at ≈8 steps/minute and Loop #3 FRV fails to respond in automatic. The crew will respond, in accordance with AOP-S.04, Condensate or Heater Drains Malfunctions Section 2.6, Total or Partial Loss of #3 Heater Drain Tank Pump Flow- [preferred]; (the crew may enter Section 2.1 #3 Heater Drain Tank Pump Trip, non-preferred). Additionally AOP-C.01 Section 2.1 and AOP-S.01 Section 2.1 may be applied.

When the plant response to the runback is complete, at the Lead Examiner direction, Loop #3 Main Feedwater Regulating Valve will fail closed resulting in a Reactor trip condition. At the time of the trip, the crew will experience a loss of offsite AC power. The crew will respond to the automatic trip by performing E-0 immediate operator actions and the SRO will enter E-0; once E-0 immediate operator actions are complete, the crew should address the loss of offsite power using AOP-P.01, Loss of Offsite Power Section 2.1.

Coincident with the reactor trip, both 1A-A and 1B-B EDGs fail to start automatically, 1B-B MDAFW Pump is airbound and U1 TDAFW Pump mechanical over speed trip actuates and cannot be reset immediately. The crew must take action to manually start at least one EDG (both will start) and verify they energize the associated 6.9 kV shutdown boards to avoid entering ECA-0.0 Additionally, 1-FCV-67-66, ERCW to 1A-A EDG fails to open automatically requiring operator action to manually open the valve following 1A-A EDG start for continued diesel operation.

The crew will continue in E-0, transition to ES-0.1, implement status tree monitoring and identify FR-H.1 entry criteria. The scenario may be terminated as directed by the Lead Examiner once the crew restores secondary heat sink control either by venting the 1B-B MDAFW Pump or by resetting the TDAFW Pump resulting in positive SG level increase/RCS temperature change.

EOP flow: E-0 – ES.01 – FR-H.1 – ES-0.1
(Note; ECA-0.0 MAY be entered briefly prior to starting EDG)

The scenario may be terminated as directed by the Lead Examiner upon completion of ES.0-1 Step 5

PSA significant task: Start EDG; Start an AFW Pump (TD or MD Pump);
PSA significant DAS: Loss Of Offsite AC Power;
PSA significant component failure: CCS Pump trip
1A1-A 480 VAC SDBd
EDG ERCW Valve Auto Opening.

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
Simulator IC	**IC-169**	**85% RTP, BOL ~1000 MWD/MTU** **CB 'D' Rods @ 192 steps, all others @ 228 steps;** **[B] = 1128 ppm; Ba Blender setting: 27.5%** **Xe/Sm @ *equilibrium*** ***Console Operator actions: Place simulator in run and perform the following:*** • **Station Spare Radio @ 1-M-7 Power Xfer Pnl** • **Place the MODE 1 sign on 1-M-4** • **Place Train Week A sign** • **Place a hold order on the 1A-A MDAFW pump handswitch and on ERCW valve 1-FCV-3-116A.** • **Protect 1B-B MDAFW Pump and the TDAFW Pump.**
MFs, RFs, ORs are active when the SCN file is loaded.	**IMF EG08A f:1**	**1A-A EDG fails to automatically start**
	IMF EG08B f:1	**1B-B EDG fails to automatically start**
	IMF RW19B f:1	**Auto Open Signal to 1-FCV-67-67, 1B-B EDG ERCW Fails**
	IRF FWR34 f:0 **IOR ZLOHS3116AA_GREEN1 f:0** **IOR ZLOHS3116AA_GREEN2 f:0**	**1A-A MDAFW Pump tagged for maintenance;**
	IMF FW22B f:1	**1B-B AFW Pump Airbound**
	IMF FW07C f:1	**U1 TDAFW Pump Mechanical over speed trip actuates**
1.		**Raise plant power to 100%**
2.	**IMF RX06A f:1 r:30 k:2**	**Pzr Level LT 68-339 Fails Low** *Support staff report: When IMs or MSS is contacted to trip bistables using AOP-I.04 Appendix E, inform the crew IMs will report to the MCR in ~25 minutes*
3.	**IMF ED08A f:1 k:3** **IMF CC09B f:1 k:3**	**Loss of 1A1-A 480 VAC SDBd** **1B-B CCS Pump fails to auto start.** *Support staff report: If dispatched, wait ~3 minutes and respond as MCR AUO or WCC SRO and inform the crew the normal feeder breaker has tripped on overcurrent;* *If requested, Report from AUO: Aux Air Hdr Pressure: 92 psig; Control Air Hdr Pressure: 95 psig.*
Evaluator Note:	**Separate radio is available to initiate 1-M-7 power transfer while at back panel, 1-M-7 location.**	

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
When requested to Transfer 1-M-7 Instrument Rack A to alternate, use:	**IRF EDR66A f:1 k:10**	**120 VAC Instrument Power Rack A** **NOTE: 1-M-7A Transfer to Alternate- coordinate with examiner via radio.**
If requested to align spare charger 1-S to Vital Battery Bd 1:	**IFR EDR54A f:1 k:11**	**Place Spare Charger 1-S on vital Battery Bd 1** *Support staff report: When dispatched, wait ~ 20 minutes to insert the remote function and report the transfer* NOTE: Remote function EDR54E can be used to select Nor or Alt power (480v SD BD 1A2-A or 1B1-B) to Spare Charger 1-S.
If requested to Transfer Charger to Alt 480v supply:	**IRF EDR65A f:1 k:26**	**Transfer Vital Charger 1 to Alternate Power (B Train)** *Support staff report: When dispatched, wait ~ 20 minutes to insert the remote function and report the transfer* NOTE: This is the **non-preferred** alignment and most likely will not be used.
If requested to align an OPERABLE BATP:	**IRF CVR19 f:1 k:12**	**Aligns B BAT Pump to A BAT Tank** *Support staff report: If requested, wait ~10 minutes to insert the remote function and report the transfer*
If requested to transfer SFP Cooling to U2,	**[Insert batch file]** **swap_spent_fuel_cooling.scn**	**SFP Xfer to U2 Batch file (manually load)** *Support staff report: If requested to transfer SFPC to U2 and start a U2-powered SFPC Pump, after ~2 minutes, report transfer completed; if pump only was requested, wait ~2 minutes and report U2 pump in service.*
BOOTH OPERATOR: after 1B-B CCS Pump is manually started:	**DMF CC09B**	**Delete 1B-B CCS Pump Auto Start Failure following this event;** [simulated process input failure for the lo header pressure auto start]
4. **BOOTH OPERATOR: When directed by Lead Examiner, insert...**	**IMF HD06A f:.6 k:4** **IMF HD03B f:1 k:4** **IMF FW29C f:1 k:4** **set yp_rd17=-1** (causes CB 'D' automatic inserts @ 8 Steps/min; Rod motion stops when Rods are placed in 'Manual')	**LCV-6-105A Fails to Variable Position** **1B #3 HDP Trip** **FRV Controller FIC 3-90 AUTO Mode Failure** **Rod Control Auto Failure** *Support staff report: When dispatched, wait ~5 minutes and report as AUO the HDT Pump motor is hot to the touch and smells of burnt insulation; report as the WCC SRO the 6.9kV Unit BD breaker is tripped on instantaneous over current.* *If dispatched, report as the AUO that #3 FRV and controls appear normal by local observation.*

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
5.	**IMF FW16C f:1 k:5**	**Loop #3 FRV (1-LCV-3-90) Fails closed;** *Support staff report: If dispatched, report as the AUO that #3 FRV is closed by location observation.*
6.	**IMF ED01 f:1 e:1**	**Loss of Offsite AC Power;** *Support staff report: If contacted, report as WCC SRO, no damage in the Switchyard;* *If contacted, report as SELD, grid disturbance cause loss of grid, restoration time indeterminate at this time.*
7.	**IMF EG08A f:1** **IMF EG08B f:1** **IMF RW19B f:1** [pre-insert]	**1A-A EDG fails to automatically start;** **1B-B EDG fails to automatically start;** **Auto Open Signal to 1-FCV-67-67, 1B-B EDG ERCW Fails** *Support staff report: none*
8.	**IMF FW22B f:1** [pre-insert]	**1B-B AFW Pump Airbound** *Support staff report: When dispatched, wait ~5 minutes and report as AUO the AFW Pump motor is hot to the touch; report as the WCC SRO the 6.9kV SDBd breaker is tripped on instantaneous over current.*
9.	**IMF FW07C f:1** [pre-insert]	**U1 TDAFW Pump Mechanical Overspeed Trip actuates;** *Support staff report: If dispatched, report as AB AUO that the TD pump overspeed trip tripped; attempting to reset (T&T Valve)*
10. **When directed by Lead Examiner, insert...**	**DMF FW07C** **IRF FWR27 f:1 k:13**	**Delete U1 TDAFW Pump Mechanical Overspeed Trip & TDAFW Pp Overspeed Trip Reset** *Support staff report: Prior to IRF FWR27, report as AB AUO that the T&T valve is being reset.*
11. **When directed by Lead Examiner, insert...**	**IRF IAR01 f:1 k:14** **IRF IAR02 f:1 k:14**	**Locally starts both A & B Control Air Compressors** *Support staff report: If requested by crew; in response to EA-32-2 to re-establish Control Air*
12. **When directed by Lead Examiner, insert...**	**IRF IAR06 f:2 k:15**	**Opens FCV-32-110.** *Support staff report: Utilize after ~75 psig is developed in response to EA-32-1 to restore non-essential air to containment.*
13. **When directed by Lead Examiner, insert...**	**IRF EGR13 f:100 k:16**	Opens VLV-35-568 to vent generator hydrogen to the roof *Support staff report: If requested by crew; in response to AOP-P.01 Step 11*
Termination Criteria		**Upon Return to ES.0-1 Step 5 following FR-H.1 performance.**

Op Test No.: NRC Scenario # 2 Event # 1 Page 1 of 55

Event Description: Raise plant power to 100% RTP

Time	Position	Applicant's Actions or behavior
Booth Instructor: No action required for Event 1		
T = 0	**Crew will perform power change IAW 0-GO-5, Section 5.1**	
	SRO	Direct a load increase in accordance with 0-GO-5 Normal Power Operations, Section 5.1, and 0-SO-62-7 Boron Concentration Control, Section 6.2.
Evaluator Note: Following Steps are from 0-SO-62-7 Boron Concentration Control, Section 6.2 Dulite		
Evaluator Note: Dilutions will be performed based on the RE-provided Reactivity Spreadsheet; based on 0-GO-4 Notes, recommended dilution rate is 50 to 75 gallon batches every 12 to 15 minutes for a steady power increase. During subsequent power escalation, large volume dilutions will be divided evenly over each hour as determined by the crew [i.e.: one-third, one-quarter of the volume over each hour's period (e.g.: ~240 gallons, 4 times per hour for 963 gallons for the first hour)].		
	RO	**[1] ENSURE** unit is NOT in a Tech Spec or TRM action that prohibits positive reactivity additions. **[C.1]**
	NOTE	HUT level increase of 1% is equal to 1380 gallons (TI-28 fig. C.21).
	RO	**[2] ENSURE** sufficient capacity available in the HUT selected to receive expected amounts of CVCS letdown: (**N/A** if not used)
		HUT / **LEVEL** / **INITIALS** A / _____ % / _____ B / _____ % / _____
	RO	**[3] ENSURE** makeup system is aligned for **AUTO** operation in accordance with Section 5.1.
	RO	**[4] RECORD** the quantity of dilution water required to achieve desired boron concentration using Appendix D. (**N/A** for minor power changes)
	NOTE	Due to eyeball interpolation the verified calculation may slightly differ from the initial calculation. The following signoff indicates that any differences in the two results have been discussed and are close enough to be considered validated.
	RO	**[5] PERFORM** Appendix I Independent Verification of Calculation for Amount of Boric Acid or Primary Water. (N/A if App. D was performed by SRO to verify data from Rx Engineering)

Op Test No.: NRC Scenario # 2 Event # 1 Page 2 of 55

Event Description: Raise plant power to 100% RTP

Time	Position	Applicant's Actions or behavior
	RO	**[6] PLACE [HS-62-140A]**, Boric Acid Supply to Blender Flow Control Switch to the **STOP** position.
	RO	**[7] PLACE [HS-62-140B]**, CVCS Makeup Selector Switch to the **DILUTE** position.
	RO	**[8] ENSURE [HS-62-140D]**, Boric Acid Valve to the Blender is **CLOSED** (Green light is **LIT**).
	RO	**[9] SET [FQ-62-142]**, Batch Integrator for the desired quantity
	NOTE	Primary Water Flow Controller **[FC-62-142]** receives its reference signal (70 gpm) from setpoint potentiometer (dial indicator) located on panel M-6. A setpoint of 35% corresponds to a 70 gpm primary water flow rate
	RO	**[10] ADJUST [FC-62-142]**, Primary Makeup Water Flow Controller for the desired flow rate
	RO	**[11] PLACE [HS-62-140A]**, Boric Acid Supply to Blender Flow Control Switch to the **START** position.
	RO	**[12] VERIFY** the following;
		[a] Inlet to top of VCT **[FCV-62-128]** is **OPEN**.
		[b] Primary Water flow by **[FI-62-142A] OR [FQ-62-142]**.
	NOTE	Alternate dilution in small amounts is acceptable on a regular basis, provided no significant changes in seal water temperature or seal leakoff are indicated. Batches of 5 to 10 gallons may be added through FCV-62-144 on a frequency not to exceed once per 30 minutes. ICS points for No. 1 seal leakoffs and seal water temperatures on the RCPs should be monitored during and after dilution.
	RO	**[13] IF** primary water addition to the bottom of the VCT **[FCV-62-144]** is desired, **THEN**
	RO	**[a] CLOSE [FCV-62-128]** with **[HS-62-128]**.
	RO	**[b] OPEN [FCV-62-144]** with **[HS-62-144]**.
	RO	**[c] VERIFY** Primary Water flow by **[FI-62-142A] OR [FQ-62-142]**.

Op Test No.: NRC Scenario # 2 Event # 1 Page 3 of 55

Event Description: Raise plant power to 100% RTP

Time	Position	Applicant's Actions or behavior
	NOTE	It may take approximately 15 minutes before any changes to reactivity are indicated on nuclear instrumentation or RCS temperature indication.
		[14] MONITOR nuclear instrumentation and reactor coolant temperature to ensure the proper response from dilution.
		[15] IF [LI-62-129], Volume Control Tank Level, increases to 63 percent, **THEN ENSURE [LCV-62-118]**, Volume Control Tank Divert Valve **OPENS** to divert excess water to the Holdup Tanks.
		[16] WHEN dilution is complete, **THEN**
		[a] PLACE [HS-62-140A], Boric Acid to Blender Flow Control Switch to the **STOP** position.
		[b] IF [FCV-62-144] was previously **OPENED**, **THEN CLOSE [FCV-62-144]** with **[HS-62-144]**.
		[c] VERIFY no primary water flow on either **[FI-62-142A] OR [FQ-62-142]**.
		[d] ENSURE [FCV-62-128] is **CLOSED**
		[17] IF power increase in progress and additional dilutions will be required, **THEN** use this table to re-perform steps **[4]** through **[18]** (next page)
		[19] REALIGN the blender controls for **AUTO** makeup to the CVCS in accordance with Section 5.1.
		[20] ENSURE dilution(s) is logged in Unit Narrative Log.
	NOTE	Sample may be obtained at normal RCS sample intervals provided the unit is at power and the unit response following the dilution is as expected.
		[21] IF RCS boron sample is required, **THEN NOTIFY** Chem Lab to obtain RCS boron sample.
		End of Section 6.2

Op Test No.: NRC Scenario # 2 Event # 1 Page 4 of 55

Event Description: Raise plant power to 100% RTP

Time	Position	Applicant's Actions or behavior

STEP	1st	2nd	3rd
[4] RECORD the quantity of dilution water required to achieve desired boron concentration using Appendix D.	Quantity	Quantity	Quantity
[5] PERFORM Appendix I, IV of Calculation for amount of BA or PW.	SRO	SRO	SRO
[6] PLACE [HS-62-140A], Boric Acid Supply to Blender Flow Control Switch to the **STOP** position.	___/___ 1st CV	___/___ st CV	___/___ st CV
[7] PLACE [HS-62-140B], CVCS Makeup Selector Switch to the **DILUTE** position.	☐	☐	☐
[8] ENSURE [HS-62-140D] Boric Acid Valve to Blender is **CLOSED** (Green light **LIT**).	☐	☐	☐
[9] SET [FQ-62-142], Batch Integrator for the desired quantity.	___/___ t CV	___/___ t CV	___/___ t CV
[10] ADJUST [FC-62-142], Primary Makeup Water Flow Controller for the desired flow rate.	___/___ t CV	___/___ t CV	___/___ t CV
[11] PLACE [HS-62-140A], BA Supply to Blender Flow Control Switch to **START**.	___/___ t CV	___/___ t CV	___/___ t CV
[12] VERIFY the following:			
[a] Inlet to top of VCT **[FCV-62-128]** is **OPEN**.	☐	☐	☐
[b] Primary Water flow by **[FI-62-142A]** or **[FQ-62-142]**.	☐	☐	☐
[13] IF PW addition to top of VCT **[FCV-62-128]** is not warranted, but PW addition to the bottom of the VCT **[FCV-62-144]** is desired, **THEN**			
[a] CLOSE [FCV-62-128]with **[HS-62-128]**	☐	☐	☐
[b] OPEN [FCV-62-144] with **[HS-62-144]**.	☐	☐	☐
[c] VERIFY Primary Water flow by **[FI-62-142A]** or **[FQ-62-142]**.	☐	☐	☐
[14] MONITOR nuclear instrumentation and reactor coolant temperature to ensure the proper response from dilution.	☐	☐	☐
[15] IF [LI-62-129], VCT level, increases to 63 percent, **THEN ENSURE [LCV-62-118]**, VCT Divert Valve, **OPENS** to divert excess water to the HUTs.	☐	☐	☐
[16] WHEN dilution is complete, **THEN**			
[a] PLACE [HS-62-140A], Boric Acid to Blender Flow Control Switch to **STOP**	___/___ t CV	___/___ t CV	___/___ t CV
[b] IF [FCV-62-144] was previously **OPENED**, **THEN CLOSE [FCV-62-144]** with **[HS-62-144]**.	☐	☐	☐
[c] VERIFY no primary water flow on either **[FI-62-142A]** or **[FQ-62-142]**.	☐	☐	☐
[d] ENSURE [FCV-62-128] is **CLOSED**.	☐	☐	☐

[18] IF Step **[17]** will be repeated, **THEN**
PERFORM the following:

[a] PLACE [HS-62-140B], CVCS Makeup Selector Switch to the **AUTO** position. ____/____ 1st CV

[b] PLACE [HS-62-140A], BA to Blender Flow Control Switch to **START** position. ☐

[c] ENSURE dilution is logged in Unit Narrative Log. ☐

Op Test No.: NRC Scenario # 2 Event # 1 Page 5 of 55

Event Description: Raise plant power to 100% RTP

Time	Position	Applicant's Actions or Behavior
Evaluator Note: Procedural steps/directions for Turbine Control manipulations are at the end of this event guide.		
	NOTES 1) Reactor power can be increased greater than 90% as long as adequate MFP suction is maintained. 2) Steps 5.1[58] through 5.1[62] may be performed out of sequence.	
	SRO	[58] **WHEN** approximately 85 to 90% reactor power **OR** when determined by Unit SRO (if power raised above 90%), **THEN,** **ENSURE** third condensate booster pump in service in accordance with 1,2-SO-2/3-1. **[C.2]**
	NOTES A nominal CBP suction pressure of approximately 180 psig, as indicated on **[PI-2-77]**, will alleviate bypassing to the condenser at full power.	
	BOP	[59] **IF** condensate pressure is high resulting in #3 or #7 heater drain tank bypassing to the condenser, **OR** the normal level control valves are near full open, **THEN**
		[59.1] **THROTTLE [14-550]** to attain desired condensate pressure.
		[59.2] **IF** unable to throttle **[14-550]**, **THEN** **REFER** to 1,2-SO-5-2, Section 8.0 to adjust condensate pressure. **OR** **EVALUATE** removal of the condensate demineralizer booster pumps (N/A if NOT in service).
	NOTE Two Cond DI Booster pumps must be started at the same time.	
	BOP	[60] **EVALUATE** starting available condensate demineralizer booster pump(s) to raise system pressure ~40 psig. **Pump Started** YES ☐ NO ☐
	SRO/RO	[61] **WHEN** reactor power is approximately 90%, **THEN** **PERFORM** the following:
		[61.1] **ADJUST** Power Range instrumentation in accordance with 0-SI-OPS-092-078.0.
		[61.2] **INITIATE** performance of 1-PI-OPS-000-020.1 or 2-PI-OPS-000-022.1, Appendix B.

Op Test No.: NRC Scenario # 2 Event # 1 Page 6 of 55

Event Description: Raise plant power to 100% RTP

Time	Position	Applicant's Actions or Behavior
	CAUTION The potential exists for condensation formation in steam extraction lines when feedwater heaters are isolated.	
	BOP	[61.3] **ENSURE** the following level controllers are maintaining levels within normal ranges: A. Secondary plant heaters. _____ B. MSR drain tanks. _____
	CAUTION DO NOT exceed an average of 3455.0 MWT during an 8-hour period. [C.1]	
	RO	[62] **MONITOR** NIS, ΔT and calorimetrics on plant computer (pt. U2118) while increasing reactor power.
	NOTES 1) Feedwater venturi unfouling may impact U1118 indication. LEFM calorimetric power (U2118) is not affected by venturi unfouling. 2) If U1118 is being used to monitor reactor power due to LEFM unavailable, then Calorimetric Calculation should be performed prior to exceeding 97% reactor power. 3) Steps 5.1[63] through 5.1[67] may be performed out of sequence.	
	BOP/RO	[63] **IF** Unit is returning to full power after a turbine load reduction to less than 50% **AND** U1118 is being used to monitor power, **THEN** **PERFORM** the following prior to exceeding 97% power:
	SRO	[63.1] **NOTIFY** Systems Engineering to perform 0-PI-SXX-000-022.2, Calorimetric Calculation, Section 8.1, if necessary.
	SRO	[63.2] **PERFORM** applicable sections of 0-PI-SXX-000-022.2 to adjust Feedwater Flow Constant. (N/A if NOT required) **BOP Engineer determined this step N/A**
	NOTES 1) Ramp load rate increases shall be within the limits of TI-40 2) Intermediate Power Threshold ramp rate target value of 2% / hr may apply.	
	RO	[64] **RECORD** power ascension ramp rate from TI-40: 4.5%/hr

Op Test No.: NRC Scenario # 2 Event # 1 Page 7 of 55

Event Description: Raise plant power to 100% RTP

Time	Position	Applicant's Actions or Behavior
	CREW	[65] **CONTINUE** power ascension to 100% RTP.
	NOTE Control rods may be used along with dilution during reactor power increase to maintain AFD within the target control band	
	RO/SRO	[66] **IF** diluting the RCS to increase TAVG, **THEN** **CONTINUE** dilution and increase turbine load to maintain TREF with TAVG. (0-SO-62-7)
	NOTE Valve position limit and governor control meter are displayed on EHC Display panel 1,2-XX-047-2000 (M-2)	
	BOP	[67] **MONITOR** the turbine load increasing **AND** **MAINTAIN** valve position limit approximately 10% above the current governor control indication as turbine load is changed.
	NOTE Steps 5.1[68] through 5.1[71] may be performed out of sequence.	
	BOP	[68] **WHEN** reactor power approaches 100%, **THEN** **ADJUST** governor valve position limiter ~ 2% above governor valve position.
	NOTE Engineering recommends placing the 3rd Condensate Demineralizer Booster Pump in service when at full power. Operation of only 2 Condensate Demineralizer Booster Pumps is allowed but reduces the operating margin in the event of a condensate transient based on the lower suction pressure to the MFPs.	
	SRO/BOP	[69] **IF** it is desired to place the 3rd condensate demineralizer booster pump in service, **THEN** **START** 3rd condensate demineralizer booster pump in accordance with 1,2-SO-2/3-1.

Op Test No.: NRC Scenario # 2 Event # 1 Page 8 of 55

Event Description: Raise plant power to 100% RTP

Time	Position	Applicant's Actions or Behavior
		CAUTION Governor valve position limit meter may NOT match the governor valve position meter; therefore, monitor the megawatt meter and valve position limit light continuously during the following step.
		NOTES 1) Operation with the VALVE POS LIMIT light LIT is acceptable if unsatisfactory load swings are experienced. 2) Actions effecting reactivity are directed in the following step. All appropriate verifications and peer checks shall be utilized during performance.
	SRO/BOP	[70] **IF** unsatisfactory load swings are experienced as the unit approaches full power, **THEN**
		[70.1] **WITH** turbine load set for maximum of 100% power, **SLOWLY** and **CAUTIOUSLY PULSE** the governor VALVE POSITION LIMIT in LOWER direction while monitoring megawatts for a decrease and VALVE POS LIMIT light to ILLUMINATE.
		[70.2] **WHEN** the limiter just reaches the governor valve position, **THEN** **STOP** limiter adjustment.
		CAUTION **Do not raise the limiter position unless the turbine control is positively controlling the turbine (limit light NOT LIT).**
		NOTE Actions effecting reactivity are directed in the following step. All appropriate verifications and peer checks shall be utilized during performance.
	BOP	[71] **PERFORM** the following if the limiter prevents reactor operation at approximately 100%:
		[71.1] **ADJUST** SETTER/REFERENCE controls to reduce turbine loading until the VALVE POS LIMIT light is NOT LIT. [71.2] **INCREASE** VALVE POSITION LIMIT to allow a load increase using the SETTER/REFERENCE controls, NOT to exceed 3455.00 MWT.

Op Test No.: NRC Scenario # 2 Event # 1 Page 9 of 55

Event Description: Raise plant power to 100% RTP

Time	Position	Applicant's Actions or Behavior
		NOTES 1) Full power operation is defined as 100% power operation at approximately 3455 MWT instantaneous value, U2118 not to exceed 3455.00 MWT average thermal power in an 8-hour period. **[C.1]** 2) Do not intentionally operate the reactor at greater than 100% power (e.g., if reactor power is less than 100% for any time period then operation at slightly greater than 100% to "make up" for "lost" power is not permissible). **[C.1]** 3) Computer point U2118 should be trended on a trend recorder in the unit horseshoe and monitored for increasing reactor power trends above 3455 MWT. Prompt action shall be taken to decrease reactor power whenever an increasing power trend is observed. **[C.1]** 4) Do not exceed an 8-hour average value (U2126) of 3455.00 MWT. Do not allow U2125 (one hour avg) to exceed 3455.00 MWT (100%) for more than one hour. **[C.1]** 5) Portions of step 5.1[73] may be performed in parallel with step 5.1[72] if required.
	CREW	[72] **WHEN** the unit stabilizes at 100% reactor power, **THEN** **PERFORM** the following: (may be performed in any order)
	CREW	[72.1] **ADJUST** Governor Valve position, rod height, and/or RCS boron concentration as necessary to establish core thermal power at desired value and Auctioneered Hi T-avg approximately equal to T-ref.
	SRO	[72.2] **NOTIFY** load coordinator that the power increase is complete.
	CREW	[72.3] **NOTIFY** RADCON that power has stabilized at 100%.
	BOP	[72.4] **IF** Seal Steam spillover bypass **[FCV-47-191]** is IN SERVICE, **THEN THROTTLE** Seal Steam spillover bypass to control **[FCV-47-191]** as required to control seal steam pressure.
	BOP/SRO	[72.5] **IF** river temperature is less than 45°F, **THEN** **CONSULT** Engineering to determine if third CCW pump should be removed from service.
	CREW	[72.6] **CONTACT** vibration engineer in Predictive Maintenance Group to monitor MFWP vibration.
		CAUTION A bias adjustment in the upward direction (> 50%) should NOT be used unless evaluated by Systems Engineering since this could impact a MFPT's maximum speed and the ability to fully load in the event the other MFPT trips.
	BOP/SRO	[72.7] **IF** feed pump vibration is above desired levels, **THEN** **CONSULT** with vibration engineer and system engineer to determine which feed pump to bias to reduce vibration.
	BOP/SRO	[72.8] **IF** MFPT master controller output is NOT indicating 45% to 55% **THEN** **CONSULT** with MFPT controls system engineer to evaluate if adjustment is required per 1,2-SO-2/3-1.

Op Test No.: NRC Scenario # 2 Event # 1 Page 10 of 55

Event Description: Raise plant power to 100% RTP

Time	Position	Applicant's Actions or Behavior
	SRO	[72.9] **IF** start up on Unit 2, **THEN…** **This step N/A**
	SRO	[73] **IF** startup is following refueling activities, **THEN….** **This step N/A**
	SRO	[74] **IF** Steam Generator WR level recorders were re-scaled to 80% - 90% in 0-GO-2, **THEN** **NOTIFY** MIG to re-scale LR-3-43A and LR-3-98A, Steam Generator Wide Range Level Recorders, to 0% - 100%. **This step N/A**
	SRO	[75] **IF** unit shutdown to minimum load, **THEN** **GO TO** Section 5.3. **This step N/A**
	SRO	[76] **IF** unit is to be maintained at normal power, **THEN** **GO TO** Section 5.2.
Evaluator Note:		**the following steps provide general direction for Main Turbine controls operation during 0-GO-4 & 5 power escalation. The following are selected steps that direct MT Controls operation.**
	0-GO-4, Section 5.4 Placing the Main Generator in Service	
		[48] **INITIATE** a turbine load increase by performing the following:
		[48.1] **ENSURE** 5% hold time as recorded in step 5.4[36] has elapsed. _____ [48.2] **REFER** to TI-28, Figure A.15 and determine the appropriate loading rate. ☐ [48.3] **SET** the LOAD RATE at the desired rate. ☐ [48.4] **SET** a desired load in the SETTER with the REFERENCE CONTROL. ☐ [48.5] **DEPRESS** the **[GO]** pushbutton. ☐ [48.6] **MONITOR** the turbine load increasing. ☐ [48.7] **MONITOR** steam dump demand/operation. ☐

Op Test No.: NRC Scenario # 2 Event # 1 Page 11 of 55

Event Description: Raise plant power to 100% RTP

Time	Position	Applicant's Actions or Behavior
		[49] **WHEN** ≤10% steam dump demand is obtained on **[XI-1-33]**, **THEN**
		[49.1] **STOP** turbine load increase. ☐ [49.2] **STABILIZE** plant. (Refer to 0-SO-1-2 for Steam Dump Demand Program.) ☐
		[50] **INCREASE** steam generator atmospheric relief valve controller setpoints from 85 to 100%. _____
		[51] **RESUME** turbine load increase.
Evaluator Note: 0-GO-4 Section 5.5 Reactor Power step 20 below Ascension to 30% RTP contains directions for Valve Position Limiter positioning reflecting Precaution M of this procedure to maintain the VPL ≈10% above governor control valve indications. **0-GO-5, Section 3.1, Precaution G provides reinforcement of the VPL positioning during GO-5 power changes.**		
		[20] **INITIATE** load increase in accordance **TI-40** to less than or equal to 30% reactor power WHILE continuing this instruction **AND** **ADJUST** turbine load as needed while maintaining valve position limit approximately 10% above governor control indication. ☐
When power change is sufficient to record a reactivity manipulation, lead examiner may cue the next event.		

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Event Description: Pressurizer Level Transmitter 68-339 Fails Low

Time	Position	Applicant's Actions or Behaviors
Booth Instructor: When directed, initiate Event 2		
Indications available: • **1-AR-M5A, C-3: LS-68-335D/E PRESSURIZER LEVEL HIGH-LOW** • **E-3:LS-68-335E/D PRZR LVL LOW HEATER OFF & LETDOWN SECURED** • **Indicator 1-TI-62-78 indicates ≈70°F** • **Indicator 1-PI-62-81 indicates ≈70-100 psig** • **Indicator 1-FI-62-82 indicates '0'gpm**		
T = 10	CREW	Respond in accordance with Alarm Response Procedures
	CREW	SRO directs AOP-I.04, Pressurizer Instrument & Control Malfunctions, Section 2.4, Pressurizer Level Instrument Malfunction
NOTE:	Appendix M shows layout of PZR level control for operator reference.	
	SRO	Directs the following operator actions:
	RO	1. **CHECK** LI-68-339 NORMAL. ***(RNO Required)***
	RO	**RNO:** **PERFORM** the following: a. **ENSURE** LEVEL CONTROL CHANNEL SELECTOR switch XS-68-339E in LT-68-335 & 320. b. **ENSURE** LEVEL REC CHANNEL SELECTOR switch XS-68-339B in LT-68-320 or LT-68-335. c. **GO TO** Step 4.
	RO/SRO	**Steps 2-3 for remaining channels, LI-68-335 and LI0-68-320 are N/A.**
	RO	4. **CHECK** letdown IN SERVICE ***(RNO Required)***
	BOP	**RNO:** **RESTORE** letdown **USING** EA-62-5, Establishing Normal Charging and Letdown.

Op Test No.: NRC Scenario # 2 Event # 2 Page 13 of 55

Event Description: Pressurizer Level Transmitter 68-339 Fails Low

Time	Position	Applicant's Actions or Behaviors
Evaluator Note: EA-62-5, Establishing Normal Charging and Letdown included following this section.		
	RO	CHECK Letdown restored: **1-M-5 Indications/Alarms** • **Letdown HX Outlet Temp Indicator 1-TI-62-78 indicates ≈100-105°F** • **Letdown HX Outlet Press Indicator 1-PI-62-81 indicates ≈325 psig** • **Letdown HX Outlet Flow Indicator 1-FI-62-82 indicates 75gpm** **0-M-27B Indications/Alarms** • **1-FI-70-190, LETDOWN HX OUTLET FLOW** indicates ≈250 gpm • **1-FI-70-191, LETDOWN HX OUTLET TEMP** indicates ≈120 gpm • **Annunciator 0-XA-55-27B-B, A-5: "LETDOWN HX OUTLET FLOW/TEMP ABNORMAL"** is clear
	SRO	5. EVALUATE the following Tech Specs for applicability: • 3.3.1.1 (3.3.1), Reactor Trip System Instrumentation Action 6 (From Table 3.3-1 Item 11) Applies – Trip inop Bistables w/i 6 Hrs. • 3.3.3.5, REMOTE SHUTDOWN INSTRUMENTATION From Table 3.3-9 Instrument 5; Applies – restore to OPERABLE status w/I 7 days or Ht SD w/I next 12 hours. • 3.3.3.7, ACCIDENT MONITORING INSTRUMENTATION Action 2.a (From Table 3.3-10 Item 7) Applies - within 30 days;
Evaluator Note:		**Crew should dispatch an AUO to check status of REMOTE SHUTDOWN instruments affected.** **Applicant may or may not enter TS 3.4.4, Pressurizer; use follow–up questioning on Pzr OPERABILITY.**
	SRO	• 3.4.4, PRESSURIZER Action b: Applies - within 6 hours, restore at least two groups to OPERABLE. During the time period after the channel failure and re-selection to an OPERABLE level channel, heaters are locked out by the "control circuit". Adequate heaters may be energized from an OPERABL:E emergency power source as required; the control circuit is the questioned feature.
	RO	6. **ENSURE** pressurizer heaters restored to service.

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Event Description: Pressurizer Level Transmitter 68-339 Fails Low

Time	Position	Applicant's Actions or Behaviors
	CAUTION:	RCS pressure changes and changes in RCS boron concentration (due to differences between Pzr and RCS boron) may impact core reactivity.
	RO	7. **MONITOR** reactor power:
		a. **CHECK** reactor in Mode 1 or 2. b. **MONITOR** core thermal power for unexpected changes.
	NOTE:	If performing AOP in conjunction with AOP-I.11 for an Eagle LCP failure, then actions to hard trip bistables should be delayed until Eagle system reset is attempted. Actions to hard trip bistables must be completed within 6 hours UNLESS affected loop is restored to operable status by resetting Eagle rack.
	CREW	8. **NOTIFY** MIG to remove failed pressurizer level channel from service **USING** appropriate Appendix:
		PZR LEVEL INSTRUMENT / **CHANNEL** / **APPENDIX** L-68-339 (L-459) / I / I L-68-335 (L-460) / II / J L-68-320 (L-461) / III / K
	SRO	**Appropriate Appendix is 'I'**
	SRO	9. **GO TO** appropriate plant procedure.
Lead Examiner may cue next event when Letdown is restored and Tech Specs are addressed.		

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Event Description: Pressurizer Level Transmitter 68-339 Fails Low

Time	Position	Applicant's Actions or Behavior
		EA-62-5 **ESTABLISHING NORMAL CHARGING AND LETDOWN**
		4.0 OPERATOR ACTIONS 4.1 Section Applicability
		Steps 4.1.1 & 4.1.3 are N/A
		1. **IF** normal charging flow is to be established,…. **This step is N/A**
	SRO	2. **IF** normal letdown flow is to be established, **THEN** **GO TO** Section 4.3.
		4.3 Establishing Normal Letdown Flow
		NOTE EA-62-3, Establishing Excess Letdown, may be utilized if Normal Letdown cannot be established.
		1. **IF** charging flow **NOT** established,… **This step is N/A**
	RO	2. **VERIFY** pressurizer level greater than 17%
	RO	3. **ENSURE** letdown orifice isolation valves CLOSED:
		LETDOWN ORIFICE ISOLATION VALVES / **CLOSED √** FCV-62-72 ☐ FCV-62-73 ☐ FCV-62-74 ☐
	RO	4. **OPEN** letdown isolation valves:
		LETDOWN ISOLATION VALVES / **OPEN √** FCV-62-69 ☐ FCV-62-70 ☐ FCV-62-77 ☐

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Event Description: Pressurizer Level Transmitter 68-339 Fails Low

Time	Position	Applicant's Actions or Behavior
		NOTE Placing cooling water on the Letdown Heat Exchanger prior to restoring letdown flow should prevent TIS-62-79B/A from actuating and fully opening TCV-70-192.
	RO	5. **PLACE [HIC-62-78]** in **MANUAL, AND OPEN [TCV-70-192]** to ~50%.
	RO	6. **PLACE** letdown pressure controller **[PCV-62-81]** in MANUAL and **ADJUST** output between 40% and 50%, (50%-60% open).
	RO	7. **ADJUST** charging flow as necessary to prevent flashing in the letdown line.
	RO	8. **OPEN** letdown orifice isolation valves as needed:
		LETDOWN ORIFICE ISOLATION VALVES / **OPEN √** FCV-62-72 ☐ FCV-62-73 ☐ FCV-62-74 ☐
		NOTE Normal letdown pressure is 325 psig at normal operating temperature.
	RO	9. **ADJUST** letdown pressure controller **[PCV-62-81]** output to obtain desired pressure.
	RO	10. **ADJUST** letdown pressure controller **[PCV-62-81]** setpoint to match existing pressure.
	RO	11. **PLACE** letdown pressure controller **[PCV-62-81]** in AUTO.

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Event Description: Pressurizer Level Transmitter 68-339 Fails Low

Time	Position	Applicant's Actions or Behavior
		NOTE Normal letdown temperature is ~100°F.
	RO	12. **ADJUST [HIC-62-78A]** to obtain desired letdown temperature, as indicated on **[TI-62-78]**.
	RO	13. **PLACE [HIC-62-78A]** in **AUTO**.
		NOTE Letdown temperature may swing due to repeated actuation of TIS-62-79B/A, which causes letdown temperature control valve TCV-70-192 to fully open.
	RO	14. **IF** necessary to stabilize letdown temperature, **THEN** **PERFORM** the following:
		a. **PLACE [HIC-62-78A]** in MANUAL and **ADJUST** controller output in OPEN direction.
		b. **WHEN** letdown heat exchanger outlet temperature is stabilized at approximately 100°F, **THEN** **PLACE [HIC-62-78A]** in AUTO.
	RO	15. **ENSURE** high temperature divert valve **[HS-62-79A]** in DEMIN position.
	RO	16. **ADJUST** charging and letdown as necessary to maintain RCP seal injection flow and pressurizer level.
	RO	17. **IF** CCP suction is aligned to the RWST and realigning CCP suction to VCT is desired, **THEN** **THEN** **ENSURE** VCT aligned for normal operation: a. **ESTABLISH** VCT level greater than 20%

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Event Description: Pressurizer Level Transmitter 68-339 Fails Low

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Actions or Behavior</th></tr>
<tr><td></td><td>RO</td><td>b. ENSURE VCT outlet valves ALIGNED:</td></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>COMPONENT</th><th>POSITION √</th></tr>
<tr><td>LCV-62-132</td><td>OPEN ☐</td></tr>
<tr><td>HS-62-132</td><td>PULL A-P AUTO ☐</td></tr>
<tr><td>LCV-62-133</td><td>OPEN ☐</td></tr>
<tr><td>HS-62-133</td><td>PULL A-P AUTO ☐</td></tr>
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<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>RO</td><td>c. ENSURE RWST supply to CCP suction valves ALIGNED for normal operation:</td></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>COMPONENT</th><th>POSITION √</th></tr>
<tr><td>LCV-62-135</td><td>OPEN ☐</td></tr>
<tr><td>HS-62-135</td><td>PULL A-P AUTO ☐</td></tr>
<tr><td>LCV-62-136</td><td>OPEN ☐</td></tr>
<tr><td>HS-62-136</td><td>PULL A-P AUTO ☐</td></tr>
</table>
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<tr><td></td><td>RO</td><td>d. ENSURE VCT makeup control system set for automatic operation with current boron concentration.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>RO</td><td>e. ENSURE Primary Water system in service.</td></tr>
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<tr><td></td><td>SRO</td><td>18. GO TO Section 4.1, step in effect.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO</td><td>4.1 Section Applicability</td></tr>
<tr><td></td><td></td><td>4. RETURN TO procedure and step in effect.</td></tr>
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<tr><td></td><td></td><td>END OF TEXT</td></tr>
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Op Test No.:	NRC	Scenario #	2	Event #	3	Page	19	of	55
Event Description:	Loss of 1A1-A 480 VAC SDBd and 1B-B CCS Pump fail to auto start								

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 3		
Indications available: **1-M-1 Annunciators:** • **1-XA-55-1B Window D-5: 480V SD BD 1A1-A FAILURE OR UNDERVOLTAGE** • **1-XA-55-1C Window A-4 "125V DC CHGR 1 FAILURE OR VITAL BAT 1 DISCHARGE"** • **Window A-5 "125V DC VITAL BAT 1 ABNORMAL** • **Window E-7 "PNL 1-M-7 TROUBLE"** **1-M-1 Indicators:** • **480V SD BD 1A1-A VOLTS, 1-EL-57-29A: goes to '0';** • **125V VITAL BATT BD 1 AMPS, 1-EL-57-92: goes up to 200 to 250 AMPS** **1-M-5B Annunciators:** • **1-XA-55-5B Window E-3: "REACTOR COOLANT PUMPS MOTOR THRUST BEARING TEMP HIGH"** **0-M-26A Annunciators:** • **0-XA-55-26A Window C-4: "DIESEL GEN 1A-A JACKET WATER TEMP HIGH-LOW ENGINE 1 OR 2"** • **Window D-6: "480V SD BD 1A1-A FAILURE OR UNDERVOLTAGE"** **0-M-27B-A Annunciators:** • **XA-55-27B-A Window A-1 "CCS REAC BLDGSUPPLY HEADERFLOW LOW"**		
T = 20	CREW	Respond in accordance with Alarm Response Procedures
		Diagnose failure and place rods in manual to stop rod motion Refer to Annunciator Response Procedure
	SRO	Enter and direct action of AOP-P.05 Section 2.3
Evaluator Note:		**Caution 1 below is a consistent performance guideline derived from AOP-R.04, Reactor Coolant Pump Malfunctions, Section 2.0 CAUTION 2 which specifies RCP trip criteria on motor winding and bearing temperatures and is in keeping with AOP-M.03, Loss of Component Cooling Water procedural guidance for loss of cooling RCP trip criteria for bearing temperature conditions as well. If the standby CCS Pump is not started within 2 minutes, excessive bearing temperatures will be challenged, however, high temperature limits may not be exceeded.**

Op Test No.:	NRC	Scenario #	2	Event #	3	Page	20	of	55
Event Description:	Loss of 1A1-A 480 VAC SDBd and 1B-B CCS Pump fail to auto start								

Time	Position	Applicant's Actions or Behavior
		CAUTIONS: • Operation of RCPs for greater than 2 minutes without CCS cooling to oil coolers will result in bearing temperatures greater than 200°F. Malf. Init time: _____; 1B-BCCS Pump Start time: _____ **Time:** _____
		• Containment Spray Pumps may experience bearing failure 10 minutes after loss of CCS cooling.
	NOTES:	CCPs, SI pumps, and RHR Pumps must be considered INOPERABLE when the associated train of CCS is out of service; however, pumps are available for operation if needed in an emergency.
		• Power loss to LCV-6-106B will result in reduced #3 Heater Drain Tank Pump discharge flow.
		• Indicating lights for the turbine throttle, governor, intercept & reheat-stop valves are de-energized.
	CREW	Acknowledges **CAUTIONS** & **NOTES**
Evaluator Note:		ARP 0-AR-M27-B-A, A-1 will direct starting the idle CCS Pump, 1B-B pump in this scenario. Any of the other ARPs on this same annunciator window will also direct standby pump start and may be implemented by the crew for the same purpose.
	BOP	1. **ENSURE** 1B-B CCS Pump SUPPLYING Train A CCS.
	RO	2. **MONITOR** REACTOR COOLANT PUMPS MOTOR THRUST BEARING TEMP HIGH alarm DARK [1-M-5B, E-3].
	NOTE 1:	Power is lost to 1-FCV-72-34, Train A Containment Spray Pump Recirc Valve and 1-FCV-72-39, Containment Spray Pump Header Isolation.
	NOTE 2:	Power is lost to 1-FCV-74-12, Train A RHR Minimum Flow Valve.
	RO	3. **PLACE** the following pumps in **PULL TO LOCK**:
		• 1A-A RHR Pump • 1A-A Containment Spray Pump
	NOTE 1:	1-M-7 Instrument Rack A is normally powered from 480V Shutdown Bd 1A1-A. Power loss results in loss of various rad monitors, boric acid flow indication, and other MCR indications and controls.
	NOTE 2:	Restoration of power to Instrument Rack A may cause LCV-6-106B to open, resulting in condensate system flow changes.

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Event Description: Loss of 1A1-A 480 VAC SDBd and 1B-B CCS Pump fail to auto start

Time	Position	Applicant's Actions or Behavior
LEAD Evaluator Notes:		**- Back panel 1-M-7 Transfer Rack is not modeled.** **- BOP operator should go to back panel 1-M-7 Transfer Rack area and describe power transfer.** **- EXAMINER: 1-M-7A Transfer to Alternate- coordinate with simulator booth operator to initiate the simulator remote function. Radio provided at back Panel 1-M-7 to communicate with Booth operator.**
Evaluator Note:		**Note 1 & 2 conditions should be restored and/or monitored following 1-M-7 Transfer Rack to transfer to the alternate source.**
	BOP	4. **RESTORE** power to 1-M-7 Instrument Rack A by placing Instrument Rack A Transfer Switch to ALTERNATE position. [1-M-7, middle switch]
Evaluator Note:		Appendix AA, Potential Tech Spec Impacts with applicable TS designations is attached at the end of this event guide. Include CCS Tech Spec 3.7.3 OPERABIILITY review.
	SRO	5. **PERFORM** Appendix AA, Potential Tech Spec Impacts
	CREW	6. **DISPATCH** operators with radios to Shutdown Board Room [AB el. 734] to determine cause of failure.
	NOTES:	Service air isolation valve 0-PCV-33-4 will be closed due to loss of power on Instrument Power Rack A [1-M-7].
		PI-32-200, Control Air Hdr and PI-33-199, Service Air Hdr are NOT available while 480V SD Bd 1A1-A is de-energized.
	BOP	7. **EVALUATE** air system status:
		a. **DISPATCH** personnel to observe header pressure in the following locations:
		• Auxiliary Control Air Header Pressure (El. 734 AB)
		• Control Air Header Pressure (El. 685 TB)
	BOP	b. **CHECK** Aux Control Air pressure greater than 90 psig. [M-15]
	BOP	c. **CHECK** control air pressure greater than 90 psig.

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Event Description: Loss of 1A1-A 480 VAC SDBd and 1B-B CCS Pump fail to auto start

Time	Position	Applicant's Actions or Behavior
	CAUTION: Loss of CRDM cooling fans can affect operability of rod position indicators due to temperature fluctuations.	
	RO/SRO	8. **EVALUATE** starting additional CRDM cooling fans based on reactor cavity air temperature (T1014A) and RPI indications **USING** 0-SO-30-6.
Evaluator Note	SRO/RO may choose to not start additional cooling fans based on containment pressure trends following the initial pressure increase. Evaluation, however, is expected. Following RO/SRO evaluation, BOP operator may be directed to place a CRDM Cooling Fan in service if an in-service fan was lost as a result the board power loss.	
	SRO	9. **ENSURE** following equipment STOPPED and LOCKED OUT:
		• 1A-A Component Cooling Water Pump
		• 1A-A Thermal Barrier Booster Pump
		• A-A Main Control Room AHU
	NOTE: Spare Charger 1-S Train A supply is from 480V Shutdown Board 1A2-A. Spare charger should be placed in service promptly to prevent excessive battery discharge.	
Evaluator Note	**BOP operator should inform the SRO of 1A Battery discharge as indicated on 1-M-1 Indicator 125V VITAL BATT BD 1 AMPS, 1-EL-57-92 (reading ~220-250 amps).**	
	SRO	10. **ENSURE** Battery Charger RESTORED for 125V Vital Battery I:
	BOP	a. **VERIFY** 480V Shutdown Board 1A1-A still DE-ENERGIZED.
		b. **PLACE** Spare Charger 1-S in service to Vital Battery Board I **USING** 0-SO-250-1.
Evaluator Note:	**1-M-1 Indicator 125V VITAL BATT BD 1 AMPS, 1-EL-57-92: returns to '0' AMPS when the 1-S Battery Charger is placed in service.**	
	BOP	11. **CHECK** CCS to SFP Cooling ADEQUATE:
		• ALIGNED to Unit 2 **OR** • 1B CCS Pump in service to Train A CCS

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Event Description: Loss of 1A1-A 480 VAC SDBd and 1B-B CCS Pump fail to auto start

Time	Position	Applicant's Actions or Behavior
	BOP	12. **DISPATCH** an operator to ensure SFP cooling in service **USING** 0-SO-78-1.
	CREW	13. **REFER TO** following Appendixes for additional equipment lost:
		• Appendix B, 480V Shutdown Board 1A1-A Load List
		• Appendix E, 480V Rx MOV Board 1A1-A Load List
		• Appendix G, 480V C & A Vent Board 1A1-A Load List
		• Appendix I, 480V Reactor Vent Board 1A-A Load List
		• Appendix J, 480V Diesel Auxiliary Bd 1A1-A Load List
	RO/SRO	14. **EVALUATE** need for starting additional Lower Compartment Cooling Units to maintain containment temperatures within Tech Spec limits.
	SRO	15. **EVALUATE** need to transfer Fire Protection Distribution Panel power supply to Alternate **USING** 0-SO-13-1, Fire Detection System.
	SRO	**CHECK** 1A1-A 480V Shutdown Board ready to be ENERGIZED. ***(RNO Required)***
	SRO	**RNO:** **DO NOT CONTINUE** in this procedure UNTIL failure repaired.
Evaluator Note: The following CREW Brief and Notification actions are not contained in the procedure.		
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).

Lead Examiner may cue next event after the battery charger has been placed in service in Step 10.

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Event Description: Loss of 1A1-A 480 VAC SDBd and 1B-B CCS Pump fail to auto start

Time	Position	Applicant's Actions or Behavior
APPENDIX AA POTENTIAL TECH SPEC IMPACTS		
Evaluator Note: See next page for Tech Spec applications		

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Event Description:	Loss of 1A1-A 480 VAC SDBd and 1B-B CCS Pump fail to auto start								

SQN	LOSS OF UNIT 1 SHUTDOWN BOARDS	AOP-P.05 Rev. 16

APPENDIX AA
POTENTIAL TECH SPEC IMPACTS

NOTE 1: Offsite power availability must be verified using 0-SI-OPS-082-007.W anytime the actions of LCO 3.8.1.1 (except d) are entered. This performance is required even if the difference between LCO entry and exit times is less than one hour.

NOTE 2: Upon loss of its respective SDBD a Pressurizer Block valve will be incapable of closing and the actions of 3.4.3.2 cannot be met. 3.0.3 may be applicable.

1. **EVALUATE** the following Tech Spec/TRM requirements for applicability:

	•	LCO 3.0.3,	Applicability: Pzr PORV & associated Block valve.
	•	LCO 3.4.3.2,	Pzr. PORVs and Block Valves: Block Valve 1-FCV-68-333 is failed open; 3.4.3.2.d applies which requires applying Action b. Action b. cannot be complied with, therefore TS 3.0.3 would apply.
	•	LCO 3.8.1.1,	AC Sources – Operating: 480V Diesel Aux Bd 1A1-A is de-energized; 3.8.1.1.b. applies since supporting equipment, cooling water control valve power and AC control power circuits are all de-energized. Perform 0-SI-OPS-082-007.W, AC Power Sources Operability Verification w/i 1 hr. & every 8 hrs thereafter; Restore at least 4 EDGs w/i 7 days or Ht Stby w/i next 6 hrs & Cld SD w/i following 30 hrs.
	•	LCO 3.8.2.1,	AC Distribution – Operating: 1A1-A 480V SDBd is de-energized; 3.8.2.1.a applies; restore the inoperable boards w/i 8 hrs or HT STBY w/i next 6 hrs & CLD SD w/i following 30 hrs.
	•	LCO 3.8.2.3,	D.C. Distribution – Operating: 125V Vital Battery 1 Charger is de-energized; 3.8.2.3.b applies; restore inoperable charger w/i 2 hrs or HT STBY w/i next 6 hrs & CLD SD w/i following 30 hrs.
	•	TRM 3.1.2.3,	Charging Pump - Shutdown: MODES 4, 5 and 6 not applicable, 1 CCP is available.
	•	TRM 3.1.2.4,	Charging Pump - Operating: MODES 1, 2, and 3 applies; restore at least two charging pumps w/i 72 hrs or HT STBY & borated to SD MARGIN at least 1% delta k/k at 200°F w/i next 6 hrs; restore at least two charging pumps w/i next 7 days or HT SD w/i next 30 hours.
	•	LCO 3.5.2,	Emergency Core Cooling System, Modes 1-3: 1A-A CCP, 1A-A SIP, 1A-A RHRP (1 ECCS Train) de-energized; 3.5.2.a, b, d & e apply
	•	LCO 3.6.2.1,	Containment Spray Subsystems: Train A Spray is de-energized; 3.6.2.1.a & b applies; restore inoperable sub-system w/i 72 hrs or HT STBY w/i next 6 hrs; restore the inoperable subsystem w/i next 48 hrs or CLD SD w/I next 30 hrs.
	•	LCO 3.7.3,	CCS, Modes 1-4: restore at least two loops w/i 72 hrs or HT STBY w/i next 6 hrs & CLD SD w/i following 30 hrs.

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Event Description:	Loss of 1A1-A 480 VAC SDBd and 1B-B CCS Pump fail to auto start								

1. **EVALUATE** the following Tech Spec/TRM requirements for applicability:

	•	LCO 3.7.15,	MODES 1, 2, 3, or 4: Action a applies; one CRACS inoperable, restore w/l 30 days or HT STBY w/i next 6 hrs. & CLD SD w/i following 30 hrs. MODES 5 or 6 or during irradiated fuel movement: Action a applies; one CRACS inoperable, restore w/i 30 days or initiate & maintain operation of OPERABLE CRACS OR suspend movement of irradiated fuel assemblies.

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Event Description: 1B #3 HDT Pump trip and 1-LCV-6-105A valve failure - HDT system low flow runback w/ Failure of #3 SG LCV and Failure of Automatic Rod Control

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 4		
Indications available: **1-M-1 Annunciators:** • **1-XA-55-1B Window E-3: "MOTOR TRIPOUT PNL 1-M-1 THRU 1-M-6"** **1-M-1 Indicators:** • **Generator Megawatts Recorder, 1-XR-57-107: megawatts decreasing, stabilizing at ≈940 MWe** **1-M-2 Annunciators:** • **1-XA-55-2C Window A-1: "LS-6-111 NO 3 HEATER DRAIN TANK LEVEL ABNORMAL"** • **B-7: "ZS-6-105A & B NO 3 HTR DR TK BYPASS TO COND"** **1-M-2 Indicators:** • **HTR DR SYSTEM FLOW, 1-FR-6-107 Red Pen: slowly degrades to <5500 gpm;** • **EHC Display, 1-XX-47-2000: Valve Pos Limit light illuminated (when runback is actuated)** • **Main Generator Electrical Load-MEGAWATTS decreasing to ≈940 MWe** **1-M-4 Annunciators:** • **1-XA-55-4B Window A-7: "ZB-412A RODCONTROL BANKS LIMIT LOW"** • **B-7: "ZB-412B RODCONTROL BANKS LIMIT LOW-LOW"** **1-M-4 Indicators:** • **SG-3 MAIN REG VALVE FLOW CONTORL 1-FIC-3-90: indicates full OPEN demand** • **SG PROGRAM LVL SP, 1-LI-1-73: Program level 44% from 20-100% RTP** • **GENERATOR WATTS, 1-EI-57-16A: decreasing to ≈940 MWe** • **ROD SPEED, SI-412 and adjacent "RODS IN/RODS OUT" red and green lights lit: indicating rod control controlling Tave.** **Automatic actions may occur due to a malfunction of the heater drain system:** • **Turbine runback from #3 Heater Drain Tank Pump trip if greater than 81% turbine load.**		
T = 30	CREW	Respond in accordance with Alarm Response Procedures
		Refer to Annunciator Response Procedure
	SRO	Directs entry into AOP-S.04, Condensate or Heater Drains Malfunction Section 2.1, "#3 Heater Drain Tank Pump Trip"
Evaluator Note: AOP-S.04, Section 2.6, "#3 Heater Drain Tank Pump Trip" crew may enter this section which is also effective in event mitigation and included at the end of this event guide.		
Evaluator Note: Appendices A & B which may be required are also attached to the end of this event guide.		

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Event Description: 1B #3 HDT Pump trip and 1-LCV-6-105A valve failure - HDT system low flow runback w/ Failure of #3 SG LCV and Failure of Automatic Rod Control

Time	Position	Applicant's Actions or Behavior
	2.1 #3 Heater Drain Tank Pump Trip	
	BOP	1. MONITOR at least one #3 HDT pump RUNNING.
Evaluator Note:	BOP recognizes 1B #3 HDT Pump tripped, places it in Pull-To-Lock (PTL) and continues to monitor #3 HD system flow using 1-FR-6-107 flow recorder	
Evaluator Note:	Step 1 RNO is not applicable based on the combination of running #3 HDT pumps and current reactor power (1 or more pumps running and ≥80%.)	
	NOTE:	Turbine runback will occur if the following conditions met: • #3 HDT bypass valve, LCV-6-105A or 105B, is OPEN • turbine load is greater than 81% (Unit 1) or 82% (Unit 2) • #3 HDT pump discharge flow, FS-6-107, less than 5500 gpm for greater than 10 seconds.
	BOP	2. **MONITOR** for turbine runback conditions:
		a. Turbine load greater than 81%(Unit 1) or 82% (Unit 2).
		b. #3 Heater Drain Tank Outlet Flow less than 5500 gpm. [M-2, FR-6-107]
		c. LCV-6-105A or 105B OPEN. [M-2]
Evaluator Note:	This is a delayed runback event; the SRO directs BOP operator to monitor #3 HDT flow on M-2 FR-6-107 recorder (pen #1 or the red pen; 2-pen recorder w/ the other pen indicating #7 HDT flow). **Some time during this event, degraded #3 HDT flow will meet the runback conditions specified and an automatic runback will actuate. At this time, the SRO/crew should return to Step 2.a. to repeat procedural steps applying to current conditions accordingly.**	
	SRO	**2.a. RNO** **IF** runback has already occurred **OR** is in progress, **THEN GO TO** Step 3.
	BOP	3. **VERIFY** turbine runback to less than or equal to 77% turbine load (approximately 940 MWE).

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Event Description: 1B #3 HDT Pump trip and 1-LCV-6-105A valve failure - HDT system low flow runback w/ Failure of #3 SG LCV and Failure of Automatic Rod Control

Time	Position	Applicant's Actions or Behavior
	SRO	Directs crew to maintain/restore Tave following runback to w/i 1.5°F of Tref by adjusting MT load.
Evaluator Note:		Following runback actuation and **AUTOMATIC** Rod Control's restoration of Tave-Tref deviation to ~1°, Rod Control Failure will be inserted resulting in the RO placing Rod Control in MANUAL
	RO	4. **CHECK** rods controlling in AUTO.
	NOTE:	If LEFM thermal power (U2118) is inoperable, rod insertion limit curve must be raised by 3 steps. Rod insertion limit alarms and ICS display are NOT automatically adjusted when LEFM is inoperable.
Evaluator Note:		1A BAT Pump is not available due to the 1A1-A 480VAC SDBd loss. Therefore, if emergency boration is required in response to lo-lo rod insertion limit alarm, the boration source is the **RWST** and required boron injection is required to be ≥90 gpm per Appendix. A attached following this event guide.
	RO	5. **MONITOR** control rods above low-low insertion limit using ICS or COLR.
	RO	5. **RNO**: **INITIATE** boration **USING** Appendix A. **EVALUATE** Tech Spec LCO 3.1.3.6 and 3.1.1.1.
		• 3.1.3.6, CONTROL ROD INSERTION LIMITS Action A Applies – Restore w/i limits w/i 2 hrs. or reduce to less than or equal to that fraction of RATED THERMAL POWER which is allowed by the group position using the insertion limits specified in the COLR, or Ht Stby w/i 6 hrs. AND • 3.1.1.1, SHUTDOWN MARGIN - Tavg Greater Than 200°F Applies – immediately initiate and continue boration at ≥35 gpm until the SHUTDOWN MARGIN is restored (CB 'D' Rods above the Lo-Lo RIL),
	CAUTION:	**Feedwater temperature changes may impact core thermal power.**
Evaluator Note:		Following runback actuation, Lp #3 FRV, 1-LCV-3-90, fails to respond in AUTOMATIC (as is); MANUAL control is available resulting in the BOP operator taking manual control to maintain #3 SG on program level (~44% NR).

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Event Description: 1B #3 HDT Pump trip and 1-LCV-6-105A valve failure - HDT system low flow runback w/ Failure of #3 SG LCV and Failure of Automatic Rod Control

Time	Position	Applicant's Actions or Behavior
	BOP	6. **MONITOR** S/G levels returning to program. **(RNO Required)**
	BOP	**RNO:** **CONTROL** Main Feedwater Pumps or Feed Reg Valves as required. **MAINTAIN** S/G generator levels on program. **IF** low S/G level reactor trip is imminent, **THEN TRIP** reactor and **GO TO** E-0, Reactor Trip or Safety Injection.
	BOP	BOP recognizes Loop #3 FRV failing to respond in automatic; takes manual control and restores #3 SG level to program.
	NOTE:	An auto valve closure for LCV-6-106B exists if any one of three #3 Heater Drain Tank Pumps trip and turbine load is greater than 81% (Unit 1) or 82% (Unit 2).
		7. **CHECK** LS-6-111 #3 HEATER DRAIN TANK LEVEL ABNORMAL alarm, DARK. [M-2C, A1]
		8. **MONITOR** reactor power:
	RO	a. **CHECK** ICS thermal power indication AVAILABLE.
	BOP	b. **REDUCE** turbine load as necessary to maintain 10 minute average power less than applicable limit (3455 or 3411 MWt).
	CAUTION:	**Reducing turbine load too rapidly could result in further drop in condensate pressure due to reduction in heater drain flow. Recommended load rate is 1% per minute if turbine load reduction is needed.**
	BOP	9. **MONITOR** Feedwater pump inlet pressure greater than 320 psig. [M-3, PI-2-129]
	BOP	10. **MONITOR** Condensate Booster pump suction pressure greater than 100 psig. [M-3, PI-2-77]
Evaluator Note: Neither condition in steps 9 or 10 above should exist during this event.		
	CREW	11. **DISPATCH** an operator to investigate cause of #3 Heater Drain Tank Pump trip.

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Event Description: 1B #3 HDT Pump trip and 1-LCV-6-105A valve failure - HDT system low flow runback w/ Failure of #3 SG LCV and Failure of Automatic Rod Control

Time	Position	Applicant's Actions or Behavior
	CREW	12. **NOTIFY** Maintenance to investigate and repair pump malfunction as necessary.
	BOP	13. **CHECK** VALVE POSITION LIMIT light DARK on 1(2)-XX-47-2000, EHC DISPLAY. ***(RNO Required)***
		RNO: **RESTORE** turbine controls to normal **USING** Appendix B, Turbine Runback Restoration. (Included at end of this event guide)
	NOTE:	Steam dump load rejection circuit may require several minutes decay time before C-7 can be reset.
	BOP	14. **IF** C-7 Interlock LIT, **THEN RESET** Load Rejection Signal:
		a. **PLACE** HS-1-103A and 103B, Steam Dump Control, in OFF.
		b. **PLACE** HS-1-103D, Steam Dump Control, in RESET and **VERIFY** spring return to TAVG.
		c. **VERIFY** C-7, LOSS OF LOAD INTERLOCK alarm, DARK. [M-4A, 5E]
		d. **ENSURE** Steam Dump demand is ZERO.
		e. **PLACE** HS-1-103A and 103B, Steam Dump Control, in ON.
	RO	15. **CHECK** reactor power less than 95 %.
	SRO	16. **GO TO** appropriate plant procedure.
		END OF SECTION
Evaluator Note: The following CREW Brief and Notification actions are not contained in the procedure.		
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead Examiner may cue the next event when SRO directs appropriate plant procedure,		

Op Test No.:	NRC	Scenario #	2	Event #	4	Page	32	of	55
Event Description:	1B #3 HDT Pump trip and 1-LCV-6-105A valve failure - HDT system low flow runback w/ Failure of #3 SG LCV and Failure of Automatic Rod Control								

Time	Position	Applicant's Actions or Behavior
AOP-S.04, Section 2.6, Total or Partial Loss of #3 Heater Drain Tank Pump flow		
Annunciators/Indications are similar to those listed in this event guide for Section 2.1		
Evaluator Note:		Appendices A & B which may be required are also attached to the end of this event guide.
	SRO	May direct entry into AOP-S.04, Condensate or Heater Drains Malfunction Section 2.6, "Total or Partial Loss of #3 Heater Drain Tank Pump flow"
	BOP	1. **MONITOR** the following: • at least one #3 Heater Drain Tank Pump RUNNING **AND** • #3 Heater Drain Tank Pump flow greater than zero
		BOP recognizes 1B #3 HDT Pump tripped, places it in Pull-To-Lock (PTL) and continues to monitor #3 HD system flow using 1-FR-6-107 flow recorder
	NOTE:	Turbine runback will occur if the following conditions met: • #3 HDT bypass valve, LCV-6-105A or 105B, is OPEN **and** • Turbine load is greater than 81% (Unit 1) or 82% (Unit 2) **and** • #3 HDT pump discharge flow, FS-6-107, less than 5500 gpm for greater than 10 seconds.
	BOP	2. **MONITOR** for turbine runback conditions:
		a. Turbine load greater than 81% (Unit 1) or 82% (Unit 2).
		b. #3 Heater Drain Tank Outlet Flow less than 5500 gpm. [M-2, FR-6-107
		c. LCV-6-105A or 105B OPEN. [M-2]
	BOP	3. **VERIFY** turbine runback to less than or equal to 77% (Unit 1) or 78% (Unit 2) turbine load (≈940 MWE).
Evaluator Note:		Following runback actuation and **AUTOMATIC** Rod Control's restoration of Tave-Tref deviation to ~1°, Rod Control Failure will be inserted resulting in the RO placing Rod Control in MANUAL
	RO	4. **CHECK** rods controlling in AUTO.

Op Test No.:	NRC	Scenario #	2	Event #	4	Page	33	of	55

Event Description: 1B #3 HDT Pump trip and 1-LCV-6-105A valve failure - HDT system low flow runback w/ Failure of #3 SG LCV and Failure of Automatic Rod Control

Time	Position	Applicant's Actions or Behavior
	NOTE:	If LEFM thermal power (U2118) is inoperable, rod insertion limit curve must be raised by 3 steps. Rod insertion limit alarms and ICS display are NOT automatically adjusted when LEFM is inoperable.
Evaluator Note:		**1A BAT Pump is not available due to the 1A1-A 480VAC SDBd loss. Therefore, emergency boration in response to lo-lo rod insertion limit alarm, boration from the RWST is required at ≥90 gpm.**
	RO	5. **MONITOR** control rods above low-low insertion limit using ICS or COLR. **(RNO Required)**
	RO SRO	**RNO:** **INITIATE** boration **USING** Appendix A.(attached to end of this event guide) **EVALUATE** Tech Spec LCO 3.1.3.6 and 3.1.1.1.
		• 3.1.3.6, CONTROL ROD INSERTION LIMITS Action A Applies – Restore w/i limits w/i 2 hrs., or reduce to less than or equal to that fraction of RATED THERMAL POWER which is allowed by the group position using the insertion limits specified in the COLR, or Ht Stby w/i 6 hrs. AND • 3.1.1.1, SHUTDOWN MARGIN - Tavg Greater Than 200°F Applies – immediately initiate and continue boration at ≥35 gpm until the SHUTDOWN MARGIN is restored (CB 'D' Rods above the Lo-Lo RIL),
	CAUTION:	Feedwater temperature changes may impact core thermal power.
Evaluator Note:		As the transient stabilizes, Rod Control will fail resulting in initial CB 'D' rod insertion at ≈8 steps/minute and Loop #3 FRV fails to respond in automatic. SRO may use or refer to AOP-C-01, ROD CONTROL SYSTEM MALFUNCTIONS, Section 2.1, Uncontrolled Rod Bank Movement: in response to this failure; attached to the end of this event guide.
	BOP	6. **MONITOR** Steam generator levels returning to program. [M-4] **(RNO Required)**
	BOP	**RNO:** **CONTROL** Main Feedwater Pumps or Feed Reg Valves as required. **MAINTAIN** S/G generator levels on program.

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Event Description: 1B #3 HDT Pump trip and 1-LCV-6-105A valve failure - HDT system low flow runback w/ Failure of #3 SG LCV and Failure of Automatic Rod Control

Time	Position	Applicant's Actions or Behavior
		IF low S/G level reactor trip is imminent, **THEN TRIP** reactor and **GO TO** E-0, Reactor Trip or Safety Injection.
	BOP	BOP recognizes Loop #3 FRV failing to respond in automatic; takes manual control and restores #3 SG level to program.
	RO	7. **MONITOR** reactor power:
		a. **CHECK** ICS thermal power indication AVAILABLE.
		b. **REDUCE** turbine load as necessary to maintain 10-minute average power less than applicable limit (3455 or 3411 MWt).
	BOP	8. **DISPATCH** operators to investigate cause for loss of #3 heater drain tank pump flow:
		• **CHECK** LCV-6-106A and -106B functioning properly.
		• **CHECK** position of LCV-6-105A and 105B
		• **CHECK** #3 heater drain tank pumps functioning properly.
	NOTE 1:	Recommended load rate is 1% per minute if turbine load reduction is needed.
	NOTE 2:	Severe MFW pump cavitation is likely if inlet pressure is less than 250 psig.
	BOP	9. **MONITOR** Feedwater pump inlet pressure greater than 320 psig. [M-3, PI-2-129]
	BOP	10. **MONITOR** Condensate Booster pump suction pressure greater than 100 psig. [M-3, PI-2-77]
Evaluator Note:		Neither condition in steps 9 or 10 above should exist during this event.
	BOP	11. **CHECK** VALVE POSITION LIMIT light DARK on 1(2)-XX-47-2000, EHC DISPLAY. ***(RNO required)***

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Event Description: 1B #3 HDT Pump trip and 1-LCV-6-105A valve failure - HDT system low flow runback w/ Failure of #3 SG LCV and Failure of Automatic Rod Control

Time	Position	Applicant's Actions or Behavior
		RNO: **RESTORE** turbine controls to normal **USING** Appendix B, Turbine Runback Restoration. (Included at end of this event guide)
	BOP	12. **IF** C-7 Interlock LIT, **THEN** **RESET** Load Rejection Signal:
		f. **PLACE** HS-1-103A and 103B, Steam Dump Control, in OFF.
		g. **PLACE** HS-1-103D, Steam Dump Control, in RESET and **VERIFY** spring return to TAVG.
		h. **VERIFY** C-7, LOSS OF LOAD INTERLOCK alarm, DARK. [M-4A, 5E]
		i. **ENSURE** Steam Dump demand is ZERO.
		j. **PLACE** HS-1-103A and 103B, Steam Dump Control, in ON.
	SRO	13. **EVALUATE** reactor power reduction to less than 60% **USING** one of the following:
		• 0-GO-5, Normal Power Operation **OR** • AOP-C.03, Rapid Shutdown or Load Reduction
		END OF SECTION
	SRO	Go to Procedure and step in effect
Evaluator Note: The following CREW Brief and Notification actions are not contained in the procedure.		
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead Examiner may cue the next event when SRO directs appropriate plant procedure,		

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Event Description: 1B #3 HDT Pump trip and 1-LCV-6-105A valve failure - HDT system low flow runback w/ Failure of #3 SG LCV and Failure of Automatic Rod Control

Time	Position	Applicant's Actions or Behavior
AOP-C.01, Section 2.1, Uncontrolled Rod Bank Movement		
Automatic actions that occur due to the heater drain system malfunction result in Turbine Runback from #3 Heater Drain Tank Pump trip if greater than 81% turbine load. SRO may choose to enter this procedure/section to address automatic rod motion; he then would be expected to enter AOP-S.04 to follow up secondary plant indications.		
	SRO	SRO may use or refer to AOP-C-01, ROD CONTROL SYSTEM MALFUNCTIONS, Section 2.1, Uncontrolled Rod Bank Movement:
	SRO	Enter and direct action of AOP-C.01 Section 2.1
	RO	1. STOP uncontrolled rod motion: a. PLACE rod control in MAN. b. CHECK rod motion STOPPED.
	CAUTION: Control Rods should NOT be manually withdrawn during a plant transient.	
	CREW	2. CHECK for plant transient: a. CHECK reactor power and T-avg STABLE.
	RO	3. CHECK for instrumentation malfunction:
		a. **CHECK** nuclear instrumentation OPERABLE.
		b. **CHECK** RCS RTDs OPERABLE
		c. **CHECK** turbine impulse pressure channels OPERABLE.
		d. **CHECK** T-ref OPERABLE **USING** TR-68-2B.
		e. **CHECK** Auctioneered T-avg OPERABLE **USING** TR-68-2B.
	RO	4. **CHECK** for inadvertent RCS dilution: ***(RNO Required* – GO TO Step 6)**
		a. **CHECK** evidence of dilution INDICATED:
		• VCT level indication
		OR
		• T-avg rising unexplained with stable turbine load.

Op Test No.: NRC Scenario # 2 Event # 4 Page 37 of 55

Event Description: 1B #3 HDT Pump trip and 1-LCV-6-105A valve failure - HDT system low flow runback w/ Failure of #3 SG LCV and Failure of Automatic Rod Control

Time	Position	Applicant's Actions or Behavior
	RO	5. **CHECK** for inadvertent boration flow: ***(RNO Required* – GO TO Step 6)**
		a. **CHECK** evidence of boration flow INDICATED:
		• Batch counters flow indication **OR** • VCT level indication **OR** • T-avg dropping unexplained.
	NOTE: When adjusting T-avg, reactivity changes should be accomplished by only one method at a time.	
	RO	6. **RESTORE** T-avg to within 1.5°F of T-ref:
		• **POSITION** control rods **OR** • **ADJUST** turbine load **OR** • **ADJUST** RCS boron concentration **USING** 0-SO-62-7, Boron Concentration Control.
	SRO	7. **EVALUATE** the following Tech Specs/TRM for applicability:
		• 3.1.1.1, Shutdown Margin - T-avg Greater than 200°F
		• 3.1.1.4, Minimum Temperature for Criticality
		• 3.1.3.1, Movable Control Assemblies, Group Height
		• 3.1.3.5, Shutdown Rod Insertion Limit
		• 3.1.3.6, Control Rod Insertion Limits
		• 3.2, Power Distribution Limits (entire section)
	RO	8. **CHECK** cause of continuous rod motion IDENTIFIED.
	CREW	9. **ENSURE** Maintenance initiated as required.
	CREW	10. **ENSURE** Plant Management notified of failure.

Op Test No.: NRC Scenario # 2 Event # 4 Page 38 of 55

Event Description: 1B #3 HDT Pump trip and 1-LCV-6-105A valve failure - HDT system low flow runback w/ Failure of #3 SG LCV and Failure of Automatic Rod Control

Time	Position	Applicant's Actions or Behavior
		11. **WHEN** problem corrected **AND** automatic rod control is available, **THEN PERFORM** the following:
	RO	a. **ENSURE** T-avg and T-ref matched within 1°F.
	RO	b. **PLACE** control rods in AUTO **USING** 0-SO-85-1, Rod Control System.
	SRO	12. **GO TO** appropriate plant procedure.
		END OF SECTION

Op Test No.: NRC Scenario # 2 Event # 4 Page 39 of 55

Event Description: 1B #3 HDT Pump trip and 1-LCV-6-105A valve failure - HDT system low flow runback w/ Failure of #3 SG LCV and Failure of Automatic Rod Control

AOP-S.04, CONDENSATE OR HEATER DRAINS MALFUNCTION

APPENDIX A

IMMEDIATE BORATION TO RESTORE RODS ABOVE LOW-LOW ROD INSERTION LIMIT

TIME	

[1] **IMMEDIATELY INITIATE** boration by performing the following:

[a] **PLACE** BA transfer pump aligned to blender in FAST speed. ☐

[b] **ADJUST** FCV-62-138 as necessary to establish boration flow greater than or equal to 35 gpm from BAT (at least 6120 ppm). ☐

[c] **IF** required flow via FCV-62-138 CANNOT be established,
THEN
PERFORM one of the following:

- **INITIATE** normal boration of greater than or equal to 35 gpm from BAT (at least 6120 ppm) **USING** 0-SO-62-7 Sect. 6.4. ☐

OR

- **INITIATE** boration flow of greater than or equal to 90 gpm from RWST **USING** 0-SO-62-7 Sect. 8.4. ☐

[d] **WHEN** control rods are verified to be above low-low insertion limit,
THEN
REDUCE or **STOP** boration flow as required. ☐

END

Op Test No.: NRC Scenario # 2 Event # 4 Page 40 of 55

Event Description: 1B #3 HDT Pump trip and 1-LCV-6-105A valve failure - HDT system low flow runback w/ Failure of #3 SG LCV and Failure of Automatic Rod Control

AOP-S.04, CONDENSATE OR HEATER DRAINS MALFUNCTION

APPENDIX B

TURBINE RUNBACK RESTORATION

TIME	
	NOTE This appendix is used to remove turbine from valve position limiter prior to starting load reduction following a BOP runback.
	[1] **ENSURE** governor valve tracking meter centered close to **ZERO**. ☐
	[2] **DEPRESS [TURB MANUAL]** mode selector pushbutton. ☐
	[3] **VERIFY [TURB MANUAL]** lamp LIT. ☐
	[4] **VERIFY** reference and setter counters stabilize. ☐
	[5] **ENSURE** governor valve tracking meter centered close to **ZERO**. ☐
	[6] **DEPRESS [OPER AUTO]** mode selector pushbutton. ☐
	[7] **VERIFY [OPER AUTO]** lamp LIT. ☐
	[8] **VERIFY** reference and setter counters stabilize. ☐
	[9] **IF** VALVE POS LIMIT light is LIT, **THEN** **REDUCE** turbine load reference using SETTER **UNTIL** VALVE POS LIMIT light is DARK. ☐
	END OF TEXT

Op Test No.:	NRC	Scenario #	2	Event #	5, 6, 7, 8, 9	Page	41	of	55

Event Description: Loop #3 FRV (1-LCV-3-90) Fails closed resulting in a Reactor Trip demand/ Loss of Offsite AC Power, both EDGs fail to Auto Start, ERCW cooling water automatic valve to 1A-A EDG fails to open, 1B-B MDAFW Pump is air/vapor bound and the TDAFW pump mechanical overspeed trip actuates.

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 5		
Indications available: **1-M-3 indications:** • **SG-3 MAIN REG VALVE FLOW CONTORL 1-FIC-3-90: indicates full OPEN demand** **1-M-4 Annunciators** • **XA-55-4D Window A-3 "LD-3-97B STM GEN LOOP 3 LEVEL LOW-LOW REACTOR TRIP** **1-M-4 indications:** • **LOOP 3 SG-3 NR LEVEL indicator 1-LI-3-97: varies, then goes down;** • **1-LI-3-94: varies, then goes down;** • **1-LI-3-93: varies, then goes down;** • **LOOP 3 SG-3 FW INLET FLOW CH-1 indicator 1-FI-3-90A: varies, then goes down;** • **CH-2 indicator 1-FI-3-90B: varies, then goes down;** **1-M-5 indications:** • **LOOP 3 SG-3 NR LEVEL indicator 1-LI-3-97: varies, then goes down;** • **1-LI-3-94: varies, then goes down;** • **1-LI-3-93: varies, then goes down;** • **LOOP 3 SG-3 FW INLET FLOW CH-1 indicator 1-FI-3-90A: varies, then goes down;** • **CH-2 indicator 1-FI-3-90B: varies, then goes down;** **1-M-6 Annunciators** • **XA-55-6B Window C-1 "LS-3-94D STM GEN LOOP 3 LOW FW FLOW LOW WATER LEVEL"** • **C-4 "LS-3-93B STEAM GENERATOR LOOP 3 LOW LOW WATER LEVEL"** • **C-7 "FS-3-90B STM GEN LOOP 3 STEAM/FEEDWATER FLOW MISMATCH**		
T = 40	BOP	Identifies failed closed Loop #3 FRV and makes a crew announcement.
	SRO	Directs reactor trip "before AUTO Rx Trip occurs" and directs operators to perform Immediate Operator Actions (IOAs)
Evaluator Note: Following IOA performance, prior to Steps 1-4 immediate action verification, RO/BOP surveys MCBs for any expected automatic system/component response that failed to occur. Upon discovery, they may take manual action(s) to align plant systems as expected for the event in progress. [Ref. EPM-4, Prudent Operator Actions (POAs)]		

Op Test No.: NRC Scenario # 2 Event # 5, 6, 7, 8, 9 Page 42 of 55

Event Description: Loop #3 FRV (1-LCV-3-90) Fails closed resulting in a Reactor Trip demand/ Loss of Offsite AC Power, both EDGs fail to Auto Start, ERCW cooling water automatic valve to 1A-A EDG fails to open, 1B-B MDAFW Pump is air/vapor bound and the TDAFW pump mechanical overspeed trip actuates.

Time	Position	Applicant's Actions or Behavior
		For this sequence of events, POAs might include but are not limited to the following:
	RO/BOP	• EDG Remote Start @ 1-M-1 (common start switch);
	BOP	• EDG Remote Start @ 1-M-26A/B Panels (individual emergency start switches);
	BOP	• 1A-A ERCW Supply Valve opening @0-M-26A;
	RO/BOP	• TDAFW Pump attempted start @ 1-M-3;
	RO/BOP	• MSS/Maintenance Notification (may be via WCC SRO also).
E-0, *Reactor Trip or Safety Injection*		
Note 1	Steps 1 through 4 are immediate action steps	
Note 2	This procedure has a foldout page	
	RO	1. VERIFY reactor TRIPPED: • Reactor trip breakers OPEN • Reactor trip bypass breakers DISCONNECTED or OPEN • Neutron flux DROPPING • Rod bottom lights LIT • Rod position indicators less than or equal to 12 steps.
	BOP	2. VERIFY turbine TRIPPED: • Turbine stop valves CLOSED.

Evaluator Note: Critical Task is manually start at least 1 EDG prior to placing safeguards loads P-T-L in ECA-0.0 including opening ERCW Cooling Valve.

(BOP may attempt to start both EDGs at 1-M-1 using 1-HS-82-15, DG EMERG START !A-A, 2A-A, 1B-B, 2B-B or 0-M-26A/B panel emergency start PBs 0-HS-82-16A and 0-HS-82-46A for 1A-A and 1B-B EDGs respectively. Either location/control will achieve the expected response.)

Op Test No.: NRC Scenario # 2 Event # 5, 6, 7, 8, 9 Page 43 of 55

Event Description: Loop #3 FRV (1-LCV-3-90) Fails closed resulting in a Reactor Trip demand/ Loss of Offsite AC Power, both EDGs fail to Auto Start, ERCW cooling water automatic valve to 1A-A EDG fails to open, 1B-B MDAFW Pump is air/vapor bound and the TDAFW pump mechanical overspeed trip actuates.

Time	Position	Applicant's Actions or Behavior
	BOP	3. VERIFY at least one train of shutdown boards ENERGIZED. • Attempt to restore power to at least ONE train of shutdown boards • Place DG 1A-A control switch in START • Verify Train A Shutdown Boards ENERGIZED
	RO	4. DETERMINE if SI actuated: • ECCS pumps RUNNING. • Any SI alarm LIT [M-4D] (SI will be actuated) ***(RNO Required)***
	RO	**RNO:** DETERMINE if SI required: a. IF any of the following conditions exists: •S/G pressure less than 600 psig, OR •RCS pressure less than 1870 psig, OR •Containment pressure greater than 1.5 psig, THEN ACTUATE SI.
	CREW	**Determines SI Actuation NOT required by current conditions**
	SRO	b. IF SI is NOT required, THEN PERFORM the following: 1) MONITOR status trees. 2) GO TO ES-0.1, Reactor Trip Response.
	SRO	SRO determines SI not required; SRO implements status tree monitoring and transitions to ES-0.1, Reactor Trip Response.

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Event Description: Loop #3 FRV (1-LCV-3-90) Fails closed resulting in a Reactor Trip demand/ Loss of Offsite AC Power, both EDGs fail to Auto Start, ERCW cooling water automatic valve to 1A-A EDG fails to open, 1B-B MDAFW Pump is air/vapor bound and the TDAFW pump mechanical overspeed trip actuates.

Time	Position	Applicant's Actions or Behavior
	SRO	Since a loss of off site power occurred at initiation of the event, AOP-P.01, LOSS OF OFFSITE POWER should be implemented and handed off to the BOP to complete via the single-performer method. AOP-P.01, LOSS OF OFFSITE POWER is attached to the end of this event guide.
ES-0.1, Reactor Trip Response		
Evaluator Note: Events 8 & 9, 1B-B AFW Pump Airbound and U1 TDAFW Pump Mechanical over speed trip actuate with the reactor trip. Since the 1A-A MDAFW Pump is out of service for maintenance, a loss of all AFW flow occurs and results in RED path conditions for Heat Sink safety function. The crew should identify this RED path condition and the SRO should transition to FR-H.1, Loss of Heat Sink. Expected indications and operator actions contained at end of this guide.		
Note: This procedure has a foldout page.		
	RO	1. MONITOR SI NOT actuated: • SI ACTUATED permissive DARK[M-4A, D4]
	BOP	2. VERIFY generator breakers OPEN.
	RO	3. MONITOR RCS temperatures: • IF any RCP running, THEN CHECK T-avg stable at or trending to between 547°F and 552°F. OR • IF RCPs stopped, THEN CHECK T-cold stable at or trending to between 547°F and 552°F.
	BOP	4. **CHECK** feedwater status: a. T-avg less than 550°F.
		b. MFW pumps TRIPPED.
		c. MFW regulating valves CLOSED.

Op Test No.: NRC Scenario # 2 Event # 5, 6, 7, 8, 9 Page 45 of 55

Event Description: Loop #3 FRV (1-LCV-3-90) Fails closed resulting in a Reactor Trip demand/ Loss of Offsite AC Power, both EDGs fail to Auto Start, ERCW cooling water automatic valve to 1A-A EDG fails to open, 1B-B MDAFW Pump is air/vapor bound and the TDAFW pump mechanical overspeed trip actuates.

Time	Position	Applicant's Actions or Behavior
		d. MFW regulating bypass valve controller outputs ZERO.
		e. MFW isolation valves CLOSED.
	BOP	5. **CHECK** total feed flow to S/Gs greater than 440 gpm. ***(RNO Required)***
	BOP SRO	**RNO:** **ESTABLISH** AFW flow as necessary. **IF** AFW flow CANNOT be established, **THEN** **ESTABLISH** main feedwater flow **USING** EA-2-2, Establishing Secondary Heat Sink Using Main Feedwater or Condensate System.
	SRO	Since the initiating event included a loss of off-site power, EA-2-2 cannot be implemented and directs the BOP to implement 1-FR-0, Status Tree Monitoring (for implementation).
	CREW	Request Maintenance support to assist in getting 1 or more AFW Pumps in service (may contact MSS, Maintenance, WCC SRO or
	BOP	BOP identifies FR-H.1 Red Path condition: • <440 gpm AFW flow, not by operator action; and, • <10% in all SGs Informs the SRO as the highest RED/ORANGE path critical safety function challenge.
	SRO	Directs transition to FR-H.1 from ES-0.1 step in effect (5)

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Event Description: Loop #3 FRV (1-LCV-3-90) Fails closed resulting in a Reactor Trip demand/ Loss of Offsite AC Power, both EDGs fail to Auto Start, ERCW cooling water automatic valve to 1A-A EDG fails to open, 1B-B MDAFW Pump is air/vapor bound and the TDAFW pump mechanical overspeed trip actuates.

Time	Position	Applicant's Actions or Behavior
Lead Evaluator Note: The scenario may be terminated as directed by the Lead Examiner once the crew restores secondary heat sink control either by venting the 1B-B MDAFW Pump or by resetting the TDAFW Pump resulting in positive SG level increase/RCS temperature change.		

Time	Position	Applicant's Actions or Behavior
		FR-H.1 , LOSS OF SECONDARY HEAT SINK
		LEAD EXAMINER: Wait until Pzr PORV cycles one to two (1 to 2) times before directing booth operator to restore 1B-B MDAFW Pump or TDAFW Pump to determine whether the crew will decide in Step 5 to go to Feed and Bleed (per Step 5.c: **GO TO**...Step 17) or Step 5.a RNO (**GO TO** Step 6.).
	CAUTION:	Unisolating a faulted S/G or secondary break should NOT be considered UNLESS needed for RCS cooldown.
	CAUTION	**Feeding an Intact or Ruptured S/G is preferred to feeding a Faulted S/G. Thermal stresses from feeding a Faulted S/G could rupture tubes, resulting in a Faulted-AND-Ruptured S/G.**
	BOP	1. **DETERMINE** procedure applicability:
		a. **CHECK** the following:
		• Total feed flow less than 440 gpm due to operator action directed by another procedure. **AND** • Total feed flow capability of greater than 440 gpm AVAILABLE. ***(RNO Required)***
		RNO: a. **GO TO** Step 2.
	SRO	Continues in FR-H.1
	RO	2. **MONITOR** RWST level greater than 27%.

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Event Description: Loop #3 FRV (1-LCV-3-90) Fails closed resulting in a Reactor Trip demand/ Loss of Offsite AC Power, both EDGs fail to Auto Start, ERCW cooling water automatic valve to 1A-A EDG fails to open, 1B-B MDAFW Pump is air/vapor bound and the TDAFW pump mechanical overspeed trip actuates.

Time	Position	Applicant's Actions or Behavior
	BOP	3. **CHECK** if secondary heat sink required:
		a. RCS pressure greater than any non-Faulted S/G pressure.
		b. RCS temperature greater than 350°F.
	CREW/ SRO	Crew determines faulted SG(s) not the initiating conditions; Continues in FR-H.1
	RO	4. **MONITOR** at least one CCP available.
LEAD EXAMINER: Wait until Pzr PORV cycles one to two (1 to 2) times before directing booth operator to restore selected AFW Pump to determine whether the crew will decide in Step 5 to go to Feed and Bleed (per Step 5.c: **GO TO...**Step 17) or Step 5.a RNO (**GO TO** Step 6.).		
	NOTE	Pressurizer pressure greater than or equal to 2335 psig with rising RCS temperature and a low loop delta-T indicates loss of heat removal capability.
	RO	5. **MONITOR** RCS feed and bleed criteria:
		a. **CHECK** the following: • Any three S/G wide range levels less than 20% [41% ADV] **OR** • Pressurizer pressure greater than or equal to 2335 psig due to loss of secondary heat removal. ***(RNO Required)***
	RO/SRO	**RNO:** a. **GO TO** Step 6.
	CREW/ SRO	Crew determines Feed/Bleed criteria not met;; Continues in FR-H.1

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Event Description: Loop #3 FRV (1-LCV-3-90) Fails closed resulting in a Reactor Trip demand/ Loss of Offsite AC Power, both EDGs fail to Auto Start, ERCW cooling water automatic valve to 1A-A EDG fails to open, 1B-B MDAFW Pump is air/vapor bound and the TDAFW pump mechanical overspeed trip actuates.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	6. **MONITOR** CST level greater than 5%.
	CREW/ SRO	Crew determines Step 6 RNO, AFW Alternate suction alignment to ERCW not appropriate corrective action; Continues in FR-H.1
	SRO	7. **ATTEMPT** to establish AFW flow to at least one S/G in the following order of priority-- Intact, Ruptured, Faulted:
	RO	a. **CHECK** S/G blowdown isolation valves CLOSED.
	BOP	b. **CHECK** control room indications for cause of AFW failure: • CST level • AFW pump power supply • AFW valve alignment
	BOP	c. **ESTABLISH** MD AFW pump flow: 1) **ENSURE** MD AFW pumps RUNNING. 2) **ENSURE** AFW level control valves OPEN. 3) **ENSURE** MD AFW recirculation valves FCV-3-400 and FCV-3-401 CLOSED.

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Event Description: Loop #3 FRV (1-LCV-3-90) Fails closed resulting in a Reactor Trip demand/ Loss of Offsite AC Power, both EDGs fail to Auto Start, ERCW cooling water automatic valve to 1A-A EDG fails to open, 1B-B MDAFW Pump is air/vapor bound and the TDAFW pump mechanical overspeed trip actuates.

Time	Position	Applicant's Actions or Behavior
	BOP	d. **ESTABLISH** TD AFW pump flow: 1) **ENSURE** turbine steam supply valves OPEN: • Either FCV-1-15 or FCV-1-16 • FCV-1-17 and FCV-1-18 • Trip and throttle valve, FCV-1-51.
	CREW/ SRO	Crew determines Steps 7.a, b, c, d RNO, B/D, AFW valve/switch alignments not the appropriate corrective action; Continues in FR-H.1
	NOTE	Continuous actions in Step 8 are NOT applicable after RCS feed and bleed is initiated in Step 17.
	BOP	8. **MONITOR** for AFW flow:
		a. **CHECK** total AFW flow to S/Gs greater than 440 gpm.
	SRO	b. **RETURN TO** procedure and step in effect.
	SRO	Determines ES-0.1 step (5) in effect

Evaluator Note: Critical Task: Establish feedwater flow into at least one SG before RCS feed and bleed is required. Crew should have at least 1 AFW Pump with flow capability to at least 2 SGs.

Lead Examiner may terminate the scenario once the crew restores secondary heat sink control resulting in positive SG level increase/RCS temperature change and a transition to procedure/step in effect.

Secondary heat sink restoration:

- **Venting/restarting 1B-B MDAFW Pump- >440 gpm to #s 3 & 4 SGs**

OR

- **Resetting/restarting the TDAFW Pump- >440 gpm to #s 1-4 SGs**

Op Test No.: NRC Scenario # 4 Event # AOP-P.01 Page 50 of 55

Event Description: **Loss of Off Site Power**

Time	Position	Applicant's Actions or Behavior
		AOP-P.01, Loss of Off Site Power
		Evaluator Note: During AOP-P.01 implementation, the crew performs through step 9, which contains actions important to support current operating strategies; further activities, while important, are administrative or are delegated to plant personnel outside the MCR.
	CREW	**2.0 OPERATOR ACTIONS** 1. DIAGNOSE the failure: IF... / GO TO SECTION / PAGE Complete loss of off-site power — 2.1 — 4 Partial Loss of Offsite Power: • A or B start busses de-energized OR • loss of normal supply to individual shutdown board (shutdown board energized from D/G) — 2.2 — 29
	CREW	NOTE: Steps 1 and 2 are immediate actions.
	BOP	1. **CHECK** Diesel Generators RUNNING and supplying shutdown boards. — **EMERGENCY START** available D/Gs.
	BOP	2. **CHECK** ERCW supply valves to D/Gs OPEN. — **ENSURE** normal or alternate ERCW supply valve OPEN. **IF** any diesel generator running **AND** cooling water NOT available, **THEN** **EMERGENCY STOP** affected diesel generator(s).

Op Test No.: NRC Scenario # 4 Event # AOP-P.01 Page 51 of 55

Event Description: **Loss of Off Site Power**

Time	Position	Applicant's Actions or Behavior
	BOP	3. **MONITOR** BOTH 6900V shutdown boards on this unit ENERGIZED. IF NO 6900V shutdown board is ENERGIZED on this unit, **THEN** **PERFORM** the following:
	SRO	a. **IF** unit is in Mode 1-4, **THEN** **ENSURE** ECA-0.0, Loss of All AC Power has been entered.
	SRO	b. **IF** unit is in Modes 4-6, **THEN** **ENSURE** AOP-R.03, RHR System Malfunction, has been entered, WHILE continuing in this procedure.
	SRO	c. **IF** any D/G is available (capable of starting), **THEN** **PERFORM** Appendix S, Manually Energizing Shutdown Board from D/G. d. **WHEN** off-site power is available, **THEN** **PERFORM** Section 2.3, Recovery from Loss of Offsite Power. e. **DO NOT CONTINUE** Section 2.1 UNTIL at least one shutdown board is ENERGIZED.
	SRO	IF one 6900V shutdown board is ENERGIZED on this unit, **THEN** **PERFORM** the following:
	RO	a. **ENSURE** available CCP RUNNING.
	SRO RO BOP	b. **IF** NO CCP is available **THEN** **PERFORM** the following: 1) **IF** Phase B is NOT actuated, **THEN** **ENSURE** RCP thermal barrier cooling: • one CCS pump RUNNING aligned to supply Train A CCS. • one TBBP RUNNING.

Op Test No.: NRC Scenario # 4 Event # AOP-P.01 Page 52 of 55

Event Description: **Loss of Off Site Power**

Time	Position	Applicant's Actions or Behavior
	SRO	2) **REFER TO** AOP-M.09, Loss of Charging.
	SRO	c. **IF** any D/G available (capable of starting), **THEN** **PERFORM** Appendix S, Manually Energizing Shutdown Board from D/G.
	SRO	d. **PERFORM** applicable AOP for loss of shutdown board as time allows: • AOP-P.05 (Unit 1 Shutdown Boards) • AOP-P.06 (Unit 2 Shutdown Boards)
	SRO	e. **IF** off-site power is available **AND** rapid restoration is needed, **THEN** **PERFORM** Sect. 2.3, Recovery from Loss of Offsite Power.
	SRO	4. **NOTIFY** SM to perform the following: a. **EVALUATE** EPIP-1, Emergency Plan Classification Matrix. b. **INITIATE** staffing of TSC and OSC **USING** Emergency Paging System.
	CREW	5. **RECORD** time of loss of off-site power. _____

Op Test No.: NRC Scenario # 4 Event # AOP-P.01 Page 53 of 55

Event Description: **Loss of Off Site Power**

Time	Position	Applicant's Actions or Behavior
	BOP	6. **MONITOR** diesel generator loading: a. **VERIFY** D/G load sequencing **USING** Appendix B, Loss of Offsite Power Diesel Generator Load Sequence **[C.2]**. b. **ENSURE** four ERCW pumps RUNNING (one per shutdown board). c. **MONITOR** diesel generator(s) load less than or equal to 4.4 MW (4.8 MW for 2 hours). c. **REDUCE** excess diesel generator load **USING** Appendix A, Diesel Generator Load Evaluation List **[C.1]**.
	RO	7. **CHECK** charging system operation: a. **ENSURE** all RCS dilution activities STOPPED. b. **ENSURE** CCP suction aligned to RWST: 1) **OPEN** LCV-62-135 or LCV-62-136. 2) **CLOSE** LCV-62-132 or LCV-62-133.
		CAUTION 1 **Failure to promptly restart air compressors and restore non-essential air to containment will delay restoration of letdown. This may result in uncontrolled pressurizer level rise and PORV opening.** **CAUTION 2** **Opening Train A ERCW supply to Station Air Compressors with ERCW temp greater than 82.3°F makes Train A MCR Chiller and EBR Chiller inoperable due to inadequate ERCW flow. This would place both units in LCO 3.0.5.** **NOTE** Starting control air compressors will add about 0.1 MW to D/G 1A-A and 1B-B.
	BOP	8. **RESTORE** control air: a. **PLACE** MSIV handswitches in CLOSE position.

Op Test No.: NRC Scenario # 4 Event # AOP-P.01 Page 54 of 55

Event Description: **Loss of Off Site Power**

Time	Position	Applicant's Actions or Behavior
	CREW	b. **ESTABLISH** cooling water to station air compressors: 1) **VERIFY** Train B ERCW available. 2) **ENSURE** FCV-67-208 Train B ERCW to air compressors OPEN. [0-M-27A] b. **IF** Train B ERCW supply NOT available **AND** ERCW temp is less than 82.3°F, **THEN** **OPEN** FCV-67-205, Train A ERCW to air compressors. [0-M-27A]
	BOP	c. **DISPATCH** an operator to start Station Air Compressors A and B **USING** EA-32-2, Establishing Control and Service Air.
	BOP	d. **ENSURE** auxiliary air compressors RUNNING. [M-15 or AB el 734] (powered from Unit 2 Shutdown Bds) d. **WHEN** control air pressure is greater than 75 psig, **THEN** **ALIGN** control air to supply auxiliary air **USING** EA-32-2.
	RO	8. e. **CHECK** Phase B NOT actuated. e. **IF** Phase B actuated, **THEN** **GO TO** Note prior to Step 9.
	BOP	f. **WHEN** control air pressure restored, **THEN** **RESTORE** air to containment **USING** EA-32-1, Establishing Control Air to Containment.
		NOTE: 0-SO-82-1, 2, 3, 4 Appendix C contains normal D/G running parameters. Copies of these appendices may be obtained from AOP-C.04 cabinet in D/G Bldg.

Op Test No.: NRC Scenario # 4 Event # AOP-P.01 Page 55 of 55

Event Description: **Loss of Off Site Power**

Time	Position	Applicant's Actions or Behavior
	BOP	9. **DISPATCH** operator to D/G Building to monitor diesel generators **USING** 0-SO-82-1, 2, 3, 4 App. C.

Evaluator Note: During AOP-P.01 implementation, the crew performs through step 9, which contains actions important to support current operating strategies; further activities, while important, are administrative or are delegated to plant personnel outside the MCR.

DELTA TIME (hrs)	REACTOR POWER (%)	POWER DEFECT (pcm)	ASSUMED ROD HT (steps)	INSERTED WORTH (pcm)	EXPECTED XENON (pcm)	DELTA RHO BORON (pcm)	BORON CONC (ppm)	DELTA PPM (ppm)	RECOMMEN DILUTION (gal)	RECOMME BORATION (gal)	IODINE CONC (% eq)	DATE/TIME
0	85.0	1450.8	192.0	-172.2	-2602.0	---	1153.0	---	---	---	99.4	2/14/10 22:00
1	89.0	1517.6	195.0	-150.0	-2664.4	107.0	1136.0	-17.0	963	0	98.2	2/14/10 23:00
2	91.0	1558.4	198.0	-130.4	-2696.3	53.1	1127.6	-8.4	481	0	97.4	2/15/10 0:00
3	93.0	1596.0	201.0	-111.5	-2709.6	32.1	1122.5	-5.1	292	0	96.9	2/15/10 1:00
4	95.0	1632.3	203.0	-98.8	-2709.8	23.8	1118.8	-3.8	217	0	96.6	2/15/10 2:00
5	97.0	1668.6	205.0	-86.7	-2700.9	15.3	1116.3	-2.4	140	0	96.5	2/15/10 3:00
6	99.0	1704.4	208.0	-69.6	-2686.4	4.2	1115.7	-0.7	39	0	96.7	2/15/10 4:00
7	100.0	1722.0	211.0	-53.3	-2670.7	-14.5	1117.9	2.3	0	25	96.9	2/15/10 5:00
8	100.0	1720.9	214.0	-38.9	-2658.3	-27.8	1122.4	4.4	0	49	97.2	2/15/10 6:00
9	100.0	1718.8	216.0	-29.9	-2650.4	-19.1	1125.4	3.0	0	34	97.5	2/15/10 7:00
10	100.0	1717.3	216.0	-29.9	-2645.8	-6.1	1126.3	1.0	0	11	97.8	2/15/10 8:00
11	100.0	1716.9	216.0	-29.9	-2643.5	-2.7	1126.8	0.4	0	5	98.0	2/15/10 9:00
12	100.0	1716.7	216.0	-29.9	-2643.0	-0.8	1126.9	0.1	0	1	98.2	2/15/10 10:00
13	100.0	1716.6	216.0	-29.9	-2643.6	0.6	1126.8	-0.1	5	0	98.4	2/15/10 11:00
14	100.0	1716.7	216.0	-29.9	-2645.1	1.5	1126.6	-0.2	14	0	98.5	2/15/10 12:00
15	100.0	1716.8	216.0	-29.9	-2647.1	2.1	1126.2	-0.3	19	0	98.7	2/15/10 13:00
16	100.0	1716.9	216.0	-29.9	-2649.4	2.5	1125.8	-0.4	23	0	98.8	2/15/10 14:00
17	100.0	1717.1	216.0	-29.9	-2652.0	2.7	1125.4	-0.4	25	0	98.9	2/15/10 15:00
18	100.0	1717.3	216.0	-29.9	-2654.5	2.8	1125.0	-0.4	25	0	99.0	2/15/10 16:00
19	100.0	1717.5	216.0	-29.9	-2657.1	2.8	1124.5	-0.4	25	0	99.1	2/15/10 17:00
20	100.0	1717.8	216.0	-29.9	-2659.6	2.7	1124.1	-0.4	25	0	99.2	2/15/10 18:00
21	100.0	1718.0	216.0	-29.9	-2662.0	2.6	1123.7	-0.4	24	0	99.3	2/15/10 19:00
22	100.0	1718.2	216.0	-29.9	-2664.3	2.5	1123.3	-0.4	23	0	99.4	2/15/10 20:00
23	100.0	1718.4	216.0	-29.9	-2666.4	2.3	1122.9	-0.4	21	0	99.4	2/15/10 21:00
24	100.0	1718.5	216.0	-29.9	-2668.4	2.2	1122.6	-0.3	20	0	99.5	2/15/10 22:00
25	100.0	1718.7	216.0	-29.9	-2670.3	2.0	1122.3	-0.3	18	0	99.5	2/15/10 23:00
26	100.0	1718.9	216.0	-29.9	-2672.0	1.9	1122.0	-0.3	17	0	99.6	2/16/10 0:00
27	100.0	1719.0	216.0	-29.9	-2673.5	1.7	1121.7	-0.3	16	0	99.6	2/16/10 1:00
28	100.0	1719.1	216.0	-29.9	-2675.0	1.6	1121.4	-0.2	14	0	99.7	2/16/10 2:00
29	100.0	1719.2	216.0	-29.9	-2676.3	1.4	1121.2	-0.2	13	0	99.7	2/16/10 3:00
30	100.0	1719.4	216.0	-29.9	-2677.5	1.3	1121.0	-0.2	12	0	99.7	2/16/10 4:00
31	100.0	1719.5	216.0	-29.9	-2678.6	1.2	1120.8	-0.2	11	0	99.7	2/16/10 5:00
32	100.0	1719.5	216.0	-29.9	-2679.6	1.1	1120.6	-0.2	10	0	99.8	2/16/10 6:00
33	100.0	1719.6	216.0	-29.9	-2680.5	1.0	1120.5	-0.2	9	0	99.8	2/16/10 7:00
34	100.0	1719.7	216.0	-29.9	-2681.3	0.9	1120.3	-0.1	8	0	99.8	2/16/10 8:00
35	100.0	1719.8	216.0	-29.9	-2682.1	0.8	1120.2	-0.1	7	0	99.8	2/16/10 9:00

36	100.0	1719.8	216.0	-29.9	-2682.7	0.7	1120.1	-0.1	7	0	99.8	2/16/10 10:00
37	100.0	1719.9	216.0	-29.9	-2683.3	0.7	1120.0	-0.1	6	0	99.9	2/16/10 11:00
38	100.0	1719.9	216.0	-29.9	-2683.9	0.6	1119.9	-0.1	5	0	99.9	2/16/10 12:00
39	100.0	1720.0	216.0	-29.9	-2684.4	0.5	1119.8	-0.1	5	0	99.9	2/16/10 13:00
40	100.0	1720.0	216.0	-29.9	-2684.8	0.5	1119.7	-0.1	4	0	99.9	2/16/10 14:00
41	100.0	1720.1	216.0	-29.9	-2685.2	0.4	1119.7	-0.1	4	0	99.9	2/16/10 15:00
42	100.0	1720.1	216.0	-29.9	-2685.6	0.4	1119.6	-0.1	4	0	99.9	2/16/10 16:00
43	100.0	1720.1	216.0	-29.9	-2685.9	0.4	1119.5	-0.1	3	0	99.9	2/16/10 17:00
44	100.0	1720.2	216.0	-29.9	-2686.2	0.3	1119.5	-0.1	3	0	99.9	2/16/10 18:00
45	100.0	1720.2	216.0	-29.9	-2686.5	0.3	1119.4	0.0	3	0	99.9	2/16/10 19:00
46	100.0	1720.2	216.0	-29.9	-2686.8	0.3	1119.4	0.0	2	0	99.9	2/16/10 20:00
47	100.0	1720.2	216.0	-29.9	-2687.0	0.2	1119.4	0.0	2	0	100.0	2/16/10 21:00
48	100.0	1720.2	216.0	-29.9	-2687.2	0.2	1119.3	0.0	2	0	100.0	2/16/10 22:00
49	100.0	1720.3	216.0	-29.9	-2687.4	0.2	1119.3	0.0	2	0	100.0	2/16/10 23:00
50	100.0	1720.3	216.0	-29.9	-2687.5	0.2	1119.3	0.0	2	0	100.0	2/17/10 0:00
51	100.0	1720.3	216.0	-29.9	-2687.7	0.2	1119.2	0.0	1	0	100.0	2/17/10 1:00
52	100.0	1720.3	216.0	-29.9	-2687.8	0.1	1119.2	0.0	1	0	100.0	2/17/10 2:00
53	100.0	1720.3	216.0	-29.9	-2687.9	0.1	1119.2	0.0	1	0	100.0	2/17/10 3:00
54	100.0	1720.3	216.0	-29.9	-2688.0	0.1	1119.2	0.0	1	0	100.0	2/17/10 4:00
55	100.0	1720.3	216.0	-29.9	-2688.1	0.1	1119.2	0.0	1	0	100.0	2/17/10 5:00
56	100.0	1720.3	216.0	-29.9	-2688.2	0.1	1119.2	0.0	1	0	100.0	2/17/10 6:00
57	100.0	1720.3	216.0	-29.9	-2688.3	0.1	1119.1	0.0	1	0	100.0	2/17/10 7:00
58	100.0	1720.3	216.0	-29.9	-2688.4	0.1	1119.1	0.0	1	0	100.0	2/17/10 8:00
59	100.0	1720.4	216.0	-29.9	-2688.4	0.1	1119.1	0.0	1	0	100.0	2/17/10 9:00
60	100.0	1720.4	216.0	-29.9	-2688.5	0.1	1119.1	0.0	1	0	100.0	2/17/10 10:00
61	100.0	1720.4	216.0	-29.9	-2688.5	0.1	1119.1	0.0	1	0	100.0	2/17/10 11:00
62	100.0	1720.4	216.0	-29.9	-2688.6	0.1	1119.1	0.0	0	0	100.0	2/17/10 12:00
63	100.0	1720.4	216.0	-29.9	-2688.6	0.0	1119.1	0.0	0	0	100.0	2/17/10 13:00
64	100.0	1720.4	216.0	-29.9	-2688.7	0.0	1119.1	0.0	0	0	100.0	2/17/10 14:00

1000	MWD/MTU
6850	BAT ppm

Hold Tavg = Tref +/- 1.5F

Total 2570 125

Small hourly boration/dilution volumes may be accumulated for larger single additions

Reason for Maneuver	#1B Condensate Booster Pump Repair
Date	2/12/10
RxEng Name	Rx Engineering
Comments	48 Hour hold at 83%

APPENDIX C

Time: Now Date: Today

Unit 1 MCR Checklist

Part 1 - Completed by Off-going Shift / Reviewed by On-coming Shift

Mode 1, 85% Power 1020 MWe
PSA Risk: Green
Grid Risk: Green
RCS Leakage ID .02 gpm, UNID .01 gpm

NRC phone Authentication Code

Until 0800 XXXX
After 0800 XXXX

Common Tech Spec Actions

LCO/TRM	Equipment INOP	Time INOP	Owner	RTS
None	None	- - - -	- - - -	- - -

U-1 Tech Spec Actions

LCO/TRM	Equipment INOP	Time INOP	Owner	RTS
3.7.1.2.a	1A-A MDAFW Pump	12 hours	MMG	+24 hrs.
3.3.3.7.18.a	ERCW to AFW Vlv Position	12 hours	MMG	+24 hrs.

Protected Equipment

- ***1B-B MD AFW Pump***
- ***TDAFW Pump***

Shift Priorities

- **1B Cond Bster Pump PMT was satisfactorily completed on the previous shift and is running ready for plant power increase.**
- **1C Cnds Demin Bstr Pump in service.**
- **Raise plant power to 100%; according to TI-40, CPL is 85%; rod withdrawal limit rate is 3 steps per hour when greater that the CPL; load rate limit is 4.5% per hour; >90%, load rate limit is ≤2% per hour.**
- **Begin power escalation, 0-GO-5 Section 5.1 Step 57;**

Part 2 – Performed by on-coming shift

☐ Verify your current qualifications (re: OPDP-1 Section 7.3 F.)

☐ Review Operating Log since last held shift or 3 days, whichever is less.

Review the following for changes since last shift turnover:

☐ ODMIs/Standing Orders/ Shift Orders ☐ LCO actions ☐ PERs (applicable to unit)

☐ TACFs ☐ Operator workarounds, burdens, and challenges ☐ Immediate required reading

Part 3 – Performed by both off-going and on-coming shift

☐ Walk down of MCR Control Boards

APPENDIX C

Time: Now Date: Today

MAIN CONTROL ROOM (7690)
• **Train A Week**
OUTSIDE (7666) [593-5214]
• **None**
AUXILIARY BUILDING (7775)
• **None**
TURBINE BUILDING (7771) (593-8455)
• **None**

Time: Now Date: Today

MCR Red Dot List

UNID And Noun Name	Panel	Problem Description	WO / PER Number	Date Scheduled

MCR WO List

ID And Noun Name	Panel	Problem Description	WO/PER Number	Date Scheduled

UNIT ONE REACTIVITY BRIEF

Date: Today Time: Now

General Information

RCS Boron: **1153** ppm Today	BA Controller Setpoint: **28.2%** *	RCS B-10 Depletion: **52** ppm	
Operable BAT: **A**	BAT A Boron: **6850** ppm	BAT C Boron: **6850** ppm	RWST Boron: **2601** ppm
Nominal Gallons per rod step from 219: **7** gallons of acid, **50** gallons of water			

* Verify boric acid flow controller is set at Adjusted BA Controller Setting iaw 0-SO-62-7 section 5.1

Estimated values for a 1° Change in Tave **

Gallons of acid: **26**	Gallons of water: **136**	Rod Steps: **3**

Estimated rods/boron for emergency step power reduction **

(Assuming Xenon equilibrium and no reactivity effects due to Xenon. 2/3 total reactivity from rods, 1/3 from boron)

Power reduction amount	Estimated Final Rod Position	Estimated boron addition
10%	**196** Steps on bank D	**99** gallons
30%	**173** Steps on bank D	**292** gallons
50%	**151** Steps on bank D	**481** gallons

** These values are approximations and not intended nor expected to be exact. The values may be superseded by Rx Engineering or SO-62-7 calculated values. These values are calculated assuming 100% steady state power operation only. Engineering data last updated **one week ago**. Data Valid until **one week from now**.

Previous Shift Reactivity Manipulations

Number of dilutions: 1	Number of borations: 0	Rod steps in: 0
Gallons per dilution: 12	Gallons per boration: 0	Rod steps out: 0
Total amount diluted: 12	Total amount borated: 0	Net change: 0 IN/Out

Current Shift Estimated Reactivity Manipulations

Number of dilutions: *	Number of borations: 0	Rod steps in: 0
Gallons per dilution: *	Gallons per boration: 0	Rod steps out: 0
Total expected dilution: *	Total expected boration: 0	Net change: 0 In/Out

Remarks: * Per Reactor Engineer Spreadsheet
Rx Power: 85%
Xenon: 2602 pcm, equilibrium
Last Dilution Completed *

Burnup: 1000 Mwd/mtU
Samarium: 926 pcm

Next Unit 1 Flux Map is scheduled - three weeks from now
Unit 1 M-P is 0 PPM

Unit Supervisor: _____
Name/Date

Operations Chemistry Information

Boron Results					
Sample Point	**Units**	**Boron**	**Date / Time**	**Goal**	**Limit**
U1 RCS	ppm	1153	Today / Now	Variable	Variable
U2 RCS	ppm	816	Today / Now	Variable	Variable
U1 RWST	ppm	2601	Today / Now	2550 - 2650	2500 - 2700
U2 RWST	ppm	2569	Today / Now	2550 - 2650	2500 - 2700
BAT A	ppm	6850	Today / Now	Variable	Variable
BAT B	ppm	6850	Today / Now	Variable	Variable
BAT C	ppm	6850	Today / Now	Variable	Variable
U1 CLA #1	ppm	2556	Today / Now	2470-2630	2400-2700
U1 CLA #2	ppm	2575	Today / Now	2470-2630	2400-2700
U1 CLA #3	ppm	2591	Today / Now	2470-2630	2400-2700
U1 CLA #4	ppm	2589	Today / Now	2470-2630	2400-2700
U2 CLA #1	ppm	2531	Today / Now	2470-2630	2400-2700
U2 CLA #2	ppm	2650	Today / Now	2470-2630	2400-2700
U2 CLA #3	ppm	2522	Today / Now	2470-2630	2400-2700
U2 CLA #4	ppm	2526	Today / Now	2470-2630	2400-2700
Spent Fuel Pool	ppm	2547	Today / Now	$\geq$ 2050	$\geq$ 2000
Lithium Results				**Goal**	**Midpoint**
U1 RCS Lithium	ppm	1.1	Today / Now	>1	>1
U2 RCS Lithium	ppm	2.43	Today / Now	2.18-2.48	2.33

Primary to Secondary Leakrate Information (Total CPM RM-90-99/119)					
Indicator	**Units**	**U1**	**Date / Time**	**U2**	**Date/Time**
SI 50 S/G Leakage?	Yes/No	No	Today / Now	No	Today / Now
SI 137.5 CVE Leakrate	gpd	< 0.1	Today / Now	< 0.1	Today / Now
5 gpd leak equivalent	cpm	115	Today / Now	111	Today / Now
30 gpd leak equivalent	cpm	492	Today / Now	464	Today / Now
50 gpd leak equivalent	cpm	793	Today / Now	747	Today / Now
75 gpd leak equivalent	cpm	1170	Today / Now	1100	Today / Now
CVE Air Inleakage	cfm	10	Today / Now	12.5	Today / Now
Bkgd on 99/119	cpm	50	Today / Now	40	Today / Now
Correction Factor 99/119	cpm/gpd	15	Today / Now	14.13	Today / Now

Steady state conditions are necessary for an accurate determination of leak rate using the CVE Rad Monitor

Facility:	Sequoyah		Scenario No.:	3	Op Test No.: NRC
Examiners:			Operators:		
Initial Conditions:	≈3-4% RTP, 1A Main Feedwater Pump is in service.				
Turnover:	Continue plant startup. Operations are complete though 0-GO-4.Section 5.2 Step 2				
Target CTs:	Start at least 1 EDG prior to placing equipment PTL in ECA.0-0				
	Start at least 1 CCP (high-head injection pump)				
	Start at least 1 'A' Train ERCW Pump in an operating safeguards train				

Event No.	Malf. No.	Event Type*	Event Description
1. T+0	N/A	R-RO N-SRO	Continue Power Increase to MODE 1
2. T+10	NI04A	I-RO TS-SRO	Intermediate Range channel N-35 failure low (>5% RTP at initiation)
3. T+20	RX21	I-BOP	PT-1-33, Mn Steam Hdr Pressure Transmitter Lo Failure
4. T+30	RW01G	C-BOP TS-SRO	Q-A ERCW Pump Over current trip
5. T+40	RC07A	C-RO TS-SRO	PORV 68-334 fails open. The PORV can be closed manually
6. T+50	TH02B	M-All	RCS Leak
7. T+55	TH02B ED01	M-All	SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards
8. T+55	ZDIHS8215 EG08A- EG03B- pre-insert	C-BOP	1-M-1 Common Start Switch Malf 1A-A EDG fails to start in Automatic 1B-B EDG trips and cannot be restarted
9. T+55	CV35 pre-insert	C-RO	1A-A CCP fails to start in Automatic
10. T+55	RP16K611A	C-BOP	Selected 'A' Train Safety Injection Loads fail to start automatically

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Scenario 3 Summary

The crew will assume the shift with the unit in startup at ≈3-4% RTP, controlling SG levels with main feedwater, ready to proceed to MODE 1. Following the briefing summary, the crew will raise reactor power starting in 0-GO-4 Section 5.2 Step 3.

At the direction of the Lead Examiner, an Intermediate Range NI will fail requiring action to remove it from service in accordance with AOP-I.01, Section 2.2. SRO will refer to Technical Specifications 3.3.1.1 Table 3.3-1 unit 5 Action 3, 3.3.3.7 Table 3.3.10 instrument 17 Action 1 and 3.9.2 Action a.

At the direction of the Lead Examiner, PT-1-33, Main Steam Header Pressure Transmitter will fail low affecting the Steam Dumps, which will all close and Main Feed Pump Control that will cause the 1A Main Feed Pump to go to minimum speed. The crew will maintain RCS temperature on the SG atmospheric relief valves according to 1-SO-1-2, Section 7.1, Steam Dump System Shutdown and respond to annunciators for SG level deviation using 1-AR-M5-A, B-7- LS-3-42D STEAM GEN LVL HIGH-LOW DEVIATION directing implementation of AOP-S.01, Loss of Normal Feedwater Section 2.2, Loss of Main Feedwater Pump Control.

At the direction of the Lead Examiner, Q-A ERCW Pump will trip; the crew will refer to ARPs 1-27A A-1 and C-2, 1-AR-M27B-A E-3 and E-4 and should go to AOP-M.01, Section 2.1 that directs manually starting J-A ERCW Pump and repositioning the DG Power Selector for proper safeguards actuation. SRO will refer to Technical Specifications 3.7.4.

When standby ERCW Pump is in service, at the direction of Lead Examiner direction, a Pzr PORV will fail open causing an uncontrolled RCS Pressure drop. The crew should close the block valve, refer to ARPs 1-AR-M5A D-2, E-2 and 1-AR-M5C B-6 and SRO direct entry into AOP-I.04, section 2.1. The crew should also refer to 0-SO-68-3, section 8.3 to close the associated block valve. SRO will refer to Technical Specifications 3.2.5.b and LCO 3.4.3.2 action a (according to TS Bases for PORV operability).

The RCS leak occurs and progresses into a SBLOCA. The crew responds to alarms by referring to ARPs 1-AR-5C B-1, B-3, 1-AR-M 6E C-6 directing them to AOP-R.05 Section 2.1 for lowering Pzr level and a challenge to VCT Make-up capability. Subsequently the crew will initiate a reactor trip and enter E-0. Shortly after the trip (~5 minutes), offsite power is lost. 1A-A EDG fails to automatically start and must be manually started; Common Start Sw 1-HS-82-15 on 1-M-1 fails to actuate a start signal. 1B-B EDG trips and cannot be re-started. The crew must start 1A-A EDG using Emergency Start PB 0-HS-82-16A on back panel 0-M-26A and place it on the bus to avoid entering ECA-0.0 [Note; ECA-0.0 MAY be entered briefly (through Step 8) prior to starting EDG].

Additionally, selected 'A' Train Safety Injection Loads: 1A-A CCP, 1A-A MD AFW Pump, Train A SI signal to TDAFW Pump and ERCW Pumps J-A, Q-A, K-A and R-A (if selected) fail to automatically start. Starting the CCP is critical to a SBLOCA with the unavailability due to the loss of AC power. Re-starting the J-A ERCW Pump is critical for long term cooling of 1A-A EDG and 1A Header ECCS loads due to the Q-A Pump loss.

EOP flow: E-0 – E-1 – ES-1.2

The scenario may be terminated at the direction of the Lead Examiner, when ES-1.1, Post LOCA Cooldown transition is determined.

PSA significant task: Start EDG, 1A-A CCP and J-A ERCW Pump
PSA significant DAS: SBLOCA
PSA significant component failure: Pzr PORV, 1A-A EDG, Q-A ERCW Pump

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
Simulator IC	**IC-170**	**≈3-4% RTP, BOL ~1000 MWD/MTU** **CB 'D' Rods @ 180 steps, all others @ 228 steps;** **[B] = 1710 ppm; Ba Blender setting: 46.3%** **Xe ≈ -54.7 pcm; Sm ≈ *equilibrium*** ***Console Operator actions: Place simulator in run and perform the following:*** • **Place the MODE 2 sign on 1-M-4** • **Place Train Week 'A' sign** • **ENSURE IR Ch 1 selected on NR-45 Rdr** • **ENSURE 1-M-5 Tave-Tref Recorder re-scaled for MODE 2 values** • **ENSURE 1C Pzr B/U Htr Group energized**
MFs, RFs, ORs are active when the SCN file is loaded.	**IMF EG08A**	**1A-A EDG fails to start in Automatic**
	IMF EG03B	**1B-B EDG trips and cannot be restarted**
	IMF CC09B	**1B CCS fails to start in Automatic**
	IMF CV35A	**1A-A CCP fails to start in Automatic**
	IMF RP16K611A	**Selected 'A' Train Safety Injection Loads fail to start automatically**
	IOR ZDIHS8215 f:0	**1-M-1 Common EDG Start HS Fails to start EDGs**
1.	**N/A**	**Raise Power to 13-15% in preparation for Main Generator Synchronization**
2.	**IMF NI04A f:0 k:2**	**Intermediate Range channel N-35 failure low** **TS evaluation- if required;** *Support staff report: When contacted, respond as MSS- inform the crew that IMs will report to the MCR in ~25 minutes.*
3.	**IMF RX21 f:1 k:3**	**PT-1-33, Mn Stm Hdr PT Lo Failure;** *Support staff report: When dispatched, wait ~5 minutes and respond as TB AUO; report no apparent local failure indications.*
4.	**IMF RW01G f:1 k:4**	**Q-A ERCW Pump Over current trip** *Support staff report: When dispatched, wait ~5 minutes and report as the AUO that the pump motor is hot the touch.* *If dispatched, Report as the WCC SRO from the 1A-A 6.9 kV SDBd, the breaker relay target actuated is instantaneous overcurrent.*
Booth Operator: Verify IOR	**IOR ZDIXS67285 f:1** **(pre-insert)**	**ERCW Pump Select Sw XS-67-285 to Q-A Pump;** (simulates BO Sequence failure *Support staff report: none*

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
5.	**IMF RC07A f:1 k:5**	**PORV 68-334 fails open**. The PORV can be closed manually *Support staff report: When MSS contacted, state that MSS will generate a WO to investigate the problem.*
6.	**IMF TH02B f:0.01 k:6**	**RCS Leak- Loop #2** *Support staff report: none*
7. Modify Malf. At Rx Trip	**MMF TH02B f:.025 r:300** **IMF ED01 f:1 d:300 e:1**	**SBLOCA Loop #2 w/ Loss of offsite power (delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards** *Support staff report: If requested, wait ~5 minutes and report the SELD is experiencing grid instabilities;*
8.	**IMF EG08A f:1 e:2** **IMF EG03B f:1 e:2** **IOR ZDIHS8215 f:0 (pre-insert)**	**1A-A EDG fails to start in Automatic;** **1B-B EDG trips and cannot be restarted;** **1-M-1 Common EDG Start HS Fails to start EDGs** *Support staff report: If dispatched, AUO reports no reason identified for 1A-A EDG failure to start; investigating 1B-B EDG start failure- nothing identified currently;*
9.	**IMF CV35A f:1 e:17**	**1A-A CCP fails to start in Automatic** (following BO) *Support staff report: If dispatched, AUO reports no apparent cause for auto-start failure;* *If requested, report 1A-A CCP Lube Oil local temperature, flow and pressure indications are normal an d the auxiliary oil pump is running.*
10.	**IMF RP16K611A f:1 e:17**	**1A-A MD AFW Pump, Trn A SI signal to TDAFW Pump and ERCW Pumps J-A, Q-A, K-A and R-A (if selected) fail to automatically start**
11. When directed by Lead Examiner, insert	**IRF IAR01 f:1 k:11** **IRF IAR02 f:1 k:11**	**Locally starts both A & B Control Air Compressors** *Support staff report: If requested by crew; in response to EA-32-2 to re-establish Control Air*
12. When directed by Lead Examiner, insert	**IRF IAR06 f:2 k:12**	**Opens FCV-32-110.** *Support staff report: Utilize after ~75 psig is developed in response to EA-32-1 to restore non-essential air to containment.*
13. When directed by Lead Examiner, insert	**IRF EGR13 f:100 k:13**	Opens VLV-35-568 to vent generator hydrogen to the roof *Support staff report: If requested by crew; in response toAOP-P.01 Step 11*
Termination Criteria		***Complete ES-1.2 Step 15***

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Event Description: Raise plant power to 13-15% RTP

Time	Position	Applicant's Actions or Behavior
Booth Instructor: No action required for Event 1		
T = 0	**Crew will perform power change IAW 0-GO-4, Section 5.2 Reactor Power Ascension To Between 13% And 15% RTP**	
	SRO	Direct a load increase in accordance with 0-GO-5 Normal Power Operations, Section 5.1, and 0-SO-62-7 Boron Concentration Control, Section 6.1.
Evaluator Note: Following Steps are from 0-SO-62-7 Boron Concentration Control, Section 6.2 Dulite		
Evaluator Note: Dilutions will be performed based on the RE-provided Reactivity Spreadsheet; based on 0-GO-4 Notes, recommended dilution rate is 50 to 75 gallon batches every 12 to 15 minutes for a steady power increase. During subsequent power escalation, large volume dilutions will be divided evenly over each hour as determined by the crew [i.e.: one-third, one-quarter of the volume over each hour's period (e.g.: ~240 gallons, 4 times per hour for 963 gallons for the first hour)].		
	RO	**[1] ENSURE** unit is NOT in a Tech Spec or TRM action that prohibits positive reactivity additions. **[C.1]**
	NOTE	HUT level increase of 1% is equal to 1380 gallons (TI-28 fig. C.21).
	RO	**[2] ENSURE** sufficient capacity available in the HUT selected to receive expected amounts of CVCS letdown: (**N/A** if not used)
		HUT / **LEVEL** / **INITIALS** A / _____ % / _____ B / _____ % / _____
	RO	**[3] ENSURE** makeup system is aligned for **AUTO** operation in accordance with Section 5.1.
	RO	**[4] RECORD** the quantity of dilution water required to achieve desired boron concentration using Appendix D. (**N/A** for minor power changes)
	NOTE	Due to eyeball interpolation the verified calculation may slightly differ from the initial calculation. The following signoff indicates that any differences in the two results have been discussed and are close enough to be considered validated.
	RO	**[5] PERFORM** Appendix I Independent Verification of Calculation for Amount of Boric Acid or Primary Water. (N/A if App. D was performed by SRO to verify data from Rx Engineering)

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Event Description: Raise plant power to 13-15% RTP

Time	Position	Applicant's Actions or Behavior
	RO	**[6] PLACE [HS-62-140A]**, Boric Acid Supply to Blender Flow Control Switch to the **STOP** position.
	RO	**[7] PLACE [HS-62-140B]**, CVCS Makeup Selector Switch to the **DILUTE** position.
	RO	**[8] ENSURE [HS-62-140D]**, Boric Acid Valve to the Blender is **CLOSED** (Green light is **LIT**).
	RO	**[9] SET [FQ-62-142]**, Batch Integrator for the desired quantity
	NOTE	Primary Water Flow Controller **[FC-62-142]** receives its reference signal (70 gpm) from setpoint potentiometer (dial indicator) located on panel M-6. A setpoint of 35% corresponds to a 70 gpm primary water flow rate
	RO	**[10] ADJUST [FC-62-142]**, Primary Makeup Water Flow Controller for the desired flow rate
	RO	**[11] PLACE [HS-62-140A]**, Boric Acid Supply to Blender Flow Control Switch to the **START** position.
	RO	**[12] VERIFY** the following;
		[a] Inlet to top of VCT **[FCV-62-128]** is **OPEN**.
		[b] Primary Water flow by **[FI-62-142A] OR [FQ-62-142]**.
	NOTE	Alternate dilution in small amounts is acceptable on a regular basis, provided no significant changes in seal water temperature or seal leakoff are indicated. Batches of 5 to 10 gallons may be added through FCV-62-144 on a frequency not to exceed once per 30 minutes. ICS points for No. 1 seal leakoffs and seal water temperatures on the RCPs should be monitored during and after dilution.
	RO	**[13] IF** primary water addition to the bottom of the VCT **[FCV-62-144]** is desired, **THEN**
	RO	**[a] CLOSE [FCV-62-128]** with **[HS-62-128]**.
	RO	**[b] OPEN [FCV-62-144]** with **[HS-62-144]**.
	RO	**[c] VERIFY** Primary Water flow by **[FI-62-142A] OR [FQ-62-142]**.

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Event Description: Raise plant power to 13-15% RTP

Time	Position	Applicant's Actions or Behavior
	NOTE	It may take approximately 15 minutes before any changes to reactivity are indicated on nuclear instrumentation or RCS temperature indication.
		[14] MONITOR nuclear instrumentation and reactor coolant temperature to ensure the proper response from dilution.
		[15] IF [LI-62-129], Volume Control Tank Level, increases to 63 percent, **THEN ENSURE [LCV-62-118]**, Volume Control Tank Divert Valve **OPENS** to divert excess water to the Holdup Tanks.
		[16] WHEN dilution is complete, **THEN**
		[a] PLACE [HS-62-140A], Boric Acid to Blender Flow Control Switch to the **STOP** position.
		[b] IF [FCV-62-144] was previously **OPENED**, **THEN CLOSE [FCV-62-144]** with **[HS-62-144]**.
		[c] VERIFY no primary water flow on either **[FI-62-142A] OR [FQ-62-142]**.
		[d] ENSURE [FCV-62-128] is **CLOSED**
		[17] IF power increase in progress and additional dilutions will be required, **THEN** use this table to re-perform steps **[4]** through **[18]** (next page)
		[19] REALIGN the blender controls for **AUTO** makeup to the CVCS in accordance with Section 5.1.
		[20] ENSURE dilution(s) is logged in Unit Narrative Log.
	NOTE	Sample may be obtained at normal RCS sample intervals provided the unit is at power and the unit response following the dilution is as expected.
		[21] IF RCS boron sample is required, **THEN NOTIFY** Chem Lab to obtain RCS boron sample.
		End of Section 6.2

Op Test No.: NRC Scenario # 3 Event # 1 Page 4 of 68

Event Description: Raise plant power to 13-15% RTP

Time	Position	Applicant's Actions or Behavior

STEP	1st	2nd	3rd
[4] RECORD the quantity of dilution water required to achieve desired boron concentration using Appendix D.	Quantity	Quantity	Quantity
[5] PERFORM Appendix I, IV of Calculation for amount of BA or PW.	SRO	SRO	SRO
[6] PLACE [HS-62-140A], Boric Acid Supply to Blender Flow Control Switch to the **STOP** position.	___/___ 1st CV	___/___ st CV	___/___ st CV
[7] PLACE [HS-62-140B], CVCS Makeup Selector Switch to the **DILUTE** position.	☐	☐	☐
[8] ENSURE [HS-62-140D] Boric Acid Valve to Blender is **CLOSED** (Green light **LIT**).	☐	☐	☐
[9] SET [FQ-62-142], Batch Integrator for the desired quantity.	___/___ t CV	___/___ t CV	___/___ t CV
[10] ADJUST [FC-62-142], Primary Makeup Water Flow Controller for the desired flow rate.	___/___ t CV	___/___ t CV	___/___ t CV
[11] PLACE [HS-62-140A], BA Supply to Blender Flow Control Switch to **START**.	___/___ t CV	___/___ t CV	___/___ t CV
[12] VERIFY the following:			
[a] Inlet to top of VCT **[FCV-62-128]** is **OPEN**.	☐	☐	☐
[b] Primary Water flow by **[FI-62-142A]** or **[FQ-62-142]**.	☐	☐	☐
[13] IF PW addition to top of VCT **[FCV-62-128]** is not warranted, but PW addition to the bottom of the VCT **[FCV-62-144]** is desired, **THEN**			
[a] CLOSE [FCV-62-128]with **[HS-62-128]**	☐	☐	☐
[b] OPEN [FCV-62-144] with **[HS-62-144]**.	☐	☐	☐
[c] VERIFY Primary Water flow by **[FI-62-142A]** or **[FQ-62-142]**.	☐	☐	☐
[14] MONITOR nuclear instrumentation and reactor coolant temperature to ensure the proper response from dilution.	☐	☐	☐
[15] IF [LI-62-129], VCT level, increases to 63 percent, **THEN ENSURE [LCV-62-118]**, VCT Divert Valve, **OPENS** to divert excess water to the HUTs.	☐	☐	☐
[16] WHEN dilution is complete, **THEN**			
[a] PLACE [HS-62-140A], Boric Acid to Blender Flow Control Switch to **STOP**	___/___ t CV	___/___ t CV	___/___ t CV
[b] IF [FCV-62-144] was previously **OPENED**, **THEN CLOSE [FCV-62-144]** with **[HS-62-144]**.	☐	☐	☐
[c] VERIFY no primary water flow on either **[FI-62-142A]** or **[FQ-62-142]**.	☐	☐	☐
[d] ENSURE [FCV-62-128] is **CLOSED**.	☐	☐	☐

[18] IF Step **[17]** will be repeated, **THEN**
PERFORM the following:

[a] PLACE [HS-62-140B], CVCS Makeup Selector Switch to the **AUTO** position. ___/___ 1st CV

[b] PLACE [HS-62-140A], BA to Blender Flow Control Switch to **START** position. ☐

[c] ENSURE dilution is logged in Unit Narrative Log. ☐

Op Test No.:	NRC	Scenario #	3	Event #	1	Page	5	of	68
Event Description:	Raise plant power to 13-15% RTP								

Time	Position	Applicant's Actions or Behavior
	0-GO-4, Section 5.2 Reactor Power Ascension To Between 13% And 15% RTP	
	NOTE: The steam generator level operator is in control of unit startup until the main feedwater reg valves are in **AUTO**. **[C.5]**	
	SRO	[1] **REVIEW** plant parameters and indications, **AND** **VERIFY** stability prior to reactor power escalation.
	NOTES: 1) Adjusting blowdown flow will provide an additional method of controlling SG water inventory. (Close blowdown isolation valves only if level cannot be maintained) 2) Prior to increasing reactor power above 5%, SG blowdown should be in service. 3) Maximum blowdown rate is less than or equal to 270 gpm. Each steam generator flow, up to 60 gpm is indicated on panel L-357 located in the A.B. Supply Fan Rm. Minimum blowdown rate equals 5 gpm for each steam generator. Final blowdown rate should be determined by chemical analysis. 4) Computer points require a prefix 0, 1, or 2 be placed in front of the point number; for example, 1F2261A.	
	BOP	[2] **IF** SG blowdown is in service, **THEN ADJUST** FIC-15-43 as desired. (plant computer pt. F2261A)
	NOTES 1) Actions effecting reactivity are directed in the following step. 0-SO-62-7 requirements shall be adhered to for reactivity changes (i.e. reactivity balance, amounts of boric acid or water). All appropriate verifications and peer checks shall be utilized during performance. 2) Recommended dilution rate is 50 to 75 gallon batches every 12 to 15 minutes for a steady power increase. Rod movement should be limited to 1/2 step increments approximately every 1 1/2 minutes. Dilution and rod movement rates may be adjusted depending on SG level control stability. 3) Control Rod withdrawal and/or dilution requirements may be significantly impacted by the change in core reactivity due to changing Xenon concentration.	
	RO	[3] **INITIATE** a methodical and deliberate reactor power increase by manual adjustment of the control banks or by diluting the RCS. RO initiates a control rod withdrawal according to the Reactivity Plan

Op Test No.: NRC	Scenario # 3	Event # 1	Page 6 of 68
Event Description: Raise plant power to 13-15% RTP			

Time	Position	Applicant's Actions or Behavior
Evaluator Note: Crew will coordinate control rod withdrawal and dilutions based on the RE-provided Reactivity Spreadsheet and would coordinate rod withdrawal and dilutions observing the guidance the Step 3 NOTES above.		
		MODE 1
Evaluator Note: Mode change call is made using Loop ΔT indications on the MCB and ICS, not NIs; NIs may be referred to during the MODE change determination Refer to 0-GO-4 Section 3.1, Precaution C, specifically bullets 2 & 3 (below): • When reactor power is less than or equal to 15%, use average loop ΔT (UO485). • When reactor power is greater than 15%, use LEFM core thermal power indication (U2118). If LEFM is **NOT** available, then continue using average loop ΔT up to 40%. (U1118 will be used above 40% with LEFM unavailable).		
	RO	[4] **WHEN** reactor power is above 5%, **THEN LOG** Mode 1 entry in the Unit Narrative Log.
	SRO	RO would be monitoring this; any crew member may make the initial identification however the SRO should announce transition to MODE 1 based on Loop ΔT indication. Normally, both MCB and ICS indications are reviewed for MODE transition verification. Crew member replaces the MODE 2 sign with MODE 1 sign on 1-M-4 under the clock.
	BOP	[5] **MAINTAIN** the SG levels on program by periodically adjusting the feedwater bypass reg controller level setpoints using Appendix B and C. BOP refers to appendices noted and maintains SG levels and program setpoints during the power increase.

Op Test No.: NRC	Scenario # 3	Event # 1	Page 7 of 68
Event Description: Raise plant power to 13-15% RTP			

Time	Position	Applicant's Actions or Behavior
Evaluator Note: According to turnover information, the crew will not prepare for nor perform MT roll; Step 6 is N/A for this exam.		
	N/A	[6] **IF** Turbine Roll in parallel with power increase is desired, **THEN PERFORM** Section 5.3 in parallel with the remainder of this section.
	RO	[7] **IF** the intermediate range rod stop setpoint is reached before P-10 energizes, **THEN**
		[7.1] **STOP** the power escalation.
		[7.2] **CONTACT** Reactor Engineering to evaluate power range calibration. **[C.3]**
	BOP	[8] **WHEN** reactor power is greater than or equal to 10% on at least 2 out of 4 PRMs, **THEN [C.1] [C.3]**
		[8.1] **VERIFY** annunciator XA-55-4A, window D-5:
		P-10 NUCLEAR AT POWER PERMISSIVE is LIT.
	BOP	[8.2] **VERIFY** annunciator XA-55-4A, window B-5:
		P-7 LOW POWER TRIP BLOCK is DARK.
	RO	[8.3] **COMPARE** the highest reading PRM with the highest reading loop ΔT indication to be within 5% of each other. **[C.1] [C.3]**
	RO	[8.4] **IF** the above conditional response is **NOT** attained, **THEN**

Op Test No.: NRC Scenario # 3 Event # 1 Page 8 of 68

Event Description: Raise plant power to 13-15% RTP

Time	Position	Applicant's Actions or Behavior
		A. **STOP** the power increase. ☐ B. **NOTIFY** the SRO. Initials Time Date
	RO	[9] **BLOCK** the IR HI FLUX reactor trip and PR LO Range HI FLUX reactor trip by performing the following:
	RO	[9.1] **PLACE** IRM TRIP BLOCK P-10 **[HS-92-5003] AND [HS-92-5004]** to **BLOCK**.
	BOP	[9.2] **VERIFY** annunciator XA-55-4A, window C-2:
		INTERMED RANGE TRAINS A & B TRIP BLOCKED is LIT.
	RO	[9.3] **RELEASE [HS-92-5003] AND [HS-92-5004]**. [9.4] **PLACE** PRM LOW POWER TRIP BLOCK P-10 **[HS-92-5005] AND [HS-92-5006]** to **BLOCK**.
	BOP	[9.5] **VERIFY** annunciator XA-55-4A, window D-1:
		POWER RANGE LOW SETPOINT TRAINS A & B TRIP BLOCKED is LIT.
	CREW	[10] **WHEN** reactor power is between 13 and 15%, **THEN**
		[10.1] **STOP** power increase.
		[10.2] **STABILIZE** the plant.

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Event Description: Raise plant power to 13-15% RTP

Time	Position	Applicant's Actions or Behavior
		[11] **IF** rolling of second MFWP… **This step N/A**
		[12] **IF** unit shutdown is required… **This step N/A**
	SRO	[13] **ENSURE** steps 5.2[1] through 5.2[11] of this section complete. (applicable steps)
		NOTE If Section 5.3 has already been initiated, then performance should continue at the step in effect.
	SRO	[14] **IF** rolling the turbine, **THEN** **GO TO** Section 5.3.
		END OF TEXT

Lead examiner may cue the next event after CREW has entered MODE 1

Op Test No.:	NRC	Scenario #	3	Event #	2	Page	10	of	68
Event Description:	Intermediate Range channel N-35 failure low (>5% RTP at initiation)								

Time	Position	Applicant's Action or Behaviors
Booth Instructor: When directed, initiate Event 2		
		1-M-4 indicators: • **1-XI-92-5003A IRM % POWER N-35 indicator fails to '0'.** • **1-XI-92-5011C, IRM-STARTUP RATE N-35 indicator trends down then stabilizes at '0'.** • **1-XR-92-5001, NUCLEAR POWER NR-45 Recorder selected trace goes to '0'** **1-M-13 indicators:** • **1-XI-92-5003B NEUTRON FLUX INTERMEDIATE RANGE indicator fails to '0'.**
T = 10	Crew	Respond to MCR indications; no alarms associated with this failure; N-35 failure will be identified by operator control board monitoring.
	SRO	May request a new reactivity spreadsheet to level power/maintain MODE 1 conditions while this instrument malfunction is addressed.
	SRO	US may use AOP-I.01,Nuclear Instrument Malfunction Section 2.2, Intermediate Range Failure:

	NOTES:	• For a high Intermediate Range (IR) channel failure, a reduction in reactor power to less than P-10 will result in a reactor trip. This condition will be corrected when the channel is bypassed in Step 5.
		
		• If an IR channel has failed at a level greater than P-6, the following conditions will exist:
		
		  • Source Range automatic re-enable at P-6 from IR signals will be disabled. (SRs will require manual reinstatement per 0-GO-6.)
		
		  • The following SR shutdown high flux annunciators will be disabled and DARK:
		
		  • SOURCE RANGE HIGH FLUX LEVEL AT SHUTDOWN [M-4B, B-1]
		
		  • SOURCE RANGE HIGH SHUTDOWN FLUX ALARM BLOCKED [M-4B, C-1]
		
		• Failure of an Intermediate Range Channel may affect the associated Source Range Channel.

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Event Description: Intermediate Range channel N-35 failure low (>5% RTP at initiation)

Time	Position	Applicant's Action or Behaviors
	RO	1. **STABILIZE** reactor power at current level.
	RO	2. **CHECK** at least one Intermediate Range OPERATING. RO should indicate N36 is reading accurately and also re-select or indicate NR-45 Recorder is re-selected to an operating channel.
	SRO	3. **EVALUATE** the following Tech Specs for applicability: • 3.3.1.1 (3.3.1), Reactor Trip System Instrumentation - Actions 3c & d, (From Table 3.3-1 functional unit 5) Applies – Above 5% & 10%of RATED THERMAL POWER, POWER OPERATION may continue; and, - Action 8a (From Table 3.3-1 functional unit 22a) less than Minimum Number, declare the interlock inoperable, apply ACTION statement for P6. TS 3.0.3. is N/A AND • 3.3.3.7, Accident Monitoring Instrumentation Action 1 (From Table 3.3-10 Instrument 17) Applies - within 30 days, return the affected instrument or Ht Stby w/i 6 hrs. & Ht SD w/i following 6 hrs.
Evaluator Note: TSs 3.3.3.5 and 3.9.2 would not be applicable with this failure since the associated Source Range is not affected.		
	RO	4. **IF** reactor power less than 1%, **THEN ENSURE** OPERABLE IR channel selected on Nuclear Power Recorder [M-4, NR-45].
Lead Evaluator Note: **Ensure RO performs following actions at NI Panel, M-13.**		
	CAUTIONS:	• **Loss of instrument OR control power will cause a single channel reactor trip signal.** • **For loss of control power only, the reactor trip signal cannot be bypassed. Reducing reactor power below P-10 will result in a reactor trip.**
	RO	5. **CHECK** power available to failed Intermediate Range channel [M-13, N35/N36]:

Op Test No.: NRC Scenario # 3 Event # 2 Page 12 of 68

Event Description: Intermediate Range channel N-35 failure low (>5% RTP at initiation)

Time	Position	Applicant's Action or Behaviors
	RO	• INSTRUMENT POWER ON indicator LIT **AND** • CONTROL POWER ON indicator LIT RO verifies Instr Pwr and Cont Pwr indicators lit and Instr and Cont Pwr fuses not blown on M-13 N35 drawer.
	SRO	SRO directs as the RO performs steps 6 - 9:
	RO	6. **PLACE** Level Trip switch for failed channel in BYPASS [M-13, N35/N36].
	BOP	7. **VERIFY** NIS TRIP BYPASS annunciator LIT [M-6A, A-1].
	RO	8. **VERIFY** appropriate annunciator LIT:
		• INTERMEDIATE RANGE TRIP BYPASS CHANNEL I [M-4A, A-2] **OR** • INTERMEDIATE RANGE TRIP BYPASS CHANNEL II [M-4A, B-2]
	RO	9. **CHECK** associated Source Range Channel NOT affected.
	SRO	10. **GO TO** appropriate plant procedure.

Op Test No.: NRC	Scenario # 3	Event # 2	Page 13 of 68
Event Description: Intermediate Range channel N-35 failure low (>5% RTP at initiation)			

Time	Position	Applicant's Action or Behaviors
Evaluator Note: The following CREW Brief and Notification actions are not contained in the procedure.		
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead Examiner may cue next event when Technical Specifications are addressed.		

Op Test No.:	NRC	Scenario #	3	Event #	3	Page	14	of	68

Event Description: PT-1-33, Mn Stm Hdr Pressure Transmitter Lo Failure

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 3		
Indications available: **1-M-3 Indicators:** • **1-SI-46-20A,** MFPT 1A Speed Indication decreasing; • **1-PI-3-66A,** MFP 1A Outlet Pressure indication decreasing; • **1-FI-3-70,** MFP 1A Outlet Flow indication decreasing **1-M-4 Indicators:** • **1-XXX-55-4A, Steam Dump Valve Status Panel:** all 12 Steam Dump Valves going closed/closed; • **LOOPS 1-4 SG-1,2,3,4 STM Flow indicators:** 2 Channels per SG (8 total indicators) flow going down; • **LOOPS 1-4 SG-1,2,3,4 FW Inlet Flow indicators:** 2 Channels per SG (8 total indicators) flow going down; • **LOOPS 1-4 SG-1,2,3,4 LEVEL -NR indicators:** 3 Channels per SG (12 total indicators) level going down; • **1-XI-1-33, Steam Dump Demand Indicator** going down • **1-PIC-1-33, Steam Dump Pressure Controller** Green (dim) indicator bar graph going down **1-M-5A Annunciators:** • **1-XA-55-5A Window** B-7, LS-3-42D STEAM GEN LVL HIGH-LOW DEVIATION **Other Symptoms:** Deviations or unexpected indications on any of the following may indicate a malfunction of the normal feedwater system: • Feedwater flow dropping to all steam generators • Level dropping in all steam generators		
T = 20	CREW	Observes indications/symptoms specified above and diagnoses event;
Evaluator Note: The failure affects Steam Dumps which close, and Main Feed Pump Control driving 1A Main Feed Pump to minimum speed. There are no initiating alarms only alarms that result later (i.e.: 1-AR-M5A, B-7, LS-3-42D STEAM GENERATOR LEVEL HIGH-LOW DEVIATION). Crew's efforts will be to first gain control of Main Feed Pump flow and restore/control SG levels. Then attention should be to monitor RCS temperature as the Steam Dumps will go closed; RCS temperature being controlled on the SG atmospheric relief valves. **0-SO-1-2, STEAM DUMP SYSTEM Section 7.1 Steam Dump System Shutdown** for RCS temperature control on the SG atmospheric relief valves follows AOP-S.01 Section 2.2 guide		
	SRO	SRO implements AOP-S.01, Loss Of Normal Feedwater Section 2.2, Loss of Main Feedwater Pump Control:
	SRO	SRO directs BOP operator to transfer Steam Dump Control to MANUAL

Op Test No.:	NRC	Scenario #	3	Event #	3	Page	15	of	68

Event Description: PT-1-33, Mn Stm Hdr Pressure Transmitter Lo Failure

Time	Position	Applicant's Actions or Behavior
	NOTE:	Step 1 is an IMMEDIATE ACTION.
	BOP	1. **RESTORE** feedwater pressure:
		a. **PLACE** affected MFP speed controller(s) in MANUAL:
		• MFPT 1A(2A) & 1B(2B) Speed Control **OR** • MFPT 1A(2A) Speed Controller **OR** • MFPT 1B(2B) Speed Controller
	BOP	b. **ADJUST** speed on affected MFP(s) to restore feedwater pressure to normal (~1040 psig at full power).
	BOP	2. **DETERMINE** if MFP trip is needed:
		a. **CHECK** BOTH MFWPs in service. ***(RNO Required)***
	BOP/ Crew	**RNO:** **RNO 1st condition N/A- adequate MFW is available:** **a. IF** reactor power is greater than AFW flow capability (~ 3%) **AND** adequate feedwater flow CANNOT be maintained… **RNO 2nd condition N/A- adequate MFW is available:** **IF** reactor power less than or equal to AFW flow capability (~ 3%), **AND** S/G levels CANNOT be controlled with main feedwater… **RNO 3rd condition implemented:** **IF** only one MFWP is in service, **THEN GO TO** Caution prior to Step 3.
	BOP	3. **MAINTAIN** steam generator level(s) on program.

Op Test No.:	NRC	Scenario #	3	Event #	3	Page	16	of	68

Event Description: PT-1-33, Mn Stm Hdr Pressure Transmitter Lo Failure

Time	Position	Applicant's Actions or Behavior
	NOTE:	Appendix C may be used to determine program feedwater D/P for current power. [Appendix C attached to end of this event guide]
	BOP	4. **MAINTAIN** MFP discharge pressure on program **USING** ICS or available control board indications.
	CAUTION:	Reactor operation at low power levels for extended periods may challenge reactivity control due to xenon changes.
	RO	5. **CHECK** Reactor power greater than 5%.
	CREW	6. **INITIATE** repairs on failed equipment.
	SRO	7. **GO TO** appropriate plant procedure.
		END OF SECTION **AOP-S.01 Section 2.2**

Op Test No.:	NRC	Scenario #	3	Event #	3	Page	17	of	68

Event Description: PT-1-33, Mn Stm Hdr Pressure Transmitter Lo Failure

Time	Position	Applicant's Actions or Behavior
		0-SO-1-2, Steam Dump System **Section 7.1, Steam Dump System Shutdown**
	BOP	[1] **IF** necessary to transition from steam dumps to S/G atmospheric relief valves for RCS temp control, **THEN PERFORM** the following:
	BOP	[1.1] **ENSURE** S/G atmospheric relief valve controllers set at 84% (1005 psig) or as required for current RCS temp and output signal approximately zero:

S/G	PIC	SETPOINT	OUTPUT	INITIALS
#1	PIC-1-6A	84% (1005 psig) or as required	~ 0	_____
#2	PIC-1-13A	84% (1005 psig) or as required	~ 0	_____
#3	PIC-1-24A	84% (1005 psig) or as required	~ 0	_____
#4	PIC-1-31A	84% (1005 psig) or as required	~ 0	_____

	BOP	[1.2] **SLOWLY RAISE [PIC-1-33]** Steam Dump Pressure Control setpoint. **Step is N/A due to PT-1-33 failure**
Evaluator Note:		**SRO directs <u>OR</u> BOP operator adjusts SG Atmospheric Relief Valves as necessary to maintain unit in MODE 1.**
	BOP	[1.3] **ADJUST** S/G atmospheric relief valve setpoints to maintain desired RCS temperature.
	BOP	[1.4] **WHEN** steam dump valves fully closed **AND** atmospheric relief valves are controlling RCS temperature, **THEN**
		[1.4.1] **PLACE [HS-1-103A]** Steam Dump Control in OFF position.
		[1.4.2] **PLACE [HS-1-103B]** Steam Dump Control in OFF position.

Op Test No.:	NRC	Scenario #	3	Event #	3	Page	18	of	68
Event Description:	PT-1-33, Mn Stm Hdr Pressure Transmitter Lo Failure								

Time	Position	Applicant's Actions or Behavior
		[2] **IF** RHR cooling is established... **Step is N/A (including NOTE preceding step and following substeps)**
		END OF TEXT
Evaluator Note: The following CREW Brief and Notification actions are not contained in the procedure.		
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead Examiner may cue the next event when Feedwater/Feed Pump Control and RCS temperature are stabilized in manual control.		

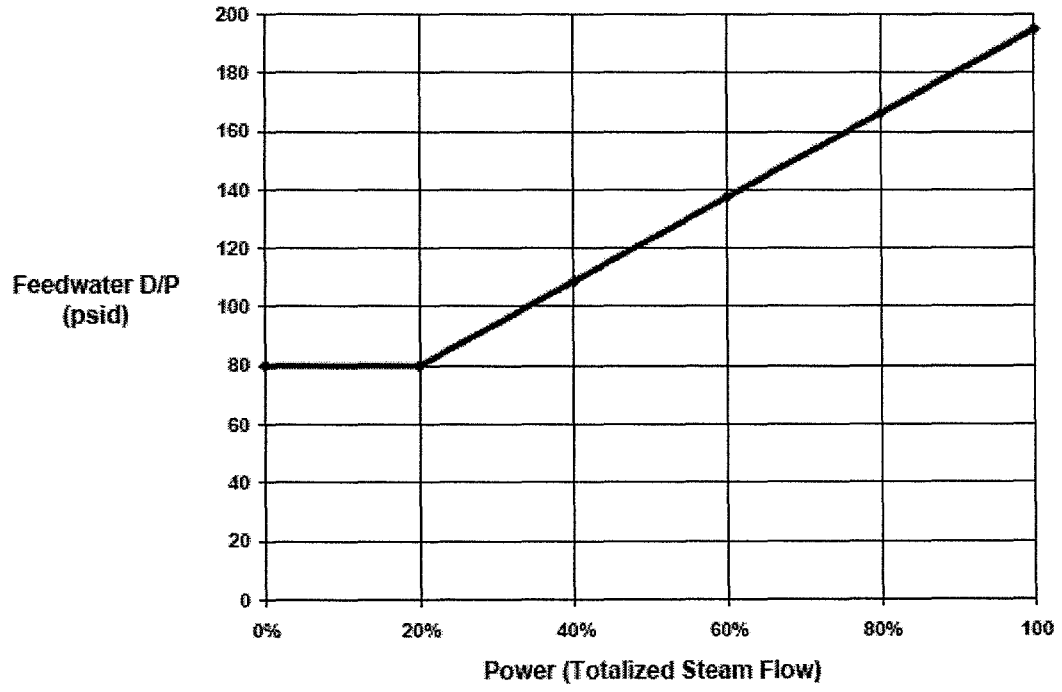
Op Test No.:	NRC	Scenario #	3	Event #	3	Page	19	of	68
Event Description:	PT-1-33, Mn Stm Hdr Pressure Transmitter Lo Failure								

Appendix C
Page 1 of 1

SQN	LOSS OF NORMAL FEEDWATER	AOP-S.01 Rev. 15

Appendix C
Page 1 of 1

Main Feedwater Pump D/P Program



Op Test No.:	NRC	Scenario #	3	Event #	4	Page	20	of	68
Event Description:	Q-A ERCW Pump Over current trip								

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 4		
Indications available: **0-M-27A Annunciators:** **0-XA-55-27A Window A-1: "UNIT 1 HEADER A PRESSURE LOW** **C-2: "PUMP Q-A DISCH PRESS LOW** **0-M-27A Indicators:** • **ERCW HDR 1A SUPPLY FLOW 1-FI-67-61 Indicator shows decreasing trend (to single pump conditions)** • **ERCW HDR 1A SUPPLY PRESS, 1-PI-67-493A indicator shows decreasing trend (to single pump conditions)** • **ERCW HDR 2A SUPPLY FLOW 2-FI-67-61 Indicator shows normal steady trend.** • **ERCW HDR 1A SUPPLY PRESS, 2-PI-67-493A indicator shows normal steady trend.** • **ERCW PUMP Q-A MOTOR AMPS, 0-EI-67-458A indicator shows '0' amps.** **0-M-27B Annunciators:** • **0-XA-55-27B-A Window E-4: "ERCW/CCS PUMP MOTOR TRIP"**		
T = 30	CREW	Respond in accordance with Alarm Response Procedures
	SRO	US may use AOP-M.01, LOSS OF ESSENTIAL RAW COOLING WATER Section 2.1, ERCW Pump(s) tripped or failed
	BOP	1. **IDENTIFY** and **LOCK OUT** failed ERCW pump.
	BOP	2. **START** additional ERCW pumps as required to maintain supply header pressure between 78 psig and 124 psig.
	BOP	3. **CHECK** two Train A ERCW Pumps AVAILABLE.

Op Test No.:	NRC	Scenario #	3	Event #	4	Page	21	of	68
Event Description:	Q-A ERCW Pump Over current trip								

Time	Position	Applicant's Actions or Behavior
	BOP	4. **CHECK** 1A and 2A ERCW supply header pressures and flows NORMAL:
		a. Supply header pressures [between 78 psig and 124 psig]: • 1-PI-67-493A • 2-PI-67-493A b. Supply header flows [expected value]: • 1-FI-67-61 • 2-FI-67-61
	BOP	5. **CHECK** 1B and 2B ERCW supply header pressures and flows NORMAL:
		a. Supply header pressures [between 78 psig and 124 psig]: • 1-PI-67-488A • 2-PI-67-488A b. Supply header flows [expected value]: • 1-FI-67-62 • 2-FI-67-62
	CREW	6. **DISPATCH** personnel to inspect failed pump(s) and determine cause for failure.
	SRO	7. **NOTIFY** STA to evaluate Tech Spec LCO 3.7.4, ERCW System, for both units.
		3.7.4, Essential Raw Cooling Water System • **Restore inoperable pump w/i 72 hrs. or Ht Stby w/i next 6 hrs and Cld SD w/i the following 30 hrs. (Action applicable until Transfer Switch 0-XS-67-285, ERCW PUMPS J-A & Q-A DG POWER SEL is re-selected to the OPERABLE pump, in this case the J-A position.**

Op Test No.: NRC Scenario # 3 Event # 4 Page 22 of 68

Event Description: Q-A ERCW Pump Over current trip

Time	Position	Applicant's Actions or Behavior
	BOP	8. **CHECK** ERCW pump loading amps NORMAL.
	BOP	9. **TRANSFER** emergency power selector switch away from failed pump.
	SRO	10. **EVALUATE** need to close and place clearance on manual discharge valve for failed pump.
	SRO	11. **GO TO** appropriate plant procedure.
Evaluator Note: The following CREW Brief and Notification actions are not contained in the procedure.		
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead Examiner may cue the next event when US directs return to appropriate plant procedures.		

Op Test No.: NRC	Scenario # 3	Event # 5	Page 23 of 68
Event Description: PORV 68-334 fails open (can be closed manually)			

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 5		
Indications available: **1-M-5 Indicators:** • **1-XX-68-363A, PZR PORV ACOUSTIC MONITORS: XI-68-334A indicates elevated acoustic (flow) noise;** • **1-TI-68-331: 68-340.334, XE-340.334 TAILPIPE TEMPS** **1-M-5 Annunciators:** • **1-XA-55-5A Window D-4: "PS-68-340G/F PRESSURIZER PRESSURE LOW BACKUP HTRS ON"** • **E-2: "TS-68-331 PRESSURIZER POWER RELIEF LIINE TEMP HIGH"** • **1-XA-55-5C Window B-6: "XS-68-363 PRESSURIZER RELIEF VALVE OPEN"** **1-M-5 Indicators:** • **RCS PR PRESS (Chs 1-4), 1-PI-68-340A, 334, 323, 322: showing RCS (Pzr) pressure going down;** • **PRT LEVEL, 1-LI-68-300 shows an increasing trend (magnitude proportional to time PORV remained open)** • **PRT PRESSURE, 1-PI-68-301 shows an increasing trend (magnitude proportional to time PORV remained open)** • **PRT TEMPERATURE, 1-TI-68-309 shows an increasing trend (magnitude proportional to time PORV remained open)** • **RCS PZR PRESS Recorder 1-PR-68-340 shows a decreasing pressure trend proportional to time PORV remained open** • **RCS LOOP 1 HL WIDE RANGE PRESS Recorder 1-PR-68-69 shows a decreasing pressure trend proportional to time PORV remained open** **1-M-6 Indicators:** • **RCS WR HL PRESSURE LOOP 3 1-PI-68-66A, shows a decreasing pressure value;** • **RCS HL PRESS WIDE RANGE 1-PI-68-62, shows a decreasing pressure value;** • **RCS HL PRESS WIDE RANGE 1-PI-68-69, shows a decreasing pressure value;**		
T = 40	CREW	Respond in accordance with Alarm Response Procedures
	SRO	US may use AOP-I.04, Pressurizer Instrument And Control Malfunctions Section 2.1, Uncontrolled RCS pressure drop due to open PORV in Modes 1-3
	CAUTION	**Partially open PORV may display no light indications.**
	NOTE	Step 1 is an IMMEDIATE ACTION.

Op Test No.: NRC Scenario # 3 Event # 5 Page 24 of 68

Event Description: PORV 68-334 fails open (can be closed manually)

Time	Position	Applicant's Actions or Behavior
	RO	1. **CHECK** Pzr PORVs CLOSED:
		• valve position indication • acoustic monitors. ***(RNO Required)***
	RO	**RNO:** **CLOSE** affected PORV and/or block valve as necessary to stop RCS pressure drop. Expected RO actions are to close/attempt to close BOTH • PORV, (w/ 1-HS-68-334A), **AND** • Associated Block Valve (w/ 1-HS-68-333A)
	RO	2. **MONITOR** RCS pressure STABLE or RISING.
	RO	3. **CHECK** SI signal NOT actuated.
	RO	4. **ENSURE** available Pzr heaters ENERGIZED as necessary. :
	CAUTION	**RCS pressure changes and changes in RCS boron concentration (due to differences between pzr and RCS boron) may impact core reactivity.**
	RO	5. **MONITOR** reactor power:
		a. **CHECK** reactor in Mode 1 or 2. b. **MONITOR** core thermal power for unexpected changes.
		6. **EVALUATE** EPIP-1, Emergency Plan Classification Matrix.

Op Test No.:	NRC	Scenario #	3	Event #	5	Page	25	of	68
Event Description:	PORV 68-334 fails open (can be closed manually)								

Time	Position	Applicant's Actions or Behavior
		7. **EVALUATE** the following Tech Specs for applicability: • 3.2.5, DNB Parameters **3.2.5 LCO states:** The following DNB related parameters shall be maintained within the limits shown on Table 3.2-1: a. Reactor Coolant System (RCS)Tavg b. Pressurizer Pressure c. RCS Total Flow Rate • 3.4.3.2, PORVs **3.4.3.2 LCO states:** Two power relief valves (PORVs) and their associated block valves shall be OPERABLE. **TS 3.4.3.2 Action a.:** With one or more PORV(s) inoperable, but capable of RCS pressure control, within 1 hour either restore the PORV(s) to OPERABLE status or close the associated block valve(s); otherwise, be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours. **TS 3.4.3.2 Action b.:** With one PORV inoperable and incapable of RCS pressure control, within 1 hour either restore the PORV to OPERABLE status or close the associated block valve and remove power from the block valve; restore the PORV to OPERABLE status within the following 72 hours or be in HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.
Evaluator Note: 3.2.5 DNB related parameter on Table 3.2-1.b. Pressurizer Pressure is stated as ≥2220 **psia*** (or entry required @ ≤2205 psig as indicated on the MCB instrumentation)		
		• 3.2.5.b DNB Parameters: The following DNB related parameters shall be maintained within the limits shown on Table 3.2-1: a. Reactor Coolant System (RCS) Tavg: ≤583°F b. Pressurizer Pressure: ≥2220 psia* c. RCS Total Flow Rate: Figure 3.2-1 d. Total Flow: [Figure 3.2-1] Applies – restore the parameter (Pressurizer Pressure) w/i 2 hrs. or reduce to ≤5% RTP w/i the next 4 hrs. AND • 3.4.3.2.a, Relief Valves – Operating Applies - restore the PORV to OPERABLE status w/i 1 hr. or close the associated block valve or HT STBY w/i next 6 hours, HT SD w/i following 6 hours.

Op Test No.: NRC Scenario # 3 Event # 5 Page 26 of 68

Event Description: PORV 68-334 fails open (can be closed manually)

Time	Position	Applicant's Actions or Behavior
		8. **IF** PORV block valve must be closed **OR** power must be removed from block valve to comply with LCO 3.4.3.2, **THEN REFER TO** 0-SO-68-3, Pressurizer Pressure Control System.
		9. **CHECK** the following NORMAL:
		10. **ENSURE** WO initiated on failed equipment.
		11. **GO TO** appropriate plant procedure.
Evaluator Note: The following CREW Brief and Notification actions are not contained in the procedure.		
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead Examiner may cue the next event when US completes Tech Spec evaluation or directs return to appropriate plant procedures.		

Op Test No.:	NRC	Scenario #	3	Event #	6	Page	27	of	68
Event Description:	RCS Leak								

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 6		
Indications available: **1-M-4 Indicators:** • **RCS PZR LVL, 1-LI-68-339A, shows a decreasing pressure value** • **RCS PZR LVL, 1-LI-68-335A, shows a decreasing pressure value** • **RCS PZR LVL, 1-LI-68-320, shows a decreasing pressure value** • **1-XI-94-101/102, Core Exit Temp Margin to Saturation (exo sensors Trn A & B) pressure indications trending down.** **1-M-5 Annunciators:** • **1-XA-55-5C Window B-1: "TS-30-31 LOWER COMPT TEMP HIGH"** • **B-3: "TS-30-241 LOWER COMPT MOISTURE HI"** • **B-4: "TS-30-240 LOWER COMPT MOISTURE HI"** **1-M-5 Indicators:** • **RCS PR PRESS (Chs 1-4), 1-PI-68-340A, 334, 323, 322: showing RCS (Pzr) pressure going down;** • **RCS PZR PRESS Recorder 1-PR-68-340 shows a decreasing pressure trend;** • **RCS LOOP 1 HL WIDE RANGE PRESS Recorder 1-PR-68-69 shows a decreasing pressure trend.** **1-M-6 Annunciators:** • **1-XA-55-6E Window C-6: "ZS-61-186 ICE CONDENSER LOWER INLET DOOR OPEN"** **1-M-6 Indicators:** • **RCS WR HL PRESSURE LOOP 3 1-PI-68-66A, shows a decreasing pressure value;** • **RCS HL PRESS WIDE RANGE 1-PI-68-62, shows a decreasing pressure value;** • **RCS HL PRESS WIDE RANGE 1-PI-68-69, shows a decreasing pressure value;**		
T = 50	CREW	Respond in accordance with Alarm Response Procedures
Evaluator Note: The RCS leak occurs and progresses into a SBLOCA. The crew responds using this procedure, AOP-R.05 Section 2.1 for lowering Pzr level and increasing Containment pressure; this situation could also present a challenge to VCT Make-up capability. MONITOR steps 2, Pzr Level, 3, Containment Pressure or 5, VCT Make-up capability are all potential Rx Trip initiators for this event depending on crew pace and actions. At the **Lead Examiner direction,** leak size will increase requiring the crew to initiate a reactor trip and enter E-0. Reactor Trip criteria		
	SRO	SRO uses AOP-R.05, RCS LEAK AND LEAK SOURCE IDENTIFICATION Section 2.1, RCS Leak in Mode 1-3

Op Test No.: NRC Scenario # 3 Event # 6 Page 28 of 68

Event Description: RCS Leak

Time	Position	Applicant's Actions or Behavior
	RO	1. **CONTROL** charging flow using one CCP::
		• **ADJUST** FCV-62-93 and FCV-62-89 as necessary to maintain pzr level on program. • **MAINTAIN** seal injection flow at least 6 gpm to each RCP.
	RO	2. **MONITOR** pressurizer level STABLE or RISING. **(RNO required)**
	SRO RO	**RNO:** **IF** sufficient time is available, **THEN** **ISOLATE** normal and excess letdown: a. **ENSURE** FCV-62-72, 73, and 74 CLOSED. b. **CLOSE** FCV-62-69 and 70. c. **ENSURE** FCV-62-54 and 55 CLOSED.
	SRO	**IF** loss of pressurizer level is imminent **OR** low pressure reactor trip (1970 psig) is imminent, **THEN** **PERFORM** the following: a. **TRIP** the reactor. b. **INITIATE** Safety Injection. c. **GO TO** E-0, Reactor Trip or Safety Injection.

Op Test No.:	NRC	Scenario #	3	Event #	6	Page	29	of	68
Event Description:	RCS Leak								

Time	Position	Applicant's Actions or Behavior
	RO	3. **MONITOR** containment pressure STABLE or DROPPING.
		RNO: **IF** containment pressure is approaching 1.5 psig, **THEN** **PERFORM** the following: a. **TRIP** the reactor. b. **INITIATE** Safety Injection. c. **GO TO** E-0, Reactor Trip or Safety Injection.
	CAUTION: If Unit is in Mode 3 with low pressurizer pressure SI NOT blocked, SI should NOT be manually blocked to prevent safety injection.	
	RO	4. **MONITOR** RCS pressure STABLE or RISING.
		RNO: **IF** Unit is in Mode 1 or 2 **AND** RCS pressure is approaching 1970 psig (dropping), **THEN** **TRIP** the reactor and **GO TO** E-0, Reactor Trip or Safety Injection.
	RO	5. **MAINTAIN** VCT level greater than 13% **USING** automatic or manual makeup.

Op Test No.: NRC Scenario # 3 Event # 6 Page 30 of 68

Event Description: RCS Leak

Time	Position	Applicant's Actions or Behavior
		RNO: **IF** VCT level CANNOT be maintained, **THEN** **PERFORM** the following: a. **ENSURE** CCP suction aligned to RWST: 1) **OPEN** LCV-62-135 and -136. 2) **CLOSE** LCV-62-132 and 133. b. **IF** in MODE 1 or 2, **THEN** **TRIP** the reactor and **GO TO** E-0, Reactor Trip or Safety Injection.
	RO/BOP	RO and/or BOP operator should monitor pocket sump level (1-M-15, indicators 1-LI-77-410 & 77-411).
	RO/BOP	RO and/or BOP operator should containment radiation levels (on (0-M-12, recorders and modules 1-RR-90-105 and 1-RR-90-112 for lower and upper containment, resp.)
	SRO	Expected to direct [BOP operator] to perform Appendices I and/or J;
	BOP	Perform, as directed, Appendix I
	NOTE 1: Appendix I or J may be used to estimate RCS leak rate.	
	NOTE 2: If letdown was isolated in Step 2, the leak rate may have exceeded capacity of one CCP in the normal charging alignment (EAL 1.2.2P).	
	SRO	6. **EVALUATE** EPIP-1, Emergency Plan Classification Matrix.
	SRO	7. **EVALUATE** Tech Spec/TRM LCOs **USING** Appendix K, Evaluating Tech Specs and TRM.

Op Test No.:	NRC	Scenario #	3	Event #	6	Page	31	of	68
Event Description:	RCS Leak								

Time	Position	Applicant's Actions or Behavior
	BOP	8. **CHECK** secondary side radiation NORMAL:
		• S/G blowdown rad monitor • Condenser vacuum exhaust rad monitor • Main steam line rad monitors.
	BOP	9. **STOP** containment purging and venting:
		a. **IF** containment purge in progress, **THEN** **ENSURE** containment purge fans STOPPED. b. **ENSURE** containment purge and vent dampers CLOSED.
	BOP	10. **CHECK** containment airborne activity RISING. (RM-90-106 or 112)
	CREW	11. **CHECK** leakage source UNKNOWN.
	RO	12. **CHECK** pressurizer PORVs NORMAL:
		• Tailpipe temperature • Acoustic monitors
	RO	13. **ISOLATE** letdown:

Op Test No.:	NRC	Scenario #	3	Event #	6	Page	32	of	68
Event Description:	RCS Leak								

Time	Position	Applicant's Actions or Behavior
		a. **ENSURE** the following letdown orifice valves CLOSED: • FCV-62-72 • FCV-62-73 • FCV-62-74
	RO	b. **ENSURE** the following letdown isolation valves CLOSED: • FCV-62-69 • FCV-62-70 • FCV-62-77
	RO BOP	c. **CHECK** leak ISOLATED based upon the following: • containment parameters • estimated leak rate **USING** Appendix I or J. ***(RNO Required)***
		RNO: c. **IF** leak is NOT isolated, **THEN** **GO TO** Step 14.
	RO	14. **ISOLATE** charging:
		a. **ENSURE** letdown orifice valves CLOSED: • FCV-62-72 • FCV-62-73 • FCV-62-74

Op Test No.: NRC Scenario # 3 Event # 6 Page 33 of 68

Event Description: RCS Leak

Time	Position	Applicant's Actions or Behavior
	RO	b. **ENSURE** the following charging header isolation valves CLOSED: • FCV-62-90 • FCV-62-91 • FCV-62-85 • FCV-62-86.
	SRO	c. **CHECK** leak ISOLATED based upon estimated leak rate **USING** Appendix I or J. ***(RNO Required)***
	RO	**RNO:** c. **IF** leak is NOT isolated, **THEN** **PERFORM** the following:
	RO/ BOP	1) **IF** normal charging is required to maintain pzr level, **THEN** **RESTORE** normal charging **USING** EA-62-5.
	SRO	**2) Substep N/A**
	SRO	3) **GO TO** Step 15.
	RO	15. **CHECK** Pzr safety valves NORMAL:
		• Tailpipe temperature • Acoustic monitors

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Event Description: RCS Leak

Time	Position	Applicant's Actions or Behavior
	RO	16. **CHECK** PRT conditions NORMAL:
		• Level • Pressure • Temperature
	BOP	17. **NOTIFY** Chemistry to ensure all primary side sample valves CLOSED. [Hot Sample Room]
	BOP	18. **CHECK** CCS parameters NORMAL:
		• CCS radiation monitors NORMAL • CCS surge tank level STABLE.
	RO	19. **CHECK** all CLA levels NORMAL.
	RO	20. **CHECK** excess letdown heat exchanger NORMAL (if applicable):
		• Temperature • Pressure
	RO	21. **CHECK** TI-68-398, Reactor Vessel Head Vent Temperature NORMAL. [M-4]
	RO	22. **CHECK** TI-68-21, reactor vessel flange leakoff temperature NORMAL. [M-5]
	BOP	23. **MONITOR** auxiliary building radiation and HELB recorders NORMAL.

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Event Description:	RCS Leak								

Time	Position	Applicant's Actions or Behavior
Evaluator Note:	RCS leak is ≈90 gpm and **NOT** isolated.	
	RO/BOP	RO and/or BOP operator should monitor pocket sump level (1-M-15, indicators 1-LI-77-410 & 77-411).
	RO/BOP	RO and/or BOP operator should containment radiation levels (on (0-M-12, recorders and modules 1-RR-90-105 and 1-RR-90-112 for lower and upper containment, resp.)
	SRO	Expected to direct [BOP operator] to perform Appendices I [and/or J];
	BOP	Perform, as directed, Appendix I
	SRO	24. **CHECK** leak IDENTIFIED and ISOLATED **USING** available methods:
	BOP	• Appendix I or J (Estimating Leak Rate) • containment parameters (radiation, pressure, humidity) • pocket sump level rate of rise on ICS (instantaneous point U0964 or U0965, 15 min avg. point U0967 or U0968) • Rx Bldg (raceway) sump rate of rise (ICS point U0966) • local observation (if applicable) ***(RNO Required)***
		RNO: **IF** leak is NOT isolated, **THEN PERFORM** the following:
		a. **IF** additional cooling is required, **THEN PERFORM** Appendix H, Additional Containment Cooling.
Evaluator Note:	SRO/RO may choose to not start additional cooling fans based on containment pressure trends following the initial pressure increase. Evaluation, however, is expected.	
		RO is expected to maintain saturated conditions in the Pzr by verifying adequate heater operation to maintain Pzr Vapor/Liquid temps equivalent (1-M-4: Pzr TEMP indicators 1-TI-68-319 & 1-TI-68-324)
	RO	b. **IF** pressurizer level is above program **AND** rising, **THEN PERFORM** the following:

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Event Description: RCS Leak

Time	Position	Applicant's Actions or Behavior
		1) **RESTORE** CVCS charging and letdown **USING** EA-62-5, Establishing Normal Charging and Letdown. 2) **ENSURE** pressurizer heaters in service as required.
Evaluator Note:		RCS leak is ≈90 gpm and **NOT** isolated.
		c. **ATTEMPT** to estimate RCS leak rate **USING** one of the following:
		• Appendix I (if leak requires rise in charging flow greater than ~10 gpm) **OR** • Appendix J (requires NO VCT makeup, dilution, or boration flow)
		d. **IF** conditions permit, **THEN DETERMINE** RCS leak rate **USING** 0-SI-OPS-068-137.0, Reactor Coolant System Water Inventory. **This step N/A**
		e. **IF** leak rate exceeds Tech Spec limit **AND** leak CANNOT be isolated, **THEN INITIATE** plant shutdown **USING** one of the following:
		• AOP-C.03, Rapid Shutdown or Load Reduction **OR** • 0-GO-5, Normal Power Operation. **OR** • 0-GO-6, Power Reduction from 30% to Hot Standby.
	RO	f. **IF** containment purging or venting is desired, **THEN PERFORM** the following:

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Event Description: RCS Leak

Time	Position	Applicant's Actions or Behavior
		1) **NOTIFY** Chem Lab to evaluate off-site dose **USING** 0-SI-CEM-030-410.1 or 410.2, as applicable. 2) **EVALUATE** resuming containment purging or venting **USING** 0-SO-30-3 or 0-SO-30-8, as applicable. **This step N/A**
	SRO	g. **IF** leak source has NOT been determined, **THEN GO TO** Section 2.3, RCS Leak Source Identification.
	RO	25. **MONITOR** if charging and letdown should be restored:
		a. **CHECK** letdown ISOLATED.
		b. **CHECK** Pzr level:
		• level greater than or equal to program level • level RISING.
		c. **CHECK** charging and normal letdown AVAILABLE:
		• piping INTACT • valves OPERABLE • Train A CCS in service.
		d. **RESTORE** CVCS charging and letdown **USING** EA-62-5, Establishing Normal Charging and Letdown.
	RO	26. **MONITOR** if pressurizer heaters should be restored:
		a. CHECK pressurizer level greater than 20% and rising. b. ENSURE pressurizer heaters in service as required.

Op Test No.:	NRC	Scenario #	3	Event #	6	Page	38	of	68
Event Description:	RCS Leak								

Time	Position	Applicant's Actions or Behavior
	SRO	27. **IF** containment purging or venting is needed, **THEN PERFORM** the following:
		a. **IF** leak was inside containment, **THEN** **NOTIFY** Chem Lab to evaluate off-site dose **USING** 0-SI-CEM-030-410.1 or 410.2, as applicable. b. **EVALUATE** resuming containment purging or venting **USING** 0-SO-30-3 or 0-SO-30-8, as applicable. **This step N/A**
	SRO	28. **INITIATE** leak repairs.
	SRO	29. **GO TO** appropriate plant procedure.
		END OF SECTION
Evaluator Note: The following CREW Brief and Notification actions are not contained in the procedure.		
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead Examiner may cue the next event as desired.		

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Event Description: SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards

Time	Position	Applicant's Actions or Behaviors
Booth Instructor: When directed, initiate Event 7		
Indications available: **1-M-4:** • **1-XI-94-101/102, Core Exit Temp Margin to Saturation (exo sensors Trn A & B) pressure indications trending to SI actuation pressure value.** **1-M-5:** • **1-PI-68-340A, 1-PI-68-334, 1-PI-68-323, 1-PI-68-322, RCS PZR PRESS narrow range indicators trending to Rx Trip/SI actuation pressure values.** • **1-PR-68-69, RCS LOOP 1 HL WIDE RANGE PRESS indicator trending to Rx Trip/SI actuation pressure value.** **1-M-6:** • **1-PI-68-66A, HL Pressure LOOP 3 indicator trending to actuation pressure value.** • **1-PI-68-62, RCS HL Press WR indicator trending to actuation pressure value.** • **1-PI-68-69, RCS HL Press WR indicator trending to actuation pressure value.**		
	SRO	Direct RO to manually trip the reactor and manually actuate SI.
	SRO	Direct entry to E-0, Reactor Trip or Safety Injection and perform Immediate Operator Actions (IOAs)
	RO	Manually trips reactor, verifies reactor tripped and actuates SI per SRO directions.
Evaluator Note:		Following IOA performance, prior to Steps 1-4 immediate action verification, RO/BOP surveys MCBs for any expected automatic system response that failed to occur. Upon discovery, they may take manual action(s) to align plant systems as expected for the event in progress. (Ref. EPM-4, Prudent Operator Actions) High Containment Pressure is expected (2.8 psig) during the course of EOP conduct; the crew should identify the ORANGE PATH condition and enter FR-Z.1, High Containment Pressure (attached following this event guide).
E-0, *Reactor Trip or Safety Injection*		
Note 1		Steps 1 through 4 are immediate action steps
Note 2		This procedure has a foldout page
	RO	1. **VERIFY** reactor TRIPPED: • Reactor trip breakers OPEN • Reactor trip bypass breakers DISCONNECTED or OPEN • Neutron flux DROPPING • Rod bottom lights LIT

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Event Description: SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards

Time	Position	Applicant's Actions or Behaviors
		• Rod position indicators less than or equal to 12 steps.
	BOP	2. **VERIFY** turbine TRIPPED: • Turbine stop valves CLOSED.
CRITICAL TASK		**5 Minutes after SI actuation, loss of offsite power occurs; Crew should re-enter or perform a second pass through E-0 IOAs (Hi-level steps only).** ***Start at least 1 EDG prior to placing equipment PTL in ECA.0-0***
	BOP	3. **VERIFY** at least one train of shutdown boards ENERGIZED. • **Attempt to restore power to at least ONE train of shutdown boards** • **Place DG 1A-A control switch in START** • **Verify Train A Shutdown Boards ENERGIZED**
	BOP	Dispatch AUO to locally reset 1B-B EDG
	RO	4. **DETERMINE** if SI actuated: • ECCS pumps RUNNING. • Any SI alarm LIT [M-4D] (SI will be actuated)
	BOP	5. **PERFORM** ES-0.5, Equipment Verifications WHILE continuing in this procedure (attached following EOPs).

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Event Description: SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards

Time	Position	Applicant's Actions or Behaviors
	RO	6. **DETERMINE** if secondary heat sink available: a. **CHECK** total AFW flow greater than 440 gpm. b. **CHECK** narrow range level greater than 10% [25 ADV] in at least one S/G. c. **CONTROL** feed flow to maintain narrow range level between 10% [25% ADV] and 50% in all S/Gs. (Heat Sink is available from Train A and TDAFW)
	RO	7. **CHECK** if main steam lines should be isolated: a. **CHECK** if any of the following conditions have occurred: • Any S/G pressure less than 600 psig AND STEAMLINE PRESS ISOL SI BLOCK RATE ISOL ENABLE permissive DARK [M-4A, A4] OR • Any S/G pressure dropping UNCONTROLLED. OR • Phase B actuation b. **ENSURE** MSIVs and MSIV bypass valves CLOSED. c. **ENSURE** applicable Foldout Page actions COMPLETED. [Main Steam lines will isolate on Phase B (actuation setpoint- 2.8 psig)]
Evaluator Note: **ØB** actuation time: _____		
	NOTE:	Loss of seal injection flow could adversely affect RCP seals.
	RO	8. **CHECK** RCP trip criteria: a. CHECK the following: • RCS pressure less than 1250 psig. AND • At least one CCP OR SI pump RUNNING b. STOP RCPs

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Event Description: SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards

Time	Position	Applicant's Actions or Behaviors
	RO	9. **MONITOR** RCS temperatures: • IF any RCP running, THEN CHECK T-avg stable at or trending between 547°F and 552°F OR • IF RCPs stopped, THEN CHECK T-cold stable or trending to between 547°F and 552°F.
	RO	10. **CHECK** pressurizer PORVs, safeties, and spray valves: a. Pressurizer PORVs CLOSED. b. Pressurizer safety valves CLOSED. c. Normal spray valves CLOSED. d. Power to at least one block valve AVAILABLE. e. At least one block valve OPEN.
	BOP (RO if BOP is performing ES-0.5)	11. :**DETERMINE** if S/G secondary pressure boundaries are INTACT: • **CHECK** all S/G pressures CONTROLLED or RISING. • **CHECK** all S/G pressures greater than 140 psig.
	BOP (RO if BOP is performing ES-0.5)	12. **DETERMINE** if S/G tubes are INTACT: • All S/G narrow range levels CONTROLLED or DROPPING • Secondary radiation NORMAL **USING** Appendix A, Secondary Rad Monitors. (App. A performed in ES-0.5).

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Event Description:	SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards								

Time	Position	Applicant's Actions or Behaviors
	RO BOP	13. **DETERMINE** if RCS is INTACT: • Containment pressure NORMAL • Containment sump level NORMAL • LOWER COMPT TEMP HIGH alarm DARK. [M-5C, B1] • Containment radiation NORMAL **USING** Appendix B, Containment Rad Monitors. (App. B performed in ES-0.5) ***(RNO Required)***
	CREW	**RNO:** **PERFORM** the following: a. **MONITOR** status trees. b. **GO TO** E-1, Loss of Reactor or Secondary Coolant.
Evaluator Note:	During the progress of the LOCA, containment pressure will reach entry conditions for FR-Z.1, High Containment Pressure (>2.8 psig). Expected FR-Z-1 actions are included following E-1 event guide.	
	US	Directs entry to E-1, Loss of Reactor or Secondary Coolant
Evaluator Note:	Following SI actuation, both EDGs will fail to start. BOP Operator is expected to manually start 1A-A EDG from back panel 0-M-26A using emergency start pushbutton 0-HS-82-16A and start at least 1 'A' Train ERCW Pump (J-A ERCW Pump should be the U1 A Train pump started).	
CRITICAL TASK		***Start at least 1 EDG prior to placing equipment PTL in ECA.0-0.*** (AOP-P.01, Loss of Offsite Power contains IOAs that should be performed during E-0 re-entry following loss of offsite power. AOP-P.01 actions are following this event guide.)
CRITICAL TASK		***Start 1A-A CCP*** (following loss of offsite power) [(ES-0.5 actions are contained in attachment at back of scenario guide)]
CRITICAL TASK		***Start at least 1 'A' Train ERCW Pump in an operating safeguards train*** (following loss of offsite power) [(ES-0.5 actions are contained in attachment at back of scenario guide)]

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Event Description: SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards

Time	Position	Applicant's Actions or Behaviors
		E-1, LOSS OF REACTOR OR SECONDARY COOLANT
NOTE		This procedure has a foldout page.
	RO	1. **CHECK** RCP trip criteria:
		a. CHECK the following: • At least one CCP **OR** SI pump RUNNING **AND** • RCS pressure less than 1250 psig. b. **STOP** RCPs.
	BOP	2. **MONITOR** if hydrogen igniters and recombiners should be turned on:
	RO	a. CHECK containment conditions NOT normal: • containment pressure high OR • containment sump level high.
	BOP	b. **DISPATCH** personnel to open ice condenser AHU breakers **USING** EA-201-1, 480 V Board Room Breaker Alignments.
	BOP	c. **CHECK** hydrogen concentration measurement AVAILABLE: • Hydrogen analyzers have been in ANALYZE for at least 5 minutes. ***(RNO Required)***
	BOP	**RNO:** c. **PERFORM** the following:
		1) **DISPATCH** operator to place hydrogen analyzers in service **USING** Appendix D (also contained in ES-0.5).

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Event Description: SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards

Time	Position	Applicant's Actions or Behaviors
		2) **WHEN** hydrogen analyzers have been in ANALYZE for at least 5 minutes, **THEN** **PERFORM** substeps 2.d through 2.f.
		3) **GO TO** Step 3.
	BOP	d. **CHECK** containment hydrogen concentration less than 6%.
	BOP	e. **WHEN** ice condenser AHU breakers have been opened, **THEN** **ENERGIZE** hydrogen igniters **USING** Appendix D.
	BOP	f. **CHECK** containment hydrogen concentration less than 0.5%. [M-10]
	BOP	3. **CHECK** S/G secondary pressure boundaries INTACT: • S/G pressures CONTROLLED or RISING • S/G pressures greater than 140 psig.
	BOP	4. **MAINTAIN** Intact S/G narrow range levels:
		a. Greater than 10% [25% ADV].
		b. Between 10% [25% [ADV] and 50%

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Event Description: SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards

Time	Position	Applicant's Actions or Behaviors
	BOP	5. **VERIFY** secondary radiation NORMAL:
		a. **CHECK** secondary radiation NORMAL **USING** Appendix A, Secondary Rad Monitors.
		b. **NOTIFY** Chem Lab to take S/G activity samples.
		c. **WHEN** Chem Lab is ready to sample S/Gs, **THEN** **PERFORM** the following:
		1) **ENSURE** FCV-15-43 Blowdown Flow Control valve CLOSED. 2) **ENSURE** Phase A RESET. 3) **OPEN** blowdown isolation valves.
		d. **NOTIFY** RADCON to survey main steam lines and S/G blowdown.
		e. **WHEN** S/G samples completed, **THEN** **CLOSE** blowdown isolation valves.
	CAUTION	**Any time a pressurizer PORV opens, there is a possibility that it may stick open.**
		6. **MONITOR** pressurizer PORVs and block valves:
		a. Power to block valves AVAILABLE.
		b. Pressurizer PORVs CLOSED.
		c. At least one block valve OPEN.
		7. **MONITOR** SI termination criteria:
		a. RCS subcooling based on core exit T/Cs greater than 40°F.

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Event Description: SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards

Time	Position	Applicant's Actions or Behaviors
		b. Secondary heat sink:
		• Narrow range level in at least one Intact S/G greater than 10% [25% ADV]. OR • Total feed flow to Intact S/Gs greater than 440 gpm.
		c. RCS pressure STABLE or RISING.
		d. Pressurizer level greater than 10% [20% ADV].
		e. **GO TO** ES-1.1, SI Termination.
		8. **MONITOR** if containment spray should be stopped:
		a. **CHECK** any containment spray pump RUNNING.
		b. **CHECK** containment pressure less than 2.0 psig.
		c. **CHECK** containment spray suction aligned to RWST.

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Event Description: SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards

Time	Position	Applicant's Actions or Behaviors
		d. **RESET** containment spray signals. e. **STOP** containment spray pumps and **PLACE** in A-AUTO. f. **CLOSE** containment spray discharge valves: • FCV-72-39, Train A • FCV-72-2, Train B.
		9. **MONITOR** if containment vacuum control should be returned to normal:
		a. CHECK containment pressure less than 1.0 psig.
		b. VERIFY containment vacuum relief isolation valves OPEN: [Panel 6K] • FCV-30-46 • FCV-30-47 • FCV-30-48.
		10. **MONITOR** shutdown boards continuously energized.
		11. **DETERMINE** if RHR pumps should be stopped:
		a. CHECK RCS pressure: 1) Greater than 300 psig 2) STABLE or RISING.
		b. CHECK RHR pump suction aligned from RWST.

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Event Description: SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards

Time	Position	Applicant's Actions or Behaviors
		c. **ENSURE** SI signal RESET.
		d. **STOP** RHR pumps and **PLACE** in A-AUTO.
		e. **MONITOR** RCS pressure greater than 300 psig.
	NOTE 1	S/G pressures dropping slowly during a LOCA with no faulted S/G should be considered "stable" in the following step.
	NOTE 2	RCS pressure rising slightly during a LOCA which is NOT isolated should be considered "stable" in the following step.
		12. **DETERMINE** if SI termination criteria should be checked again:
		a. **CHECK** pressure in all S/Gs STABLE or RISING. b. **CHECK** RCS pressure STABLE or DROPPING.
		13. **MONITOR** if RHR spray should be placed in service:
		a. **CHECK** the following conditions met: • Containment pressure greater than 9.5 psig **AND** • At least 1 hour has elapsed since beginning of accident
		AND • RHR suction aligned to containment sump **AND** • At least one CCP **AND** one SI pump RUNNING.

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Event Description: SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards

Time	Position	Applicant's Actions or Behaviors
		b. CHECK both RHR pumps RUNNING.
		c. **ESTABLISH** Train B RHR spray: 1) **CHECK** Train B RHR pump RUNNING. 2) **ENSURE** RHR crosstie FCV-74-35 CLOSED. 3) **CLOSE** RHR injection FCV-63-94. 4) **OPEN** RHR spray FCV-72-41.
		d. **MONITOR** containment pressure greater than 4 psig.
		14. **DETERMINE** if diesel generators should be stopped:
		a. **VERIFY** shutdown boards ENERGIZED from start busses.
		b. **ENSURE** SI signal RESET.
		c. **STOP** any unloaded diesel generators and **PLACE** in standby **USING** EA-82-1, Placing D/Gs in Standby.
		15. **INITIATE** evaluation of plant status:

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Event Description: SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards

Time	Position	Applicant's Actions or Behaviors
		a. **ENSURE** cold leg recirculation capability:
		1) Power to at least one RHR pump AVAILABLE. 2) Capability to operate the following valves AVAILABLE: • FCV-63-72 and FCV-74-3 (for RHR Pump A-A). OR • FCV-63-73 and FCV-74-21 (for RHR Pump B-B).
		b. **CHECK** Auxiliary Building radiation: 1) Area Radiation Monitors RR–90–1A and RR–90–1B NORMAL. 2) Aux Bldg Vent monitor recorder 0-RR-90-101 NORMAL (prior to isolation).
		c. **MONITOR** containment sump level less than 68%. d. **NOTIFY** TSC to initiate post-accident sampling as necessary. e. **EVALUATE** plant equipment status **USING** EA-0-4, Evaluation of Equipment Status.

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Event Description: SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards

Time	Position	Applicant's Actions or Behaviors
		16. **DETERMINE** if RCS cooldown and depressurization is required:
		a. CHECK RCS pressure greater than 300 psig.
		b. GO TO ES-1.2, Post LOCA Cooldown and Depressurization.
		17. **DETERMINE** if transfer to cold leg recirculation is required:
		a. CHECK RWST level less than 27%.
		b. IF ES-1.3 has NOT been performed, THEN GO TO ES-1.3, Transfer to RHR Containment Sump.
		18. **MONITOR** if CLAs should be isolated:
		a. CHECK RCS pressure less than 100 psig. b. CHECK power to CLA isolation valves AVAILABLE. c. ENSURE SI signal RESET. d. CLOSE CLA isolation valves.

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Event Description:	SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards								

Time	Position	Applicant's Actions or Behaviors
		19. **DETERMINE** if Intact S/Gs should be depressurized to RCS pressure:
		a. **CHECK** RCS pressure less than Intact S/G pressures. b. **NOTIFY** Chem Lab to sample all S/Gs for activity levels. c. **CONSULT** TSC to determine dose projection for steaming S/Gs.
		d. **CHECK** dose projection for each S/G acceptable. e. **DUMP** steam to condenser from Intact S/Gs UNTIL S/G pressure less than RCS pressure.
		20. **DETERMINE** if reactor vessel head should be vented:
		• **CONSULT** TSC for evaluation of vessel head venting.
		21. **WHEN** 4 hours have elapsed since event initiation, **THEN PREPARE** for hot leg recirculation:
		• **DISPATCH** personnel to restore power to FCV-63-22 **USING** EA-201-1, 480V Board Room Breaker Alignments.
		22. **WHEN** 5 hours have elapsed since event initiation, **THEN GO TO** ES-1.4, Transfer to Hot Leg Recirculation.
		23. **EVALUATE** long term plant status:

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Event Description: SBLOCA/Loss of offsite power(delayed) resulting in a loss of power to both 6.9 kV Shutdown Boards

Time	Position	Applicant's Actions or Behaviors
		• **CONSULT** TSC.
		END

Scenario may be terminated upon transition to ES-1.2

Op Test No.:	NRC	Scenario #	3	Event #	FR-Z.1	Page	55	of	68
Event Description:	High Containment Pressure Function Restoration (Orange Path)								

Time	Position	Applicant's Actions or Behavior
		FR-Z-1, High Containment Pressure
	NOTE:	If this procedure has been entered for an orange path and performance of ECA-1.1 (Loss of RHR Sump Recirculation) is required, FR-Z.1 may be performed concurrently with ECA-1.1.
	RO	1. **MONITOR** RWST level greater than 27%.
	RO	2. **VERIFY** Phase B valves CLOSED: • Panel 6K PHASE B GREEN • Panel 6L PHASE B GREEN.
	RO	3. **ENSURE** RCPs STOPPED
		4. **DETERMINE** if this procedure should be exited:
	BOP	a. **CHECK** for faulted S/G:
		• Any S/G pressure DROPPING in an uncontrolled manner **OR** • Any S/G pressure less than 140 psig. ***RNO Required)***
		RNO: a. **GO TO** Step 5.
		b. **CHECK** containment pressure less than 12 psig.
		c. **CHECK** at least one containment spray pump RUNNING and delivering flow.
		d. **CHECK** at least one containment air return fan RUNNING.
		e. **RETURN** to procedure and step in effect.
	RO	5. **VERIFY** containment spray operation:

Op Test No.: NRC Scenario # 3 Event # FR-Z.1 Page 56 of 68

Event Description: High Containment Pressure Function Restoration (Orange Path)

Time	Position	Applicant's Actions or Behavior
		a. **CHECK** RHR sump recirculation capability AVAILABLE.
		b. **VERIFY** containment spray pumps RUNNING.
		c. **CHECK** RWST level greater than 27%.
		d. **VERIFY** containment spray suction ALIGNED to RWST:
		• FCV-72-22 OPEN • FCV-72-21 OPEN.
		e. **VERIFY** containment spray discharge valves OPEN:
		• FCV-72-39 • FCV-72-2.
		f. **VERIFY** containment spray recirc valves CLOSED
		• FCV-72-34 • FCV-72-13.
		g. **VERIFY** containment spray flow greater than 4750 gpm on each train.
	BOP	6. **MONITOR** containment air return fans:
		• **WHEN** at least 10 minutes have elapsed from Phase B, **THEN** **ENSURE** containment air return fans RUNNING.
	RO	7. **VERIFY** containment ventilation dampers CLOSED:
		• Panel 6K CNTMT VENT GREEN • Panel 6L CNTMT VENT GREEN.
	RO	8. **VERIFY** Phase A valves CLOSED:
		• Panel 6K PHASE A GREEN • Panel 6L PHASE A GREEN.
	RO	9. **VERIFY** cntmnt vacuum relief isolation valves CLOSED: [Pnl 6K

Op Test No.: NRC Scenario # 3 Event # FR-Z.1 Page 57 of 68

Event Description: High Containment Pressure Function Restoration (Orange Path)

Time	Position	Applicant's Actions or Behavior
		MANUAL]
		• FCV-30-46 • FCV-30-47 • FCV-30-48.
	BOP	10. **VERIFY** MSIVs and MSIV bypass valves CLOSED.
	BOP	11. **DETERMINE** if any S/G Intact:
		a. **CHECK** at least one S/G pressure: • CONTROLLED or RISING **AND** • Greater than 140 psig.
	CAUTION: Isolating all S/Gs will result in a loss of secondary heat sink.	
	BOP	12. **DETERMINE** if any S/G Faulted:
		a. **CHECK** S/G pressures:
		• Any S/G pressure DROPPING in an uncontrolled manner **OR** • Any S/G pressure less than 140 psig.
	BOP	b. **ISOLATE** feed flow to affected S/G:
		• MFW • AFW
	BOP	13. **MONITOR** if hydrogen igniters and recombiners should be turned on:

Op Test No.: NRC Scenario # 3 Event # FR-Z.1 Page 58 of 68

Event Description: High Containment Pressure Function Restoration (Orange Path)

Time	Position	Applicant's Actions or Behavior
		a. **DISPATCH** personnel to open ice condenser AHU breakers **USING** EA-201-1, 480 V Board Room Breaker Alignments.
		b. **CHECK** hydrogen concentration measurement AVAILABLE:
		• Hydrogen analyzers have been in ANALYZE for at least 5 minutes.
		c. **CHECK** containment hydrogen concentration less than 6%.
		d. **WHEN** ice condenser AHU breakers have been opened, **THEN ENERGIZE** hydrogen igniters **USING** Appendix D, Placing Hydrogen Analyzers and Igniters In Service.
		e. **CHECK** containment hydrogen concentration less than 0.5%.
	RO	14. **MONITOR** if RHR spray should be placed in service:
		a. **CHECK** the following:
		• Containment pressure greater than 9.5 psig **AND** • At least 1 hour has elapsed since beginning of accident **AND** • RHR suction ALIGNED to containment sump **AND** • At least one CCP **AND** one SI pump RUNNING.
	RO	b. **CHECK** both RHR pumps RUNNING.
	RO	c. **ESTABLISH** Train B RHR spray:
		1) **CHECK** Train B RHR pump RUNNING.
		2) **ENSURE** RHR crosstie FCV-74-35 CLOSED.
		3) **CLOSE** RHR injection FCV-63-94.
		4) **OPEN** RHR spray FCV-72-41.

Op Test No.: NRC Scenario # 3 Event # FR-Z.1 Page 59 of 68

Event Description: High Containment Pressure Function Restoration (Orange Path)

Time	Position	Applicant's Actions or Behavior
	RO	d. **MONITOR** containment pressure greater than 4 psig.
	RO	15. **MONITOR** if containment spray should be stopped:
		a. **CHECK** any containment spray pump RUNNING.
		b. **CHECK** containment pressure less than 2.0 psig.
		c. **CHECK** containment spray suction aligned to RWST.
		d. **RESET** Containment Spray.
		e. **STOP** containment spray pumps and **PLACE** in A-AUTO.
		f. **CLOSE** containment spray discharge valves:
		• FCV-72-39, Train A • FCV-72-2, Train B.
	SRO	16. **RETURN TO** procedure and step in effect.
		END

Op Test No.: NRC Scenario # 3 Event # ES-0.5 Page 60 of 68

Event Description: **ES-0.5, Equipment Verifications**

Time	Position	Applicant's Actions or Behavior
ES-0.5, Equipment Verification		
CRITICAL TASK		***Start at least 1 'A' Train ERCW Pump in an operating safeguards train*** [(ES-0.5 actions are contained in attachment at back of scenario guide)]
	BOP	CHECK ERCW system operation: • VERIFY at least four ERCW pumps RUNNING. • VERIFY D/G ERCW supply valves OPEN.
	BOP	VERIFY CCS pumps RUNNING: • Pump 1A-A (2A-A) Must Manually Start • Pump 1B-B (2B-B) • Pump C-S.
	BOP	VERIFY EGTS fans RUNNING.
	BOP	VERIFY generator breakers OPEN.
	BOP	VERIFY AFW pumps RUNNING: • MD AFW pumps • TD AFW pump.
NOTE AFW level control valves should NOT be repositioned if manual action has been taken to control S/G levels, to establish flow due to failure, or to isolate a faulted S/G.		
	BOP	CHECK AFW valve alignment: a. VERIFY MD AFW LCVs in AUTO. b. VERIFY TD AFW LCVs OPEN. c. VERIFY MD AFW pump recirculation valves FCV-3-400 and FCV-3-401 CLOSED.

Op Test No.:	NRC	Scenario #	3	Event #	ES-0.5	Page	61	of	68
Event Description:	**ES-0.5, Equipment Verifications**								

Time	Position	Applicant's Actions or Behavior
	BOP	VERIFY MFW Isolation: • MFW pumps TRIPPED • MFW regulating valves CLOSED • MFW regulating bypass valve controller outputs ZERO • MFW isolation valves CLOSED • MFW flow ZERO.
CRITICAL TASK		***Critical Task to start 1A-A CCP is contained in ES-0.5 actions*** [(ES-0.5 actions are contained in attachment at back of scenario guide)]
	BOP	MONITOR ECCS operation: VERIFY ECCS pumps RUNNING: • **CCPs - MANUALLY START 1A-A CCP** • RHR pumps • SI pumps
	BOP	VERIFY CCP flow through CCPIT. • CHECK RCS pressure less than 1500 psig. • VERIFY SI pump flow. • CHECK RCS pressure less than 300 psig. • VERIFY RHR pump flow.
	BOP	VERIFY ESF systems ALIGNED: • Phase A ACTUATED: o CONTAINMENT ISOLATION PHASE A TRAIN A alarm LIT [M-6C, B5]. o CONTAINMENT ISOLATION PHASE A TRAIN B alarm LIT [M-6C, B6]. • Containment Ventilation Isolation ACTUATED: o CONTAINMENT VENTILATION ISOLATION TRAIN A alarm LIT [M-6C, C5]. o CONTAINMENT VENTILATION ISOLATION TRAIN B alarm LIT [M-6C, C6]. • Status monitor panels: o 6C DARK

Op Test No.: NRC Scenario # 3 Event # ES-0.5 Page 62 of 68

Event Description: **ES-0.5, Equipment Verifications**

Time	Position	Applicant's Actions or Behavior
		○ 6D DARK ○ 6E LIT OUTSIDE outlined area ○ 6H DARK ○ 6J LIT. • Train A status panel 6K: ○ CNTMT VENT GREEN ○ PHASE A GREEN • Train B status panel 6L: ○ CNTMT VENT GREEN ○ PHASE A GREEN
	BOP	MONITOR containment spray NOT required: • Phase B NOT ACTUATED AND • Containment pressure less than 2.81 psig • Ensure Containment Spray is actuated
	BOP	VERIFY pocket sump pumps STOPPED: [M-15, upper left corner] • HS-77-410, Rx Bldg Aux Floor and Equipment Drain Sump pump A • HS-77-411, Rx Bldg Aux Floor and Equipment Drain Sump pump B.
	BOP	DISPATCH personnel to perform EA-0-1, Equipment Checks Following ESF Actuation.

Op Test No.: NRC Scenario # 3 Event # AOP-P.01 Page 63 of 68

Event Description: **Loss of Off Site Power**

Time	Position	Applicant's Actions or Behavior
		AOP-P.01, Loss of Off Site Power
Evaluator Note:		During AOP-P.01 implementation, the crew performs through step 9, which contains actions important to support current operating strategies; further activities, while important, are administrative or are delegated to plant personnel outside the MCR.
	CREW	**2.0 OPERATOR ACTIONS** 1. **DIAGNOSE** the failure: IF... / GO TO SECTION / PAGE Complete loss of off-site power — 2.1 — 4 Partial Loss of Offsite Power: • A or B start busses de-energized OR • loss of normal supply to individual shutdown board (shutdown board energized from D/G) — 2.2 — 29
	CREW	**NOTE:** Steps 1 and 2 are immediate actions.
CRITICAL TASK		***Start at least 1 EDG prior to placing equipment PTL in ECA.0-0.***
	BOP	1. **CHECK** Diesel Generators RUNNING and supplying shutdown boards. — **EMERGENCY START** available D/Gs.
	BOP	2. **CHECK** ERCW supply valves to D/Gs OPEN. — **ENSURE** normal or alternate ERCW supply valve OPEN. IF any diesel generator running AND cooling water NOT available, THEN **EMERGENCY STOP** affected diesel generator(s).

Op Test No.: NRC Scenario # 3 Event # AOP-P.01 Page 64 of 68

Event Description: **Loss of Off Site Power**

Time	Position	Applicant's Actions or Behavior
	BOP	3. **MONITOR** BOTH 6900V shutdown boards on this unit ENERGIZED.
		IF NO 6900V shutdown board is ENERGIZED on this unit, **THEN** **PERFORM** the following:
	SRO	a. IF unit is in Mode 1-4, **THEN** **ENSURE** ECA-0.0, Loss of All AC Power has been entered.
	SRO	b. IF unit is in Modes 4-6, **THEN** **ENSURE** AOP-R.03, RHR System Malfunction, has been entered, WHILE continuing in this procedure.
	SRO	c. IF any D/G is available (capable of starting), **THEN** **PERFORM** Appendix S, Manually Energizing Shutdown Board from D/G. d. **WHEN** off-site power is available, **THEN** **PERFORM** Section 2.3, Recovery from Loss of Offsite Power. e. **DO NOT CONTINUE** Section 2.1 UNTIL at least one shutdown board is ENERGIZED.
	SRO	IF one 6900V shutdown board is ENERGIZED on this unit, **THEN** **PERFORM** the following:
	RO	a. **ENSURE** available CCP RUNNING.
	SRO RO BOP	b. IF NO CCP is available **THEN** **PERFORM** the following: 1) IF Phase B is NOT actuated, **THEN** **ENSURE** RCP thermal barrier cooling: • one CCS pump RUNNING aligned to supply Train A CCS. • one TBBP RUNNING.

Op Test No.: NRC Scenario # 3 Event # AOP-P.01 Page 65 of 68

Event Description: **Loss of Off Site Power**

Time	Position	Applicant's Actions or Behavior
		2) **REFER TO** AOP-M.09, Loss of Charging.
	SRO	c. **IF** any D/G available (capable of starting), **THEN** **PERFORM** Appendix S, Manually Energizing Shutdown Board from D/G.
	SRO	d. **PERFORM** applicable AOP for loss of shutdown board as time allows: • AOP-P.05 (Unit 1 Shutdown Boards) • AOP-P.06 (Unit 2 Shutdown Boards)
	SRO	e. **IF** off-site power is available **AND** rapid restoration is needed, **THEN** **PERFORM** Sect. 2.3, Recovery from Loss of Offsite Power.
	SRO	4. **NOTIFY** SM to perform the following: a. **EVALUATE** EPIP-1, Emergency Plan Classification Matrix. b. **INITIATE** staffing of TSC and OSC **USING** Emergency Paging System.
	CREW	5. **RECORD** time of loss of off-site power. _____

Op Test No.: NRC Scenario # 3 Event # AOP-P.01 Page 66 of 68

Event Description: **Loss of Off Site Power**

Time	Position	Applicant's Actions or Behavior
	BOP	6. **MONITOR** diesel generator loading: a. **VERIFY** D/G load sequencing **USING** Appendix B, Loss of Offsite Power Diesel Generator Load Sequence **[C.2]**. b. **ENSURE** four ERCW pumps RUNNING (one per shutdown board). c. **MONITOR** diesel generator(s) load less than or equal to 4.4 MW (4.8 MW for 2 hours). c. **REDUCE** excess diesel generator load **USING** Appendix A, Diesel Generator Load Evaluation List **[C.1]**.
	RO	7. **CHECK** charging system operation: a. **ENSURE** all RCS dilution activities STOPPED. b. **ENSURE** CCP suction aligned to RWST: 1) **OPEN** LCV-62-135 or LCV-62-136. 2) **CLOSE** LCV-62-132 or LCV-62-133.
		CAUTION 1 **Failure to promptly restart air compressors and restore non-essential air to containment will delay restoration of letdown. This may result in uncontrolled pressurizer level rise and PORV opening.** **CAUTION 2** **Opening Train A ERCW supply to Station Air Compressors with ERCW temp greater than 82.3°F makes Train A MCR Chiller and EBR Chiller inoperable due to inadequate ERCW flow. This would place both units in LCO 3.0.5.** **NOTE** Starting control air compressors will add about 0.1 MW to D/G 1A-A and 1B-B.
	BOP	8. **RESTORE** control air: a. **PLACE** MSIV handswitches in CLOSE position.

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Event Description: **Loss of Off Site Power**

Time	Position	Applicant's Actions or Behavior
	CREW	b. **ESTABLISH** cooling water to station air compressors: 1) **VERIFY** Train B ERCW available. 2) **ENSURE** FCV-67-208 Train B ERCW to air compressors OPEN. [0-M-27A] b. **IF** Train B ERCW supply NOT available **AND** ERCW temp is less than 82.3°F, **THEN** **OPEN** FCV-67-205, Train A ERCW to air compressors. [0-M-27A]
	BOP	c. **DISPATCH** an operator to start Station Air Compressors A and B **USING** EA-32-2, Establishing Control and Service Air.
	BOP	d. **ENSURE** auxiliary air compressors RUNNING. [M-15 or AB el 734] (powered from Unit 2 Shutdown Bds) d. **WHEN** control air pressure is greater than 75 psig, **THEN** **ALIGN** control air to supply auxiliary air **USING** EA-32-2.
	RO	8. e. **CHECK** Phase B NOT actuated. e. **IF** Phase B actuated, **THEN** **GO TO** Note prior to Step 9.
	BOP	f. **WHEN** control air pressure restored, **THEN** **RESTORE** air to containment **USING** EA-32-1, Establishing Control Air to Containment.
		NOTE: 0-SO-82-1, 2, 3, 4 Appendix C contains normal D/G running parameters. Copies of these appendices may be obtained from AOP-C.04 cabinet in D/G Bldg.

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Event Description: **Loss of Off Site Power**

Time	Position	Applicant's Actions or Behavior
	BOP	9. **DISPATCH** operator to D/G Building to monitor diesel generators **USING** 0-SO-82-1, 2, 3, 4 App. C.

Evaluator Note: During AOP-P.01 implementation, the crew performs through step 9, which contains actions important to support current operating strategies; further activities, while important, are administrative or are delegated to plant personnel outside the MCR.

DELTA TIME (hrs)	REACTOR POWER (%)	POWER DEFECT (pcm)	ASSUMED ROD HT (steps)	INSERTED WORTH (pcm)	EXPECTED XENON (pcm)	DELTA RHO BORON (pcm)	BORON CONC (ppm)	DELTA PPM (ppm)	RECOMMEN DILUTION (gal)	RECOMMEN BORATION (gal)	IODINE CONC (% eq)
0	4.0	73.1	180.0	-430.8	-54.7	---	1710.0	---	---	---	0.1
1	9.0	160.6	182.0	-401.0	-55.6	58.6	1700.6	-9.4	371	0	0.7
2	15.0	262.1	186.5	-346.5	-63.8	55.1	1691.7	-8.9	351	0	1.8
3	15.0	262.6	187.0	-341.5	-79.9	11.8	1689.8	-1.9	75	0	3.1
4	18.0	310.8	188.0	-326.4	-102.9	56.0	1680.9	-9.0	357	0	4.5
5	20.0	343.5	189.0	-312.6	-132.7	48.7	1673.0	-7.8	312	0	5.9
6	22.0	375.0	190.0	-298.9	-168.7	53.8	1664.4	-8.6	346	0	7.4
7	27.0	452.4	196.0	-233.7	-211.0	54.4	1655.7	-8.7	351	0	9.1
8	30.0	498.7	200.0	-191.5	-259.7	52.9	1647.2	-8.5	343	0	11.0
9	30.0	499.8	200.0	-190.8	-314.3	54.9	1638.4	-8.8	357	0	12.8
10	30.0	500.8	201.0	-180.8	-373.0	49.8	1630.4	-8.0	324	0	14.5
11	30.0	501.8	202.0	-170.8	-434.3	52.3	1622.0	-8.4	342	0	16.1
12	30.0	502.8	203.0	-160.8	-496.9	53.7	1613.4	-8.6	352	0	17.4
13	30.0	503.8	204.0	-150.9	-559.9	54.0	1604.7	-8.7	356	0	18.7
14	30.0	504.8	205.0	-141.3	-622.2	53.8	1596.1	-8.6	356	0	19.8
15	30.0	505.9	207.0	-122.9	-683.5	43.8	1589.1	-7.0	291	0	20.8
16	30.0	506.7	208.0	-113.5	-743.0	51.0	1580.9	-8.2	339	0	21.7
17	30.0	507.7	209.0	-104.2	-800.6	49.2	1573.0	-7.9	328	0	22.5
18	30.0	508.6	209.0	-103.8	-855.9	55.8	1564.1	-8.9	373	0	23.2
19	30.0	509.6	209.0	-103.3	-908.7	53.4	1555.5	-8.6	359	0	23.9
20	30.0	510.7	209.0	-102.9	-958.9	50.8	1547.4	-8.1	342	0	24.5

1000	MWD/MTU
6820	BAT ppm

Hold Tavg = Tref +/- 1.5F

Total 6628 0

Small hourly boration/dilution volumes may be accumulated for larger single additions

Reason for Maneuver	Reactor/Plant restart following forced outage- 30% hold
Date	Today
RxEng Name	J. Sidekick
Comments	none

APPENDIX C

Time: Now Date: Today

Unit 1 MCR Checklist

Part 1 - Completed by Off-going Shift / Reviewed by On-coming Shift

Mode 2, 3-4% Power - - MWe **PSA Risk: Green** **Grid Risk: Green** **RCS Leakage ID .02 gpm, UNID .01 gpm**	**NRC phone Authentication Code** **Until 0800 XXXX** **After 0800 XXXX**

Common Tech Spec Actions

LCO/TRM	Equipment INOP	Time INOP	Owner	RTS
None	None	- - - -	- - - -	- - -

U-1 Tech Spec Actions

LCO/TRM	Equipment INOP	Time INOP	Owner	RTS
None	None	- - - -	- - - -	- - -

Protected Equipment

- ***None***

Shift Priorities

- ***Raise power to 13-15%; prepare for Main Generator Synchronization.***
- **According to TI-40, no fuel failures, CPL trending not required peior to 50%.**
- ***Section 5.2 Step 6, Perform Section 5.3, Turbine Roll in parallel is being prep'ed/briefed by another SRO/RO;***

Part 2 – Performed by on-coming shift

☐ Verify your current qualifications (re: OPDP-1 Section 7.3 F.)

☐ Review Operating Log since last held shift or 3 days, whichever is less.

Review the following for changes since last shift turnover:

☐ ODMIs/Standing Orders/ Shift Orders	☐ LCO actions	☐ PERs (applicable to unit)
☐ TACFs	☐ Operator workarounds, burdens, and challenges	☐ Immediate required reading

Part 3 – Performed by both off-going and on-coming shift

☐ Walk down of MCR Control Boards

Time: Now Date: Today

MCR Red Dot List

UNID And Noun Name	Panel	Problem Description	WO / PER Number	Date Scheduled

MCR WO List

ID And Noun Name	Panel	Problem Description	WO/PER Number	Date Scheduled

UNIT ONE REACTIVITY BRIEF

Date: Today Time: Now

General Information

RCS Boron: **1710** ppm Today	BA Controller Setpoint: **46.3%** *		RCS B-10 Depletion: **52** ppm
Operable BAT: **A**	BAT A Boron: **6850** ppm	BAT C Boron: **6850** ppm	RWST Boron: **2601** ppm
Nominal Gallons per rod step from 219: **7** gallons of acid, **50** gallons of water			

* Verify boric acid flow controller is set at Adjusted BA Controller Setting iaw 0-SO-62-7 section 5.1

Estimated values for a 1° Change in Tave **

Gallons of acid: **26**	Gallons of water: **136**	Rod Steps: **3**

Estimated rods/boron for emergency step power reduction **

(Assuming Xenon equilibrium and no reactivity effects due to Xenon. 2/3 total reactivity from rods, 1/3 from boron)

Power reduction amount	Estimated Final Rod Position	Estimated boron addition
10%	**196** Steps on bank D	**99** gallons
30%	**173** Steps on bank D	**292** gallons
50%	**151** Steps on bank D	**481** gallons

** These values are approximations and not intended nor expected to be exact. The values may be superseded by Rx Engineering or SO-62-7 calculated values. These values are calculated assuming 100% steady state power operation only. Engineering data last updated **one week ago**. Data Valid until **one week from now**.

Previous Shift Reactivity Manipulations

Number of dilutions: 1	Number of borations: 0	Rod steps in: 0
Gallons per dilution: 12	Gallons per boration: 0	Rod steps out: 0
Total amount diluted: 12	Total amount borated: 0	Net change: 0 IN/Out

Current Shift Estimated Reactivity Manipulations

Number of dilutions: *	Number of borations: 0	Rod steps in: 0
Gallons per dilution: *	Gallons per boration: 0	Rod steps out: 0
Total expected dilution: *	Total expected boration: 0	Net change: 0 In/Out

Remarks: * Per the RE Reactivity Spreadsheet
Rx Power: 3-4%
Xenon: -54.7 pcm, equilibrium
Last Dilution Completed: *

Burnup: 10,000 Mwd/mtU
Samarium: 544 pcm

Next Unit 1 Flux Map is scheduled - three weeks from now
Unit 1 M-P is 0 PPM

Unit Supervisor: _____
Name/Date

Operations Chemistry Information

Boron Results					
Sample Point	**Units**	**Boron**	**Date / Time**	**Goal**	**Limit**
U1 RCS	ppm	1710	Today / Now	Variable	Variable
U2 RCS	ppm	816	Today / Now	Variable	Variable
U1 RWST	ppm	2601	Today / Now	2550 - 2650	2500 - 2700
U2 RWST	ppm	2569	Today / Now	2550 - 2650	2500 - 2700
BAT A	ppm	6850	Today / Now	Variable	Variable
BAT B	ppm	6850	Today / Now	Variable	Variable
BAT C	ppm	6850	Today / Now	Variable	Variable
U1 CLA #1	ppm	2556	Today / Now	2470-2630	2400-2700
U1 CLA #2	ppm	2575	Today / Now	2470-2630	2400-2700
U1 CLA #3	ppm	2591	Today / Now	2470-2630	2400-2700
U1 CLA #4	ppm	2589	Today / Now	2470-2630	2400-2700
U2 CLA #1	ppm	2531	Today / Now	2470-2630	2400-2700
U2 CLA #2	ppm	2650	Today / Now	2470-2630	2400-2700
U2 CLA #3	ppm	2522	Today / Now	2470-2630	2400-2700
U2 CLA #4	ppm	2526	Today / Now	2470-2630	2400-2700
Spent Fuel Pool	ppm	2547	Today / Now	≥ 2050	≥ 2000
Lithium Results				**Goal**	**Midpoint**
U1 RCS Lithium	ppm	1.1	Today / Now	>1	>1
U2 RCS Lithium	ppm	2.43	Today / Now	2.18-2.48	2.33

Primary to Secondary Leakrate Information (Total CPM RM-90-99/119)					
Indicator	**Units**	**U1**	**Date / Time**	**U2**	**Date/Time**
SI 50 S/G Leakage?	Yes/No	No	Today / Now	No	Today / Now
SI 137.5 CVE Leakrate	gpd	< 0.1	Today / Now	< 0.1	Today / Now
5 gpd leak equivalent	cpm	115	Today / Now	111	Today / Now
30 gpd leak equivalent	cpm	492	Today / Now	464	Today / Now
50 gpd leak equivalent	cpm	793	Today / Now	747	Today / Now
75 gpd leak equivalent	cpm	1170	Today / Now	1100	Today / Now
CVE Air Inleakage	cfm	10	Today / Now	12.5	Today / Now
Bkgd on 99/119	cpm	50	Today / Now	40	Today / Now
Correction Factor 99/119	cpm/gpd	15	Today / Now	14.13	Today / Now

Steady state conditions are necessary for an accurate determination of leak rate using the CVE Rad Monitor

Facility:	Sequoyah	Scenario No.:	4	Op Test No.:	NRC
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		
Initial Conditions:	100% stable, long duration run;				
Turnover:	100% RTP; Preparations complete for power reduction for MT Valve testing,				
Target CTs:	Depressurize the RCS to meet SI termination criteria prior to affected SG overfill				

Event No.	Malf. No.	Event Type*	Event Description
1. T+0	N/A	R-RO N-SRO/BOP	Reduce power in preparation for MT Valve testing
2. T+20	RX19	I-RO	Auto Rod Motion Failure (Tref Computer failure)
3. T+30	RX24	I-BOP	Feedwater Header Pressure Transmitter PT-3-1 fails low
4. T+40	RX07A	I-RO TS-SRO	Pressurizer Pressure Transmitter 1-PT-68-340 (Ch 1) fails low
5. T+50	FW11B	C-All	1B MFP Trip w/ Plant Runback
6. T+60	TH05B	N- ALL TS-SRO	#2 SG Tube Leakage (~150 gpd)
7. T+70	TH05B	M-All	#2 SGTL to SGTR ~200 gpm over three minutes.
8. T+70	FW04A	C-BOP	#1 SG MDAFW Level Control Valve Fails Open

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Scenario 4 Summary

The crew will assume the shift with the unit in Mode 1, 100% RTP; the crew will proceed to reduce power in preparation to perform Main Turbine Valve testing (<93% RTP) according to 1-PI-OPS-047-002.0, Steam Inlet Valve Testing. Instructions for the power reduction are from 0-GO-5, *Normal Power Operation,* Section 5.3 Beginning at Notes prior to step 7.

Following the plant power reduction and at the Lead Examiner direction, an Auto Rod Control Program failure will occur when reactor power is reduced below ~95% RTP. The malfunction results in a failure of Tref Computer failure program signal to the rod drive system. The control rods will not move from any automatic control signal. The crew will respond using alarm response procedure (ARPs) 1-AR-M5A A-6 and abnormal procedure AOP-C.01, Rod Control Malfunctions Section 2.1, Uncontrolled Rod Bank Movement to place Rod Control in Manual.

When the plant is stable, at the Lead Examiner direction, Feedwater Header Pressure Transmitter fails low causing MFPs to go to the high-speed stop, FRVs to close down abnormally and feedwater header pressure to increase excessively possibly lifting HP Fdwtr Htr relief valves. The crew will respond to alarm, ARP 1-AR-M3C C-1 and abnormal procedure AOP-S.1, Loss of Normal Feedwater, Section 2.2, by placing MFP Control in manual to control feedwater flow/feedwater header pressure. MFWPT Control will remain in manual through the remainder of the scenario.

After the crew has stabilized the plant, at the Lead Examiner direction, Pressurizer Pressure Transmitter 1-PT-68-340 (CH 1) fails high, will cause the Pzr heaters to de-energize, and sprays to open. The crew will respond according to ARPs 1-AR-M5A B-3, 1-AR-M6A C-5 and AOP-1.04, Pressurizer Instrument and Controls Malfunctions Section 2.3. The RO will manually control pressurizer pressure by closing the spray valves and controlling heaters; once plant conditions are stable, the crew will defeat the failed channel, contact I&C to remove the channel from service and restore RCS Pressure control to automatic. The SRO will identify Tech Spec actions: LCO 3.1.3.6.a, 3.3.1 Table 3.3-1 units 7, 9, 10- Action 6, 3.3.2.1 Table 3.3-3 units 1.d- Action 17, 8- Action 22a and 3.4.12 (MODEs 4-6*).

When the plant is stable, at the Lead Examiner direction, 1B MFW Pump trips on a spurious trip signal. The plant will run automatically back and stabilize at ~72%; the BOP will manually control MFP Control (from the previous PT-3-1 failure). The crew will respond to alarms using ARPs 1-AR-M2A B-1, 1-AR-M3B A-2, B-1 and D-6 (possibly), 1-AR-M3C A-1, 1-AR-M5A B-7 and go to AOP-S.01 Section 2.3 to control and stabilize the plant.

When the plant is stable, at the Lead Examiner direction, a SG tube leak will develop. The crew will respond using ARPs 0-AR-M12A B-5 and C-1 and go to AOP-R.01, SG Tube Leak Section 2.2 initially. The SRO will identify Tech Spec actions: 3.4.6.2.c

At the Lead Examiner direction, the leak will increase to approximately 200 gpm over several minutes giving the crew time to transition to AOP-R.01 Section 2.1 where the decision should be made (Step 1 RNO column) to trip the reactor and enter E-0. The crew will carry; out E-0 immediate actions continuing to a transition to E-3 to mitigate the tube rupture.

Additionally, the MDAFW Level Control Valve for #1 SG will fail open at the time of the trip causing the BOP stop the 1A-A MDAFW Pump to prevent overfilling the #1 SG; subsequent #1 SG level control is via the TDAFW Pump and level control valve.

EOP flow: E-0 – E-3

The scenario may be terminated as directed by the Lead Examiner upon completion of E-3 Step 24, CCPIT isolation.

PSA significant task: Manually actuate at least one train of SIS-actuated safeguards before transition into E-3 series.
Depressurize RCS to meet SI termination criteria prior to SG overfill;
PSA significant component failure: Steam Generator Tube Failure

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
Simulator IC	**IC-16**	**100%, BOL ~1000 MWD/MTU** **CB 'D' Rods @ 216 steps, all others @ 228 steps;** **[B] = 1093 ppm; Ba Blender setting: 27%** **Xe/Sm @ *equilibrium*** ***Console Operator actions: Place simulator in run and perform the following:*** • **Place the MODE 1 sign on 1-M-4** • **Place Train Week A sign** • **ENSURE 1C Pzr Backup Group Htrs energized**
MFs, RFs, ORs are active when the SCN file is loaded.		**NONE**
1.	**N/A**	**Reduce power in preparation for MT Valve testing;** *Support staff report: none*
2.	**IMF RX19 f:53 r:120 k:2**	**Auto Rod Motion Failure** (Tref Computer failure) *Support staff report: When contacted, respond as MSS; report that I&C will report to the MCR in ~15 minutes for briefing to investigate/troubleshoot the RD Auto motion failure.*
3.	**IMF RX24 f:1 k:3**	**Feedwater Header Pressure Transmitter fails low** *Support staff report: When contacted, respond as MSS; report that I&C will report to the MCR in ~15 minutes for briefing to investigate/troubleshoot MFP Control problem;* *If dispatched, in ~5 minutes, AUO reports no apparent leaks, damage to the FW PT.*
4.	**IMF RX07A f:1 k:4**	**Pressurizer Pressure Transmitter 1-PT-68-340 (Ch 1) fails high;** *Support staff report: When the MSS is contacted, inform the crew that I&C will report to the MCR in ~ 25 minutes to remove the affected channel from service.*
5.	**IMF FW11B f:1 k:5**	**1B MFW Pump Trip- Spurious Trip signal** *Support staff report: When dispatched, wait ~5 minutes and respond as AUO that visual inspection identifies no apparent cause for the MFP trip is evident;* *If MSS is contacted, wait ~5 minutes and report that I&C will report to the MCR in ~30 minutes to troubleshoot the MFP trip cause.*

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
6.	**IMF TH05B f:0.00216 r:30 k:6**	**#2 SG Tube Leakage of ~150 gpd;** *Support staff report:* *1- **Chem Lab** value for 1-RM-90-119 equivalent to 150 gpd leakage limit, report the value as 2290 cpm & report other Chemistry actions will take ~45 minutes to complete;* *2- **Chem Lab** contacted to EVALUATE Primary-to-Secondary leakage, wait ≈12 minutes and report **#2 SG;** and,* *3- **(Chem Lab)** Wait ≈20 more minutes, report that samples confirm higher secondary activity/ SGTL on #2 SG.* *When RadCon Lab contacted to SURVEY MS & SG BD lines, wait ≈15 minutes and report **#2 SG** is higher than background and the other SGs;*
BOOTH OPERATOR:		**If crew requests Chemistry to provide a value for 1-RM-90-119 equivalent to 150 gpd leakage limit, report the value as 2290 cpm.**
7.	**MMF TH05B f:4 r:180**	**Increases the SGTL to ~200 gpm over three minutes.** *Support staff report: Continue as in Event 6 dialogue as requested;*
8.	**IMF FW04A f:1 e:2**	**#1 SG MDLCV 3-164 Fails Open** *Support staff report: If dispatched, report as AB AUO that valve appears to be jammed in the open position (no AUO action will restore valve function);*
9.	**IRF FWR03 f:0 k:9**	**Positions #1 SG MDAFW Isolation Valve 3-828** *Support staff report: If directed, wait ~3 minutes and report Valve 3-828 is closed*
Termination Criteria		***Complete E-3 Step 2: Isolate CCPIT.***

Op Test No.:	NRC	Scenario #	4	Event #	1	Page	1	of	60
Event Description:	Reduce power in preparation for MT Valve testing								

Time	Position	Applicant's Actions or Behavior
Booth Instructor: **No action required for Event 1**		
Indications available: **None: Crew will initiate power reduction IAW 0-GO-5 Section 5.3 starting at step 7.**		
T = 0	SRO	Direct a load reduction in accordance with 0-GO-5 Normal Power Operations, Section 5.3, and 0-SO-62-7 Boron Concentration Control, Section 6.4.
Evaluator Note: Following Steps are from 0-SO-62-7 *Boron Concentration Control, Section 6.4* During the load reduction, the operating crew may choose to lower power initially using control rods to control AFD within required limits and follow up with boration as necessary for RCS temperature control.		
CAUTION: Returning the Boric Acid Blender to service after unplugging, cleaning, or maintenance on Boric Acid System could introduce debris, sludge, air or solidified boron into CCP suction resulting in pump damage. Extreme care must be exercised to properly flush the Boric Acid piping following an outage.		
NOTE: If a large amount of boration is required (plant shutdown), Pzr heaters should be energized to cause spray operation for equalizing boron concentration in RCS and pressurizer. If Normal Spray is NOT available, then this should be accomplished by use of Auxiliary Spray (1, 2-SO-62-1) in conjunction with pressurizer backup heaters.		
	RO	[1] **ENSURE** makeup system aligned for **AUTO** operation in accordance with Section 5.1.
NOTE: Steps 2 and 3 are **N/A** for minor power changes OR if immediate boration is required to maintain shutdown margin, to maintain rods above the insertion limit, during an emergency shutdown (AOP-C.03), during recovery of a dropped/misaligned rod (AOP-C.01), or at Chemistry recommendation in mode 3, 4, 5 or 6.		
	RO	[2] **RECORD** the quantity of boric acid required to achieve desired boron concentration using Appendix D. _____ gals
	CREW	[3] **PERFORM** Appendix I Independent Verification of Calculation for Amount of Boric Acid or Primary Water. (N/A if App. D was performed by SRO to verify data from Rx Engineering)
	RO	[4] **DETERMINE** available boric acid volume in in-service BAT. _____ gals

Op Test No.: NRC Scenario # 4 Event # 1 Page 2 of 60

Event Description: Reduce power in preparation for MT Valve testing

Time	Position	Applicant's Actions or Behavior
	RO	[5] **PLACE [HS-62-140A]**, Boric Acid to Blender Flow Control Switch to the **STOP** position.
	RO	[6] **PLACE [HS-62-140B]**, CVCS Makeup Selector Switch to the **BORATE** position.
	RO	[7] **ADJUST [FC-62-139]**, Boric Acid Flow Controller to the desired flow rate.
	RO	[8] **SET [FQ-62-139]**, Batch Integrator to the desired quantity.
	RO	[9] **PLACE [HS-62-140A]**, Boric Acid to Blender Flow Control Switch to the **START** position.
	RO	[10] **ENSURE** Boric Acid Pump aligned to blender in FAST speed by right red light **LIT** on **[HS-62-230A] OR [HS-62-232A]**.
	NOTE:	Flow oscillations and/or erratic controller response may require manual operation of Boric Acid Flow Controller **[FC-62-139]** until stable conditions exist.
	RO	[11] **VERIFY** Boric Acid Flow established.
	NOTE:	It may take approximately 15 minutes before any changes to reactivity are indicated on nuclear instrumentation or RCS temperature indication.
	RO	[12] **IF** reactor is critical, **THEN MONITOR** nuclear instrumentation and reactor coolant temperature to ensure proper response from boration.
	NOTE:	BAT operability limits are prescribed by TRM 3.1.2.6 (Modes 1-3) or 3.1.2.5 (Modes 4-6).

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Event Description: Reduce power in preparation for MT Valve testing

Time	Position	Applicant's Actions or Behavior
	RO	[13] **MONITOR** Boric Acid Storage Tank level.
	RO	**IF** Volume Control Tank level increases to 63 percent, [14] **THEN ENSURE [LCV-62-118]**, Volume Control Tank Divert Valve **OPENS** to divert excess water to the Holdup Tank.
	NOTE:	Sample may be obtained at normal RCS sample intervals provided the unit is at power and the unit response following the boration is as expected.
		[15] **WHEN** boration is complete, **THEN**
	RO	[a] **PLACE [HS-62-140A]**, Boric Acid to Blender Flow Control Switch to the **STOP** position. [b] **CHECK** no primary water flow on either **[FI-62-142A] OR [FQ-62-142]**. [c] **ENSURE [FC-62-142]**, Primary Water to Blender Flow [d] Controller is in **AUTO** position and the potentiometer (dial indicator) is set at 35%. [e] **ADJUST [FC-62-139]**, Boric Acid Flow Controller to the desired blend solution in accordance with TI-44 Boron Tables. [f] **ENSURE [FCV-62-128]** is **CLOSED**. [g] **PLACE [HS-62-140B]**, CVCS Makeup Selector Switch to the **AUTO** position. [h] **PLACE [HS-62-140A]**, Boric Acid to Blender Flow Control Switch to the **START** position. [i] **IF** RCS boron sample required, **THEN NOTIFY** Chem Lab to obtain RCS boron sample.
	NOTE:	Boration is done in batches until the total boron and/or power change is completed.
	RO	[16] **REPEAT** this section as required to complete total boron change.
	RO	[17] **WHEN** total boration is complete, [a] **THEN: REALIGN** the blender controls for **AUTO** makeup to the CVCS in accordance with Section 5.1. [b] **NOTIFY** Chem Lab to obtain RCS boron sample.

Op Test No.: NRC Scenario # 4 Event # 1 Page 4 of 60

Event Description: Reduce power in preparation for MT Valve testing

Time	Position	Applicant's Actions or Behavior
	SRO	[18] **IF** in modes 1, 2, or 3, **THEN ENSURE** requirements of TRM 3.1.2.6 are met.
Evaluator Note:		**the following steps provide general direction for Main Turbine controls operation during 0-GO-4 & 5 power escalation. The following are selected steps that direct MT Controls operation.**
		0-GO-4, Section 5.4 Placing the Main Generator in Service
		[48] **INITIATE** a turbine load increase by performing the following:
		[48.1] **ENSURE** 5% hold time as recorded in step 5.4[36] has elapsed. _____ [48.2] **REFER** to TI-28, Figure A.15 and determine the appropriate loading rate. ☐ [48.3] **SET** the LOAD RATE at the desired rate. ☐ [48.4] **SET** a desired load in the SETTER with the REFERENCE CONTROL. ☐ [48.5] **DEPRESS** the **[GO]** pushbutton. ☐ [48.6] **MONITOR** the turbine load increasing. ☐ [48.7] **MONITOR** steam dump demand/operation. ☐
		[49] **WHEN** ≤10% steam dump demand is obtained on **[XI-1-33]**, **THEN**
		[49.1] **STOP** turbine load increase. ☐ [49.2] **STABILIZE** plant. (Refer to 0-SO-1-2 for Steam Dump Demand Program.) ☐
		[50] **INCREASE** steam generator atmospheric relief valve controller setpoints from 85 to 100%. _____
		[51] **RESUME** turbine load increase.

Op Test No.: NRC Scenario # 4 Event # 1 Page 5 of 60

Event Description: Reduce power in preparation for MT Valve testing

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**0-GO-4 Section 5.5 Reactor Power step 20 below Ascension to 30% RTP contains directions for Valve Position Limiter positioning reflecting Precaution M of this procedure to maintain the VPL ≈10% above governor control valve indications.** **0-GO-5, Section 3.1, Precaution G provides reinforcement of the VPL positioning during GO-5 power changes.**
		[20] **INITIATE** load increase in accordance **TI-40** to less than or equal to 30% reactor power WHILE continuing this instruction **AND** **ADJUST** turbine load as needed while maintaining valve position limit approximately 10% above governor control indication. ☐
Evaluator Note:		Following Steps are from 0-GO-5, *Normal Power Operation,* Section 5.3 Beginning at Notes prior to step 7.
		NOTES 1) Guidance on restoration of EHC Controls after a BOP runback is contained in Appendix B, *Turbine Runback Restoration.* 2) For core operating recommendations for situations such as end of core life coast down or unusual power maneuvers, contact Reactor Engineering for guidance. 3) It is recommended that AFD be controlled within the target band. 4) The following general approach should be used during power reduction: (a) borate RCS to reduce RCS TAVG within limits of TREF, (b) reduce turbine load to match TREF with TAVG (c) periodically take rod control to MANUAL from AUTO and insert the bank to move AFD near the target value, (d) return rod control to AUTO when not using the bank to control AFD, and (e) repeat the above as necessary to accomplish the load change. 5) Actions effecting reactivity are directed in the following step. 0-SO-62-7 requirements shall be adhered to for reactivity changes (i.e. reactivity balance, amounts of boric acid or water). All appropriate verifications and peer checks shall be utilized during performance.
	BOP	[7] **INITIATE** a load reduction

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Event Description: Reduce power in preparation for MT Valve testing

Time	Position	Applicant's Actions or Behavior
	BOP	[8] **MONITOR** turbine load decreasing
	BOP	[9] **MONITOR** MFP discharge pressure:
		[9.1] **DETERMINE** MFP D/P Program setpoint using Appendix A. [9.2] **IF** auto control of any MFWP controller is **NOT** functional, **THEN** **ADJUST** MFWP speed as necessary to maintain MFWP A and B flow/speed approximately matched **USING** one of the following: [9.2.1] MFWP speed controller in **MANUAL** **OR** [9.2.2] Governor Valve Positioner **USING** 1,2-SO-2/3-1, Sect 8.6.
	CAUTION: Do NOT exceed a load change rate of plus or minus 5%/minute or a step change of 10%	
	NOTE: TAVG is programmed from 578.2°F at 100% power to 547°F at zero power at a rate of 0.312°F per % power.	
	CREW	[10] **MONITOR** the following during the load reduction:
		[10.1] TAVG following TREF program.
		[10.2] All RPIs, group step counters for rod insertion limits and inoperable rods or rod misalignment, Loop ΔT, and NIS for correct power distribution and quadrant power tilts.
		[10.3] Core AFD within ~5% control band around the power level dependent target value.
	NOTE: Valve position limit and governor control meter are displayed on EHC Display panel 1, 2-XX-047-2000 (M-2).	
	BOP	[10.4] Valve position limit approximately 10% above the current governor control indication as turbine load is changed.

Lead examiner may cue the next event when power has been decreased sufficiently to record a reactivity manipulation.

Op Test No.: NRC Scenario # 4 Event # 2 Page 7 of 60

Event Description: Auto Rod Motion Failure (Tref Computer failure)

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 2		
Indications available: **Annunciators:** • **XA-55-5A Window A-6 "TS-68-2M/N RC LOOPS T AVG /AUCT T AVG DEVN HIGH-LOW"** • **B-6 "TS-68-2A/B REACTOR COOLANT LOOPSΔT DEVN HIGH-LOW** • **XA-55-6A Window D-2 "TS-68-2J REACTOR COOLANT LOPS LO LO TAVG"** **1-M-5 indications:** • **RCS Lp 4 Indicator 1-TI-68-67E indicates downward trend consistent with rod motion;** • **1-TI-68-67D indicates downward trend consistent with rod motion;** • **1-TI-68-67A indicates downward trend consistent with rod motion;** • **1-TI-68-67B indicates downward trend consistent with rod motion;**		
T = 20	CREW	Respond in accordance with Alarm Response Procedures
	RO	Diagnose failure and place rods in manual to stop rod motion
	SRO	Enter and direct action of AOP-C.01 Section 2.1
	SRO	SRO uses AOP-C-01, ROD CONTROL SYSTEM MALFUNCTIONS, Section 2.1, Uncontrolled Rod Bank Movement:
	NOTE: Step 1 is an immediate action step.	
	RO	1. STOP uncontrolled rod motion: a. PLACE rod control in MAN. b. CHECK rod motion STOPPED.
	CAUTION: Control Rods should NOT be manually withdrawn during a plant transient.	
	CREW	2. CHECK for plant transient: a. CHECK reactor power and T-avg STABLE.
	RO	3. CHECK for instrumentation malfunction:
		a. CHECK nuclear instrumentation OPERABLE.
		b. CHECK RCS RTDs OPERABLE.
		c. **CHECK** turbine impulse pressure channels OPERABLE.
		d. **CHECK** T-ref OPERABLE **USING** TR-68-2B.

Op Test No.: NRC Scenario # 4 Event # 2 Page 8 of 60

Event Description: Auto Rod Motion Failure (Tref Computer failure)

Time	Position	Applicant's Actions or Behavior
		(RNO Required)
	RO	**RNO:** d. **PERFORM** the following:
		1) **PLACE** Steam Dumps in Steam Pressure Mode **USING** 0-SO-1-2, Steam Dump System. **0-SO-1-2 Section 8.2. Placing Steam Dump Controls in Pressure Mode is attached following this event guide.**
		2) **DETERMINE** Program T-avg for current reactor power **USING** Appendix A or ICS (Trend Menu, Program T-avg.) **Appendix A, Tavg/Tref And Pzr Level Program Values attached following this event guide**
	RO	e. **CHECK** Auctioneered T-avg OPERABLE **USING** TR-68-2B.
	RO	4. **CHECK** for inadvertent RCS dilution:
		a. **CHECK** evidence of dilution INDICATED:
		• VCT level indication OR • T-avg rising unexplained with stable turbine load.
		b. **GO TO** AOP-C.02, Uncontrolled RCS Boron Concentration Changes.
	RO	5. **CHECK** for inadvertent boration flow:
		a. **CHECK** evidence of boration flow INDICATED:
		• Batch counters flow indication OR • VCT level indication OR • T-avg dropping unexplained.
		b. **GO TO** AOP-C.02, Uncontrolled RCS Boron Concentration Changes.
	NOTE:	When adjusting T-avg, reactivity changes should be accomplished by only one method at a time.

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Event Description: Auto Rod Motion Failure (Tref Computer failure)

Time	Position	Applicant's Actions or Behavior
	RO	6. **RESTORE** T-avg to within 1.5°F of T-ref:
		• **POSITION** control rods **OR** • **ADJUST** turbine load **OR** • **ADJUST** RCS boron concentration **USING** 0-SO-62-7, Boron Concentration Control.
	SRO	7. **EVALUATE** the following Tech Specs/TRM for applicability:
		• 3.1.1.1, Shutdown Margin - T_{avg} Greater than 200°F • 3.1.1.4, Minimum Temperature for Criticality • 3.1.3.1, Movable Control Assemblies, Group Height • 3.1.3.5, Shutdown Rod Insertion Limit • 3.1.3.6, Control Rod Insertion Limits • 3.2, Power Distribution Limits (entire section)
	SRO	8. **CHECK** cause of continuous rod motion IDENTIFIED.
	CREW	9. **ENSURE** Maintenance initiated as required.
	SRO	10. **ENSURE** Plant Management notified of failure.

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Event Description: Auto Rod Motion Failure (Tref Computer failure)

Time	Position	Applicant's Actions or Behavior
	CREW	11. **WHEN** problem corrected **AND** automatic rod control is available, **THEN PERFORM** the following:
		a. **ENSURE** T_{-avg} and T_{-ref} matched within 1°F. b. **PLACE** control rods in AUTO **USING** 0-SO-85-1, Rod Control System.
	SRO	12. **GO TO** appropriate plant procedure.
Evaluator Note: The following CREW Brief and Notification actions are not contained in the procedure.		
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead Examiner may cue next event when stable plant conditions are achieved.		

SQN Unit 1 & 2	STEAM DUMP SYSTEM	0-SO-1-2 Rev. 0012 Page 14 of 27

Unit_____ Date _____

8.2 Placing Steam Dump Controls in Pressure Mode.

CAUTION

Placing steam dumps in service with water accumulated in header could result in severe water hammer. Monitoring and confirmation of normal Main Steam Dump Drain Tank operation by 0-GO-14-3 and 0-GO-14-4 performance provides assurance that the line does not contain sufficient water to produce a water hammer.

[1] PLACE [HS-1-103A] Steam Dump A FSV handswitch to OFF. _____

[2] PLACE [HS-1-103B] Steam Dump B FSV handswitch to OFF. _____

[3] PLACE [HS-1-103D] Steam Dump Mode selector to **STEAM PRESS**. ☐

[4] VERIFY [XI-1-103A/B] Steam Dumps Armed white light is **LIT**. ☐

[5] IF [PIC-1-33] Steam Dump Controller in MANUAL, **THEN**

ENSURE demand is Zero on controller. ☐

[6] IF [PIC-1-33] Steam Dump controller in **AUTO**, **THEN**

ADJUST setpoint to obtain zero output (demand). ☐

CAUTION

If a demand signal is present on XI-1-33 Steam Dump demand and dumps are armed, then the dump valves will open when Steam Dump FSV handswitches are placed in ON position.

[7] PLACE [HS-1-103A] Steam Dump A FSV handswitch to **ON**. _____

[8] PLACE [HS-1-103B] Steam Dump B FSV handswitch to **ON**. _____

[9] **ADJUST** [PIC-1-33] Steam Dump controller to maintain desired steam pressure. ☐

END OF TEXT

Op Test No.: NRC Scenario # 4 Event # 2 Page 12 of 60

Event Description: Auto Rod Motion Failure (Tref Computer failure)

SQN	ROD CONTROL SYSTEM MALFUNCTIONS	AOP-C.01 Rev. 20

APPENDIX A
Page 1 of 1

Tavg/Tref AND PZR LEVEL PROGRAM VALUES

RX POWER	Tavg/Tref	PZR LEVEL
2%	547.6	25 %
4%	548.2	26 %
6%	548.9	27 %
8%	549.5	28 %
10%	550.1	28 %
12%	550.7	29 %
14%	551.4	30 %
16%	552.0	30 %
18%	552.6	31 %
20%	553.2	32 %
22%	553.9	32 %
24%	554.5	33 %
26%	555.1	34 %
28%	555.7	35 %
30%	556.4	35 %
32%	557.0	36 %
34%	557.6	37 %
36%	558.2	37 %
38%	558.9	38 %
40%	559.5	39 %
42%	560.1	40 %
44%	560.7	40 %
46%	561.4	41 %
48%	562.0	42 %
50%	562.6	42 %

RX POWER	Tavg/Tref	PZR LEVEL
52%	563.2	43 %
54%	563.8	44 %
56%	564.5	44 %
58%	565.1	45 %
60%	565.7	46 %
62%	566.3	47 %
64%	567.0	47 %
66%	567.6	48 %
68%	568.2	49 %
70%	568.8	49 %
72%	569.5	50 %
74%	570.1	51 %
76%	570.7	52 %
78%	571.3	52 %
80%	572.0	53 %
82%	572.6	54 %
84%	573.2	54 %
86%	573.8	55 %
88%	574.5	56 %
90%	575.1	56 %
92%	575.7	57 %
94%	576.3	58 %
96%	577.0	59 %
98%	577.6	59 %
100%	578.2	60 %

Op Test No.: NRC Scenario # 4 Event # 3 Page 13 of 60

Event Description: Feedwater Header Pressure Transmitter PT-3-1 fails low

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 3		
Indications available: **1-M-4 indications:** • **Feedwater flow dropping to all steam generators;** • **Level dropping in all steam generators;** **Annunciators:** • **XA-55-3C Window C-1 "PS-3-4 NO 1 FW HTR PRESSURE HI** • **XA-55-5A Window B-7 "LS-3-42D STEAM GEN LVL HIGH-LOW DEVIATION"** • **XA-55-6B Window A-7 "LS-3-39D STM GEN LOOP 1 LOW FW FLOW LOW WATER LEVEL"** • **B-7 "LS-3-52D STM GEN LOOP 2 LOW FW FLOW LOW WATER LEVEL"** • **C-7 "LS-3-94D STM GEN LOOP 3 LOW FW FLOW LOW WATER LEVEL"** • **D-7 "LS-3-107D STM GEN LOOP 4 LOW FW FLOW LOW WATER LEVEL"**		
T = 30	CREW	Respond MCR indications and alarms according to Alarm Response Procedures
	BOP	Diagnose failure. Refer to Annunciator Response Procedure
	SRO	SRO may use AOP-S.01, Loss Of Normal Feedwater Section 2.2, Loss of Main Feedwater Pump Control
	NOTE: Step 1 is an IMMEDIATE ACTION.	
	BOP	1. **RESTORE** feedwater pressure:
		a. **RESTORE** feedwater pressure:
		• MFPT 1A(2A) & 1B(2B) Speed Control OR • MFPT 1A(2A) Speed Controller OR • MFPT 1B(2B) Speed Controller
	BOP	b. **ADJUST** speed on affected MFP(s) to restore feedwater pressure to normal (~1040 psig at full power).

Op Test No.: NRC Scenario # 4 Event # 3 Page 14 of 60

Event Description: Feedwater Header Pressure Transmitter PT-3-1 fails low

Time	Position	Applicant's Actions or Behavior
	BOP	2. **DETERMINE** if MFP trip is needed:
		a. **CHECK** BOTH MFWPs in service.
	BOP	b. **IF** MFW pump trip is needed due to loss of speed control, **THEN PERFORM** the following:
		1) TRIP affected MFP. 2) GO TO applicable section:

UNIT	INITIAL CONDITION	SECTION
1	Above 76% Turbine Load	2.3
	Below 76% Turbine Load	2.5
2	Above 77% Turbine Load	2.4
	Below 77% Turbine Load	2.6

	CAUTION: Feed flow transients may impact core thermal power.	
	BOP	3. **MAINTAIN** steam generator level(s) on program.
	NOTE: Appendix C may be used to determine program feedwater D/P for current power.	
	BOP	4. **MAINTAIN** MFP discharge pressure on program **USING** ICS or available control board indications.
	CAUTION: Reactor operation at low power levels for extended periods may challenge reactivity control due to xenon changes.	

Op Test No.: NRC Scenario # 4 Event # 3 Page 15 of 60

Event Description: Feedwater Header Pressure Transmitter PT-3-1 fails low

Time	Position	Applicant's Actions or Behavior
	RO	5. **CHECK** Reactor power greater than 5%.
	CREW	6. **INITIATE** repairs on failed equipment.
	SRO	7. **GO TO** appropriate plant procedure.
Evaluator Note: The following CREW Brief and Notification actions are not contained in the procedure.		
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead examiner may cue the next event when MFP Control is established in MANUAL and SG levels are controlled.		

Op Test No.: NRC Scenario # 4 Event # 4 Page 16 of 60

Event Description: Pressurizer Pressure Transmitter 1-PT-68-340 (Ch 1) fails high

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 4		
Indications available: **Annunciators:** • **XA-55-5A Window B-3 "PS-68-340F/G PRESSURIZER PRESS ABOVE REF SET POINT"** • **XA-55-6A Window C-5 "PS-68-340A PRESSURIZER HIGH PRESSURE "** **1-M-5 indications:** • **RCS PZR PRESS 1-PI-68-340A pressure going up** • **RCS PZR PRESS Recorder 1-PR-68-340 pressure going up;** • **1-XX-55-5, Reactor Trip Status Panel "PROT. SET 4 TROUBLE" Status light**		
T = 40	CREW	Respond MCR indications and alarms according to Alarm Response Procedures
	BOP	Diagnose failure. Refer to Annunciator Response Procedure
	SRO	SRO may use AOP-I.04, PRESSURIZER INSTRUMENT AND CONTROL MALFUNCTIONS Section 2.3, Pressurizer Pressure Instrument OR Controller Malfunction
	NOTE: Step 1 is an IMMEDIATE ACTION.	
	RO	1. **CHECK** normal spray valves CLOSED. ***(RNO Required)***
		RNO: **IF** RCS pressure is less than 2260 psig, **THEN CLOSE** affected spray valve(s) **USING** the following:
Evaluator Note: Acceptable action: either the Master Controller in MANUAL or BOTH individual Spray Controllers in MANUAL to close the Spray valves in the following step.		
		• PIC-68-340A, Master Pressure Controller. OR • PZR Spray controllers PIC-68-340D (Loop 1) and/or PIC-68-340B (Loop 2).

Op Test No.: NRC Scenario # 4 Event # 4 Page 17 of 60

Event Description: Pressurizer Pressure Transmitter 1-PT-68-340 (Ch 1) fails high

Time	Position	Applicant's Actions or Behavior
		2. **MONITOR** pressurizer pressure stable or trending to desired pressure.
	NOTE: Appendix L shows layout of PZR pressure control for operator reference.	
	RO	3. **CHECK** PI-68-340A NORMAL ***(RNO Required)***
	RO	**RNO:** **PERFORM** the following:
		a. **ENSURE** PRESS CONTROL SELECTOR switch XS-68-340D in PT-68-334 & 323.
		b. **ENSURE** LOOP TAVG ΔT REC/SEL selector switch XS-68-2B in LOOP 2, 3, or 4.
		c. **ENSURE** PRESS REC CHANNEL SELECTOR XS-68-340B in PT-68-334, PT-68-323, or PT-68-322.
		d. **GO TO** Caution prior to Step 8.
	SRO	Steps 4-7 are bypassed in Step 3 RNO
	CAUTION: **RCS** pressure changes and changes in RCS boron concentration (due to differences between Pzr and RCS boron) may cause small change in core reactivity.	
	RO	8. **MONITOR** reactor power:
		a. CHECK reactor in Mode 1 or 2. b. MONITOR core thermal power for unexpected changes.

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Event Description: Pressurizer Pressure Transmitter 1-PT-68-340 (Ch 1) fails high

Time	Position	Applicant's Actions or Behavior
	SRO	9. **EVALUATE** the following Tech Specs for applicability:
		• 3.2.5 DNB Parameters • 3.3.1.1 (3.3.1), Reactor Trip System Instrumentation • 3.3.2.1 (3.3.2), ESF Actuation System Instrumentation • 3.3.3.5 Remote Shutdown Instrumentation • 3.4.4 Pressurizer Heaters (may be applicable while heaters are unavailable due to instrument failure)
		• 3.2.5.b DNB Parameters Applies – restore the parameter (Pressurizer Pressure) w/i 2 hrs. or reduce to ≤5% RTP w/i the next 4 hrs. AND • 3.3.1.1 (3.3.1), Reactor Trip System Instrumentation Action 6 (From Table 3.3-1 Items 7, 9, 10) Applies – Trip inop Bistables w/i 6 hrs. AND • 3.3.2.1 (3.3.2), Engineered Safety Feature Actuation System Instrumentation Action 17 (From Table 3.3-3 Item 1.d) Applies – Trip inop Bistables w/i 6 hrs. Action 22.a (From Table 3.3-3 Item 8.a) Apply - Declare the interlock inoperable and verify that all affected channels of the functions listed are OPERABLE w/i 6 hrs. TS 3.3.3.5 may be identified; SRO would dispatch an AUO to the Auxiliary Control Room to validate indications/controls affected. TS 3.4.4 would not be applicable here since the operator has manual control capability from the MCB.
	RO	10. **CHECK** PZR PRESS and PZR SPRAY controllers in AUTO. ***(RNO Required)***
	RO	**RNO:** **WHEN** malfunction has been identified **AND** isolated or corrected, **THEN PERFORM** the following:

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Event Description: Pressurizer Pressure Transmitter 1-PT-68-340 (Ch 1) fails high

Time	Position	Applicant's Actions or Behavior
		a. **ENSURE** Master Pzr Pressure Controller PIC–68–340A Output Percent Meter is less than 40%. b. **ENSURE** PZR PRESS Controller, PZR SPRAY controller, and PZR HTRS in AUTO.
	NOTE: If performing AOP in conjunction with AOP-I.11 for an Eagle LCP failure, then actions to hard trip bistables should be delayed until Eagle system reset is attempted. Actions to hard trip bistables must be completed within 6 hours UNLESS affected loop is restored to operable status by resetting Eagle rack. **SRO marks N/A**	
	RO	11. **REMOVE** failed pressurizer pressure channel from service:
		a. **CHECK** any pressurizer pressure channel INOPERABLE.
	RO	b. **CHECK** OTΔT setpoint on affected channel NORMAL. ***(RNO Required)***
	RO	**RNO:** b. **GO TO** Substep 11.d.
	RO	d. **IF** any of the following conditions exists:
	SRO	• transmitter signal failed (entire instrument loop affected including OTΔT pressure input) OR • OTΔT pressure input potentially affected or status CANNOT be determined, **THEN** **PERFORM** applicable appendix:

Op Test No.: NRC Scenario # 4 Event # 4 Page 20 of 60

Event Description: Pressurizer Pressure Transmitter 1-PT-68-340 (Ch 1) fails high

Time	Position	Applicant's Actions or Behavior
		<table><tr><th>PZR PRESSURE INSTRUMENT</th><th>CHANNEL</th><th>APPENDIX</th></tr><tr><td>P-68-340 (P-455)</td><td>I</td><td>A</td></tr><tr><td>P-68-334 (P-456)</td><td>II</td><td>B</td></tr><tr><td>P-68-323 (P-457)</td><td>III</td><td>C</td></tr><tr><td>P-68-322 (P-458)</td><td>IV</td><td>D</td></tr></table>
	SRO	Directs Appendix A, P-68-340 to be performed.
	SRO	12. **GO TO** appropriate plant procedure.
		END OF SECTION
Evaluator Note: The following CREW Brief and Notification actions are not contained in the procedure.		
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead examiner may cue the next event when Pzr Pressure control is returned to automatic and notifications identified.		

Op Test No.: NRC Scenario # 4 Event # 5 Page 21 of 60

Event Description: 1B MFP Trip

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 5		
Indications available: **Annunciators:** • **XA-55-2A Window B-1 "TURBINE RUNBACK BOP** • **XA-55-3B Window A-2 "TRIPPED"** • **B-1 "MAIN FEEDWATER PUMP TURBINE 1B ABNORMAL"** **1-M-3 indications:** • **MFPT 1B SPEED 1-SI-46-20B shows decreasing RPM** • **MFPT 1B OUTLET PRESSURE 1-PI-3-80A shows decreasing pressure** • **MFPT 1B OUTLET FLOW 1-FI-3-84 shows decreasing flow**		
T = 50	CREW	Respond MCR indications and alarms according to Alarm Response Procedures
	BOP	Diagnose failure. Refer to Annunciator Response Procedures
	SRO	SRO may use AOP-S.01, Loss of Normal Feedwater Section 2.3, Unit 1 Loss of One Main Feedwater Pump Above 76% Turbine Load
	BOP	1. **VERIFY** turbine runback to less than 72% load (~880 MWe).
Evaluator Note: RO will be manually controlling Tave since Control Rods are in MANUAL from Event 2. RO is expected to control Tave by referring to AOP-C.01, Appendix A.		
	RO	2. **VERIFY** control rods inserting automatically to match T-avg and T-ref.
		RNO: **INSERT** control rods **USING** manual rod control as necessary to bring T-avg to within 3°F of T-ref.
Evaluator Note: BOP will be manually controlling MFP Speed since MFP Control is in MANUAL from Event 3.		
	BOP	3. **ENSURE** running main feedwater pump FULLY LOADED:
		• Speed controller output at maximum. [M-3, SIC-46-20A or SIC-46-20B]

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Event Description: 1B MFP Trip

Time	Position	Applicant's Actions or Behavior
	BOP	4. **ENSURE** AFW pumps started:
		a. MDAFW Pumps RUNNING. [M-4]
		b. TDAFW Pump RUNNING. [M-3]
		c. TDAFW Pump LCVs OPEN. [M-3]
		d. MDAFW Pump recirculation valves CLOSED: [M-4] • FCV-3-400 • FCV-3-401
	BOP	5. **ENSURE** affected Main Feedwater Pump Turbine Condenser isolation valves CLOSED:
		a. Condenser A
		• FCV-2-205, Condensate Inlet • FCV-2-210, Condensate Outlet OR
		b. Condenser B
		• FCV-2-211, Condensate Inlet • FCV-2-216, Condensate Outlet
	BOP	6. **ENSURE** the following steam generator blowdown valves CLOSED [M-4]:
		• FCV-1-7 • FCV-1-14 • FCV-1-25 • FCV-1-32

Evaluator Note: BOP may request implementation of 'a' 'b' & 'd' parts of this step's **RNO** to null FRV controllers and stabilize MFPC following the FF/SF mismatch and SG Level transient.

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Event Description: 1B MFP Trip

Time	Position	Applicant's Actions or Behavior
Evaluator Note: During the SG level transient, BOP may close the TDAFWP LCVs, with SRO concurrence, once ALL SG levels have recovered to levels greater than or equal to current program level values.		
	BOP	7. **MONITOR** steam generator levels returning to program level.
	BOP	**RNO:** **PERFORM** the following:
		a. **IF** any feed reg valve is in AUTO **AND** controller deviation is off-scale high with level above program, **THEN PLACE** affected feed reg valve controller(s) to MANUAL and back to AUTO to reset output.
		b. **IF** manual control of MFWP speed or feed reg valve position is needed, **THEN PERFORM** the following as necessary:
		• **ADJUST** running MFWP speed OR • **ADJUST** main feed reg valve position.
		c. **IF** reactor trip is imminent due to low S/G level, **THEN TRIP** the reactor and **GO TO** E-0, Reactor Trip or Safety Injection.
		d. **IF** necessary to prevent S/G overfill, **THEN CLOSE** Turbine Driven AFW LCVs. [M-3]
		e. **WHEN** S/G levels are stable and on program, **THEN EVALUATE** placing MFWP speed controls and main feed reg valve controllers in AUTO.
	NOTE: If LEFM thermal power (U2118) is inoperable, rod insertion limit curve must be raised by 3 steps. Rod insertion limit alarms and ICS display are NOT automatically adjusted when LEFM is inoperable.	
	RO	8. **MONITOR** control rods above low-low insertion limit using ICS or COLR.
Evaluator Note: Appendix A attached at the end of this event guide.		
	RO SRO	**RNO:** **INITIATE** boration **USING** Appendix A. **EVALUATE** Tech Spec LCO 3.1.3.6 and 3.1.1.1.
		• 3.1.3.6, CONTROL ROD INSERTION LIMITS Action A Applies – Restore w/i limits w/i 2 hrs., or reduce to less than or equal to that fraction of RATED THERMAL POWER which is allowed by the group position using the insertion limits specified in the COLR, or Ht Stby w/i 6 hrs. AND

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Event Description: 1B MFP Trip

Time	Position	Applicant's Actions or Behavior
		• 3.1.1.1, SHUTDOWN MARGIN - Tavg Greater Than 200°F Applies – immediately initiate and continue boration at ≥35 gpm until the SHUTDOWN MARGIN is restored (CB 'D' Rods above the Lo-Lo RIL),
	CREW	9. **DISPATCH** operator to investigate cause of main feedwater pump trip.
	CREW	10. **ENSURE** unit STABILIZED:
		• Rx Power STABLE. • S/G Levels STABLE. • Tavg - Tref approximately matched. • Steam dump valves CLOSED
	NOTE: The load rejection circuit may require several minutes decay time before C-7 can be reset.	
	BOP	11. **IF** Steam Dumps are in Tavg Mode, **THEN RESET** Steam Dump Load Rejection Signal: a. **PLACE** HS-1-103A and 103B, Steam Dump Control, in OFF. b. **PLACE** HS-1-103D, Steam Dump Control, in RESET and VERIFY spring return to TAVG. c. **VERIFY** C-7, LOSS OF LOAD INTERLOCK permissive DARK. [M-4A, E-5] d. **ENSURE** Steam Dump demand is ZERO. e. **PLACE** HS-1-103A and 103B, Steam Dump Control, in ON.
	BOP	12. **RESTORE** turbine control **USING** Appendix B, Turbine Runback Restoration.

Evaluator Note: Appendix B attached at the end of this event guide.

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Event Description: 1B MFP Trip

Time	Position	Applicant's Actions or Behavior
	BOP	13. **EVALUATE** need to reduce number of running condensate pumps:
		• **EVALUATE** stopping one condensate booster pump **USING** 1-SO-2/3-1. • **EVALUATE** stopping cond demin booster pumps **USING** 1-SO-2/3-1.
	RO	14. **EVALUATE** need to borate to restore AFD **USING** 0-SO-62-7.
	NOTE	To ensure unit is within capacity of one MFWP, the following should be considered when determining final power level: • Power should be reduced below 60% (if all cond booster pumps and heater drain tank pumps in service) or 55% (if two cond booster pumps in service). • Less than or equal to 90% controller output should be maintained on running MFWP
	SRO	15. **INITIATE** turbine load reduction to reduce steam flow below capacity of one MFWP **USING** 0-GO-5, Normal Power Operation.
	BOP	16. **WHEN** turbine load has been reduced to below capacity of one MFWP, **THEN RESTORE** the following systems to NORMAL:
		• Auxiliary Feedwater **USING** 1-SO-3-2. • Steam Generator Blowdown **USING** 1-SO-15-1.
	CREW	17. **INITIATE** repairs on failed equipment.
	SRO	18. **GO TO** appropriate plant procedure.

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Event Description: 1B MFP Trip

Time	Position	Applicant's Actions or Behavior
		END OF SECTION
Evaluator Note: The following CREW Brief and Notification actions are not contained in the procedure.		
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead examiner may cue the next event when Feedwater and Feed Pump control is stable and MT Control is reset.		

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Event Description: 1B MFP Trip

APPENDIX A
IMMEDIATE BORATION TO RESTORE RODS ABOVE LOW-LOW ROD INSERTION LIMIT

[1] **IMMEDIATELY INITIATE** boration by performing the following:

[a] **PLACE** BA transfer pump aligned to blender in FAST speed. ☐

[b] **ADJUST** FCV-62-138 as necessary to establish boration flow greater than or equal to 35 gpm from BAT (at least 6120 ppm). ☐

[c] **IF** required flow via FCV-62-138 CANNOT be established,
THEN
PERFORM one of the following:

- **INITIATE** normal boration of greater than or equal to 35 gpm from BAT (at least 6120 ppm) **USING** 0-SO-62-7 Sect. 6.4. ☐

  OR

- **INITIATE** boration flow of greater than or equal to 90 gpm from RWST **USING** 0-SO-62-7 Sect. 8.4. ☐

[d] **WHEN** control rods are above low-low insertion limit,
THEN
REDUCE or **STOP** boration flow as required. ☐

END

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Event Description: 1B MFP Trip

APPENDIX B
TURBINE RUNBACK RESTORATION

NOTE This appendix is used to remove turbine from valve position limiter prior to starting load reduction following a BOP runback.

[1] **ENSURE** governor valve tracking meter centered close to ZERO. ☐

[2] **DEPRESS** [TURB MANUAL] mode selector pushbutton. ☐

[3] **VERIFY** [TURB MANUAL] lamp LIT. ☐

[4] **VERIFY** reference and setter counters stabilize. ☐

[5] **ENSURE** governor valve tracking meter centered close to ZERO. ☐

[6] **DEPRESS** [OPER AUTO] mode selector pushbutton. ☐

[7] **VERIFY** [OPER AUTO] lamp LIT. ☐

[8] **VERIFY** reference and setter counters stabilize. ☐

[9] **IF** VALVE POS LIMIT light is LIT,
THEN
REDUCE turbine load reference using SETTER
UNTIL VALVE POS LIMIT light is DARK. ☐

END OF TEXT

Op Test No.: NRC	Scenario # 4	Event # 6	Page 29 of 60
Event Description: #2 SG Tube Leakage			

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 6		
Indications available: **Annunciators:** • **0-XA-55-12A Window B-5, "1-RA-120A/121A, STM GEN BLDN LIQ SAMP MON HI RAD"** **C-1, "1-RA-90-119A, CNDS VAC PMP LO RNG AIR EXH MON HIGH RAD"** **D-3, 1-RA-90-99A, "CNDS VAC PMP LO RNG AIR EXH MON HIGH RAD"** • **XA-55-30 C-8, RA-421A, "MN STM LN HI RAD"**		
Indications available: Deviations or unexpected indications on any of the following may indicate a steam generator tube leak: 1. Charging flow rises to maintain Pressurizer level. 2. Rise in makeup to VCT. 3. Rising activity on: • Condenser Vacuum Exhaust Radiation Monitor • S/G Blowdown Liquid Radiation Monitor • Main Steam Line Monitor 4. S/G sample results indicating greater than or equal to 5 gallons per day (gpd) on any S/G.		
T = 60	CREW	Diagnose and respond MCR indications and alarms according to Alarm Response Procedures.
Evaluator Note: Initial SG tube leak size is ≈150 gpd and 1-RR-90-119, Condenser Off Gas Radiation Monitor reading would be ≈2290 cpm for that leak size; Turnover Chemistry Sheet gives leakrate values up to 75 gpd and R-90-119 equivalent readings.		
	SRO	SRO may use AOP-R.01, Steam Generator Tube Leak 2.2, Secondary plant radiation levels rising with stable charging flow and pressurizer level. **[C.4]**
	NOTE	This section provides steps to monitor primary to secondary leakage and directs unit shutdown if leakage limits are exceeded. Entry into this section is required when secondary radiation monitors indicate a rise in primary-to-secondary leakage or when Chemistry determines S/G leak rate exceeds 5 gal. per day (gpd).
	RO	1. **MONITOR** charging flow and Pressurizer level STABLE.

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Event Description: #2 SG Tube Leakage

Time	Position	Applicant's Actions or Behavior
	SRO	**RNO:** **IF** Charging flow rising **OR** Pressurizer level dropping due to S/G tube leak, **THEN GO TO** Section 2.1.
	SRO	2. **EVALUATE** EPIP-1, Emergency Plan Classification Matrix.
	SRO	3. **EVALUATE** the following Tech Specs for applicability:
		• 3.4.6.2.c, Operational Leakage Action 'A' Applies – Prim-to sec leakage not w/i limits, Ht Stby w/i 6 hrs, Cld SD w/i the following 30 hrs. AND • 3.7.1.4, Secondary Coolant Activity Applies – When notified by chemistry, Ht Stby w/i 6 hrs. & Cld SD w/i the following 30 hrs.
	NOTE	Lower containment rad monitor count rate rising concurrently with secondary rad monitors may indicate a sudden fuel defect, which could give a false indication of S/G tube leak. Threshold values for correlating RM-90-99/119 count rate to S/G tube leakage must be recalculated if RCS activity has changed significantly.
	SRO	4. **INITIATE** sampling to confirm S/G leak:
		a. **CHECK** lower containment rad monitor count rate STABLE or DROPPING.
		b. **PERFORM** Appendix E, Chemistry Sampling Actions.
	NOTE 1:	Based on monitor sensitivity, condenser vacuum exhaust rad monitor (RM-90-99 or -119) is preferred indication for leak rate monitoring. Other secondary rad monitors (if available) and/or S/G sampling should be used for confirmation. Confirmation time should be kept to a minimum.
	NOTE 2:	Radiation Monitor values (cpm) must be converted to a gallons per day (gpd) equivalency to determine leakrate. Correlation of RM-90-99/119 responses to Primary - Secondary leak rates and limits are provided by Chem Lab on the daily turnover package.

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Event Description:	#2 SG Tube Leakage								

Time	Position	Applicant's Actions or Behavior
	NOTE 3:	Steady State conditions (<10% power change per hour) are required to accurately correlate cpm readings with gpd leakage.
	BOP	5. **MONITOR** primary-to-secondary leak rate…
Evaluator Note:		Appendix B, Summary Of Action Levels For SG Tube Leak is attached following this event guide. At this step SRO transitions to Section 2.1 based on RO recognizing SG leakage is affecting charging/pressurizer level control and BOP recognizing effects on FRV positioning.
		Section 2.1 **High Secondary Radiation AND** **Pressurizer level dropping OR Charging flow rising**
	RO	1. **MONITOR** if Pressurizer level can be maintained:
		a. **CONTROL** charging flow **USING** FCV-62-93 and FCV-62-89 as necessary to maintain Pzr level on program.
		a. **RNO: IF** charging isolated and available, **THEN ESTABLISH** Charging as necessary **USING** EA-62-5, Establishing Normal Charging and Letdown.
		b. **MONITOR** pressurizer level STABLE or RISING.
		b. **RNO:** **PERFORM** the following: 1) **ENSURE** letdown isolated: • FCV-62-72 CLOSED • FCV-62-73 CLOSED • FCV-62-74 CLOSED 2) **IF** Pzr level continues to drop, **THEN START** additional CCP as necessary.
		IF Pzr level CANNOT be maintained greater than 5% **OR** loss of Pzr level is imminent, **THEN PERFORM** the following: 1) **TRIP** the reactor. 2) **WHEN** reactor is tripped, **THEN INITIATE** Safety Injection. 3) **GO TO** E-0, Reactor Trip or Safety Injection.

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Event Description: #2 SG Tube Leakage

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**SRO/RO may decide to raise charging flow ~10 gpm above the current normal to assist in determining leak size, ability to maintain Pzr level and potential EPIP-1 EAL classification conditions.**
	NOTE 1	Appendix F or G can be used to estimate leak rate.
	NOTE 2	If letdown was isolated in Step 1, the leak rate may have exceeded the capacity of one CCP in the normal charging alignment (EAL 1.2.2P).
	SRO	2. **EVALUATE** EPIP-1, Emergency Plan Classification Matrix.
	RO	3. **MONITOR** VCT level:
		• **MAINTAIN** VCT level greater than 13% **USING** auto or manual makeup • **CHECK** VCT makeup capability adequate to maintain level.
	BOP	4. **MONITOR** indications of leaking S/G:
		a. **NOTIFY** Chem Lab to evaluate Primary to Secondary Leakage **USING** 1(2)-SI-CEM-068-137.5: • Method 1, Rapid Identification of Leaking Steam Generators • Method 3, Condenser Vacuum Exhaust (CVE) Sampling for Determination of Primary-to-Secondary (P/S) Leakage.
		b. **NOTIFY** RADCON to monitor Turbine Building and site environment: • Steam lines • S/G blowdown

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Event Description: #2 SG Tube Leakage

Time	Position	Applicant's Actions or Behavior
		c. **IDENTIFY** leaking S/G(s) **USING** any of the following: • Unexpected rise in any S/G narrow range level **OR** • S/G sample results **OR** • RADCON survey of main steamlines and S/G blowdown lines **OR** • High radiation on any main steamline radiation monitor.
	SRO	5. **EVALUATE** the following Tech Specs for applicability:
		• 3.4.6.2, Operational Leakage • 3.7.1.4, Secondary Coolant Activity
		• 3.4.6.2.c, Operational Leakage Action A Applies – Prim-to sec leakage not w/i limits, Ht Stby w/i 6 hrs, Cld SD w/i the following 30 hrs. AND • 3.7.1.4, Secondary Coolant Activity Applies – When notified by chemistry, Ht Stby w/i 6 hrs. & Cld SD w/i the following 30 hrs.
Lead Evaluator Note: At the Lead Examiner direction, the leak will increase to approximately 200 gpm resulting in the reactor trip demand/decision by crew		
	NOTE	Initiating shutdown required by Tech Specs requires 4 hour NRC notification per SPP-3.5, Regulatory Reporting Requirements.

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Event Description: #2 SG Tube Leakage

Time	Position	Applicant's Actions or Behavior
	SRO	6. **INITIATE** rapid shutdown by performing the following:
		a. **ANNOUNCE** S/G tube leak on PA system. b. **PERFORM** rapid shutdown **USING** AOP-C.03 WHILE continuing in this section. c. **ENSURE** power reduced to less than 50% within one hour. d. **ENSURE** unit in Mode 3 within the following 2 hours.
	BOP	7. **MINIMIZE** Spread of contamination:
		a. **IF** tube leak identified on S/G #1 **AND** S/G #4 is intact, **THEN** **PERFORM** the following:
		1) **EVALUATE** LCO 3.7.1.2. 2) **CLOSE** FCV-1-15 TDAFWP steam supply from S/G #1. 3) **ENSURE** FCV-1-16 TDAFWP steam supply from S/G #4 **OPEN**.
	SRO	b. **PERFORM** EA-0-3, Minimizing Secondary Plant Contamination.

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Event Description: #2 SG Tube Leakage

Time	Position	Applicant's Actions or Behavior
	SRO	c. **IF** S/G blowdown is aligned to the river, **THEN** **TERMINATE** S/G Blowdown to river: 1) **ENSURE** S/G blowdown flow control FCV-15-43 **CLOSED**. 2) **DISPATCH** operator to perform EA-15-1, Realigning S/G Blowdown to Cond DI. 3) **WHEN** EA-15-1 completed, **THEN** **ADJUST** FCV-15-43 to establish desired blowdown flow.
	CREW	d. **NOTIFY** Chem Lab to determine release rate for condenser vacuum exhaust **USING** 0-SI-CEM-030-415.0 and 0-SI-CEM-030-407.2. e. **NOTIFY** Chem Lab to evaluate rerouting steam generator sample drain lines to FDCT **USING** 0-TI-CEM-000-016.4.
	BOP	f. **WHEN** notified by Chemistry to bypass Condensate DI, **THEN** **DISPATCH** AUO to bypass polishers on affected unit:
		• Unit 1 Only: **PLACE** 1-HS-14-3, Condensate Polisher Bypass Valve to OPEN. [Cond DI Bldg]
		• Unit 2 Only: **PLACE** 2-HS-14-3, Condensate Polisher Bypass Valve to OPEN. [Cond DI Bldg]

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Event Description: #2 SG Tube Leakage

Time	Position	Applicant's Actions or Behavior
	SRO	g. **EVALUATE** Appendix C, Contingency Plan for Control and Processing of Large Volumes of Contaminated Water **[C.5]**.
	RO	8. **CHECK** reactor trip breakers OPEN.

Evaluator Note: at or before this point, the crew would have tripped the unit and transitioned to E-0, Rx Trip or SI Actuation.

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Event Description: #2 SG Tube Leakage			

SQN	STEAM GENERATOR TUBE LEAK	AOP-R.01 Rev. 26

APPENDIX B

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SUMMARY OF ACTION LEVELS FOR SG TUBE LEAK

NOTE 1 Leakage should be qualitatively confirmed by two independent rad monitors (if available) trending in the same direction prior to shutdown. Confirmation of precise leak rate is not important. Confirmation time should be kept to a minimum. If in Action Level 3 and NO additional rad monitor is available, then plant shutdown should be initiated based upon a single rad monitor.

NOTE 2 Leak rate limits do not apply to temporary spikes which are followed by a drops to below the limit.

NOTE 3 Leakage action levels apply to leak rate from a single S/G. If unable to determine leakage from individual S/Gs, total leakage should be assumed to be coming from one S/G.

NOTE 4 Steady State conditions (<10% power change per hour) are required to accurately correlate cpm readings with gpd leakage.

OPERATING CONDITION	ACTIONS
ACTION LEVEL 3: • Leak rate in any one SG is greater than or equal to 75 gpd	1. Reduce power to less than or equal to 50% power within one hour and be in Mode 3 within the next 2 hours (total of 3 hrs). 2. Monitor radiation monitor readings every 15 min and perform Appendix A. 3. Coordinate with Chemistry to identify leaking SG, quantify leakage and determine leakage rate-of-change. 4. Initiate actions to minimize spread of contamination. 5. Evaluate need for additional resources in the following areas: Operations, Chemistry, Radcon, water processing, makeup water.

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Event Description: #2 SG Tube Leakage			

SQN	STEAM GENERATOR TUBE LEAK	AOP-R.01 Rev. 26

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SUMMARY OF ACTION LEVELS FOR SG TUBE LEAK

NOTE Leakage should be qualitatively confirmed by two independent rad monitors trending in the same direction prior to shutdown. Confirmation of precise leak rate is not important. Confirmation time should be kept to a minimum.

OPERATING CONDITION	ACTIONS
ACTION LEVEL 2: • Leak rate in any one SG is greater than or equal to 50 gpd (sustained for greater than one hour) but less than 75 gpd.	1. If Action Level 2 criteria is met with RM-90-99 or RM-90-119 available, then place unit in Mode 3 within 24 hours. 2. If Action Level 2 criteria is met based upon sample results with RM-90-99 and RM-90-119 NOT available, then place unit in Mode 3 within 6 hours. 3. Monitor available radiation monitor readings every 15 min and perform Appendix A. 4. Coordinate with Chemistry to identify leaking SG and quantify leakage. 5. Make preparations for plant shutdown. 6. Initiate actions to minimize spread of contamination. 7. Evaluate need for additional resources in the following areas: Operations, Chemistry, Radcon, water processing, makeup water.

Op Test No.:	NRC	Scenario #	4	Event #	6	Page	39	of	60
Event Description:	#2 SG Tube Leakage								

SQN	STEAM GENERATOR TUBE LEAK	AOP-R.01 Rev. 26

APPENDIX B
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SUMMARY OF ACTION LEVELS FOR SG TUBE LEAK

NOTE If unable to determine leakage from individual S/Gs, total leakage should be assumed to be coming from one S/G.

OPERATING CONDITION	ACTIONS
ACTION LEVEL 1: Leak rate greater than or equal to 30 gpd but less than 50 gpd (sustained) in any S/G.	1. If RM-90-99 and RM-90-119 are NOT available AND sample results show unstable leak rate or increasing trend, then ensure unit is placed in Mode 3 within 24 hours and go to Action Level 2. 2. Ensure Chemistry has raised frequency of grab sample monitoring to identify leaking SG and quantify leakage as specified by 1,2-SI-CEM-068-137.5. 3. When leak rates are stable for at least one hour (less than or equal to 10% rise over one hour), reset rad monitor setpoints to above their existing baseline reading using 0-SI-CEM-090-100.0. Cond vac exhaust rad monitor setpoint shall not exceed equivalent leak rate of 75 gpd to permit detection of rapidly rising leak rate. 4. Monitor radiation monitor readings every 15 min and perform Appendix A. If the leak rates are stable (less than or equal to 10% rise during 24 hrs), monitoring frequency can be relaxed as specified in Sect. 2.2 of this procedure. 5. Evaluate potential for spread of contamination in secondary plant and initiate actions to contain as required. 6. Review applicable procedures to be utilized by Operations, Chemistry, and Radcon in case leak deteriorates (e.g. E-3, AOP-R.01 Sect. 2.1, etc). 7. Make preparations for plant cooldown.

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Event Description: #2 SG Tube Leakage			

SQN	STEAM GENERATOR TUBE LEAK	AOP-R.01 Rev. 26

APPENDIX B
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SUMMARY OF ACTION LEVELS FOR SG TUBE LEAK

NOTE If unable to determine leakage from individual S/Gs, total leakage should be assumed to be coming from one S/G.

OPERATING CONDITION	ACTIONS
INCREASED MONITORING: Leak rate is greater than or equal to 5 gpd but less than 30 gpd.	1. If RM-90-99 and RM-90-119 are NOT available AND sample results show unstable leak rate or increasing trend, then ensure unit is placed in Mode 3 within 24 hours and go to Action Level 2. 2. Coordinate with Chemistry and MIG to adjust condenser vacuum exhaust and S/G blowdown rad monitor setpoints using 0-SI-CEM-090-100.0 to provide prompt indication of leakage rise. Adjusted setpoint shall not exceed 30 gpd equivalent. 3. Coordinate with chemistry to identify leaking steam generator and verify leak rate. 4. Ensure any out-of-service leakage monitoring equipment is returned to service as soon as practical. 5. Establish more frequent grab sample monitoring on secondary activity as specified by 1,2-SI-CEM-068-137.5. 6. Monitor radiation monitor indications using App. A. 7. Trend leak rates and report trends to plant management.

END OF TEXT

Op Test No.: NRC Scenario # 4 Event # 7, 8 Page 41 of 60

Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
Booth Instructor: When directed, initiate Event 7		
Indications available: **1-M-3:** • **LOOP #2 FEEDWATER MAIN REG VALVE indicator shows a lower feed flow that steam flow;** **1-M-4:** • **LOOP #2 FF indicators showing lower flow than SF for a constant power level.** • **RCS Pzr LEVEL Chs, 1-LI-68-339A, 335A & 320 going down slowly initially;** **1-M-5:** • **RCS PZR LEVEL 1-LR-68-339 shows Pzr level trending down initially.** • **1-PR-68-69, RCS LOOP 1 HL WIDE RANGE PRESS indicator trending down.** • **CHARGING HDR FLOW 1FI-62-93A indicating above normal flow to maintain Pzr level on program.** **1-M-6:** • **1-PI-68-66A, HL Pressure LOOP 3 indicator trending down.** • **1-PI-68-62, RCS HL Press WR indicator trending down.** • **1-PI-68-69, RCS HL Press WR indicator trending down.**		
T = 70	US	Direct manual reactor trip and SI actuation and crew to perform IOAs of E-0, Reactor Trip or Safety Injection
Evaluator Note: following IOA performance, prior to Steps 1-4 immediate action verification, RO/BOP surveys MCBs for any expected automatic system response that failed to occur. Upon discovery, they may take manual action(s) to align plant systems as expected for the event in progress. [Ref. EPM-4, Prudent Operator Actions, (POAs)]		
Evaluator Note: the following POA is allowed by EPM-4 and may be performed following E-0 IOAs: • Turbine Driven Auxiliary Feedwater Level Control Valves may be closed to preclude a SG overfill condition provided that the requirements for secondary heat sink are satisfied.		
E-0, *Reactor Trip or Safety Injection*		
Note 1	Steps 1 through 4 are immediate action steps	
Note 2	This procedure has a foldout page	
	RO	1. VERIFY reactor TRIPPED: • Reactor trip breakers OPEN • Reactor trip bypass breakers DISCONNECTED or OPEN • Neutron flux DROPPING • Rod bottom lights LIT • Rod position indicators less than or equal to 12 steps.

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Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
	BOP	2. VERIFY turbine TRIPPED: • Turbine stop valves CLOSED.
	BOP	3. VERIFY at least one train of shutdown boards ENERGIZED. • Attempt to restore power to at least ONE train of shutdown boards • Place DG 1A-A control switch in START • Verify Train A Shutdown Boards ENERGIZED
	RO	4. DETERMINE if SI actuated: • ECCS pumps RUNNING. • Any SI alarm LIT [M-4D] (SI will be actuated)
	BOP	5. PERFORM ES-0.5, Equipment Verifications WHILE continuing in this procedure. [ES-0.5 is attached at the end,]
Evaluator Note: RO/BOP may perform the POA stated above to isolate AFW to the affected SG, once at least 1 of 4 SGs is >10% NR for heat sink concerns.		
	RO	6. DETERMINE if secondary heat sink available: a. CHECK total AFW flow greater than 440 gpm. b. CHECK narrow range level greater than 10% [25 ADV] in at least one S/G. c. CONTROL feed flow to maintain narrow range level between 10% [25% ADV] and 50% in all S/Gs.
	RO	7. CHECK if main steam lines should be isolated: a. CHECK if any of the following conditions have occurred: • Any S/G pressure less than 600 psig OR • Any S/G pressure dropping UNCONTROLLED. OR • Phase B actuation b. ENSURE MSIVs and MSIV bypass valves CLOSED.

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Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
		c. ENSURE applicable Foldout Page actions COMPLETED.
	RO	8. CHECK RCP trip criteria: a. CHECK the following: • RCS pressure less than 1250 psig. AND • At least one CCP OR SI pump RUNNING b. STOP RCPs
	RO	9. MONITOR RCS temperatures: • IF any RCP running, THEN CHECK T-avg stable at or trending between 547°F and 552°F. OR • IF RCPs stopped, THEN CHECK T-cold stable or trending to between 547°F and 552°F.
	RO	10. CHECK pressurizer PORVs, safeties, and spray valves: a. Pressurizer PORVs CLOSED. b. Pressurizer safety valves CLOSED. c. Normal spray valves CLOSED. d. Power to at least one block valve AVAILABLE. e. At least one block valve OPEN.
	RO	11. CHECK S/G secondary pressure boundaries INTACT: • All S/G pressures CONTROLLED or RISING • All S/G pressures greater than 140 psig.

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Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
	RO	CHECK S/G tubes INTACT: a. CHECK all S/G narrow range levels CONTROLLED or DROPPING. b. Secondary radiation NORMAL **USING** Appendix A, Secondary Rad Monitors. (App. A performed in ES-0.5). **(RNO Required)**
		RNO: **IF** any S/G has level rising in an uncontrolled manner **OR** has high radiation, **THEN PERFORM** the following:
		IF any S/G has level rising in an uncontrolled manner **OR** has high radiation, **THEN PERFORM** the following: a. **MONITOR** status trees. b. **GO TO** E-3, Steam Generator Tube Rupture.
E-3, Steam Generator Tube Rupture.		
	NOTE	This procedure has a foldout page.
	RO	1. **MONITOR** at least one RCP RUNNING
	RO	2. **MONITOR** RCP trip criteria:
		a. **CHECK** the following: • RCS pressure less than 1250 psig **AND** • At least one CCP **OR** SI pump **RUNNING.** b. **STOP** RCPs.

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Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
	BOP	3. **MONITOR NOTE** indications of Ruptured S/G(s):
		• Unexpected rise in any S/G narrow range level. **OR**
		• High radiation from any S/G sample. **OR**
		• RADCON survey of main steam lines and S/G blowdown lines. **OR**
		• High radiation on any main steamline radiation monitor.
Evaluator Note: Step #3 RNO following should is included for information; the ruptured SG should have been identified earlier.		
	SRO	**Step 3 RNO:** a. **WHEN** Ruptured S/G(s) identified, **THEN** **PERFORM** Steps 4 through 8. **GO TO** Step 9.
	CAUTION	**Isolating both steam supplies to the TD AFW pump when it is the only source of feed flow will result in loss of secondary heat sink.**

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Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
	BOP	4. **ISOLATE** flow from Ruptured S/G(s):
		a. **ADJUST** Ruptured S/G(s) atmospheric relief controller setpoint to 87% in AUTO. (1040 psig) b. **CHECK** Ruptured S/G(s) atmospheric relief hand switch in P-AUTO and valve(s) CLOSED.
		c. **CLOSE** TD AFW pump steam supply from Ruptured S/G FCV-1-15 (S/G #1) or FCV-1-16 (S/G #4).
		e. **CLOSE** Ruptured S/G(s) MSIV and MSIV bypass valve.
	CAUTION	**Feeding a S/G that is Faulted and Ruptured increases the potential for an uncontrolled RCS cooldown and S/G overfill. This option should NOT be considered UNLESS needed for RCS cooldown.**
	BOP	5. **MONITOR** Ruptured S/G(s) level:
		a. **CHECK** narrow range level greater than 10% [25% ADV].
		b. **WHEN** ruptured S/G level is greater than 10% [25% ADV], **THEN** **PERFORM** the following:
		1) **STOP** feed flow to ruptured S/G. 2) **ENSURE** Turbine Driven AFW LCV for ruptured S/G in CLOSE PULL TO LOCK.

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Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
	BOP	6. **VERIFY** Ruptured S/G **ISOLATED** form Intact S/G(s):
		a. **CHECK** either of the following conditions SATISFIED: • Ruptured S/G MSIVs and MSIV bypass valves CLOSED **OR** • MSIV(s) and MSIV bypass valve(s) CLOSED on Intact S/G(s) to be used for RCS cooldown.
	BOP	b. **CHECK** S/G #1 or S/G #4 ruptured. ***(RNO Required)***
		RNO: b. **GO TO Step 7**
	BOP	7. **CHECK** Ruptured S/G pressure greater than 550 psig (Unit 1) or 425 psig (Unit 2).
	NOTE	• Blocking low steamline pressure SI as soon as pressurizer pressure is less than 1960 psig will prevent an inadvertent MSIV closure and keep the condenser available for steam dump. • After the low steamline pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded. • The 1250 psig RCP trip criterion is NOT applicable after RCS cooldown is initiated in the following step.
	BOP	8. **INITIATE** RCS cooldown:
		a. **DETERMINE** target core exit T/C temperature based on Ruptured S/G pressure:

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Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
		Lowest Ruptured S/G pressure (psig) / **Target Core Exit T/C Temp (°F)** 1100 or greater: 497 1050 - 1099: 492 1000 - 1049: 486 950 - 999: 480 900 - 949: 473 850 - 899: 467 800 - 849: 460 750 - 799: 453 700 - 749: 445 650 - 699: 437 600 - 649: 428 550 - 599: 419 500 - 549: 410 450 - 499: 399 425 - 449: 393
	BOP	8. b. **WHEN** RCS pressure less than 1960 psig, **THEN** **PERFORM** the following:
		1) **BLOCK** low steamline pressure SI.
		2) **CHECK** STEAMLINE PRESS ISOL/SI BLOCK RATE ISOL ENABLE permissive LIT. [M-4A, A4]

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Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
		c. **DUMP** steam to condenser from Intact S/G(s) at maximum achievable rate: 1) **CHECK** condenser available: • C-9 condenser interlock permissive LIT. [M-4A, E6] • Intact S/G MSIVs OPEN. 2) **PLACE** steam dumps in OFF. 3) **ENSURE** steam dumps in steam pressure mode with demand less than 25%. 4) **PLACE** steam dumps in ON. 5) **ADJUST** steam dump demand to FULLY OPEN three cooldown valves. 6) **WHEN** T-avg is less than 540°F, **THEN** **BYPASS** steam dump interlock. 7) **RAISE** AFW flow to intact S/Gs as necessary to support cooldown.
		d. **WHEN** core exit T/Cs less than target temperature determined in Substep 8.a, **THEN** **PERFORM** the following:
		1) **CLOSE** steam dumps or S/G atmospheric reliefs to stop cooldown.

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Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
		2) **REDUCE** AFW flow as necessary to stop cooldown. **MAINTAIN** total feed flow greater than 440 gpm UNTIL level greater than 10% [25% ADV] in at least one Intact S/G.
		3) **MAINTAIN** core exit T/Cs less than target temperature **USING** steam dumps or atmospheric reliefs.
	BOP	9. **MAINTAIN** Intact S/G narrow range levels:
		a. Greater than 10% [25% ADV]
		b. Between 20% [25% ADV] and 50%.
	RO	10. **MONITOR** pressurizer PORVs and block valves:
		a. Power to block valves AVAILABLE
		b. Pressurizer PORVs CLOSED
		c. At least one block valve OPEN.
	RO	11. **RESET** SI signal.
	BOP	12. **MONITOR** AC busses energized from start busses.

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Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
	RO	13. **ENSURE** Phase A and Phase B RESET.
	RO	14. **CHECK** control air established to containment: [Panel 6K and 6L] • 1-FCV-32-80 (2-FCV-32-81) Train A essential air OPEN • 1-FCV-32-102 (2-FCV-32-103) Train B essential air OPEN • 1-FCV-32-110 (2-FCV-32-111) non-essential air OPEN.
	RO	15. **DETERMINE** if RHR pumps should be stopped:
		a. **CHECK** RHR pump suction aligned from RWST.
		b. **CHECK** RCS pressure greater than 300 psig.
		c. **STOP** RHR pumps and **PLACE** in A-AUTO.
		d. **MONITOR** RCS pressure greater than 300 psig.
		16. **CHECK** if RCS cooldown should be stopped:
	RO	a. **CHECK** core exit T/Cs less than target temperature determined in Substep 8.a.
	BOP	b. **CLOSE** steam dumps or atmospheric reliefs to stop cooldown.

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Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
	BOP	c. **REDUCE** AFW flow as necessary to stop cooldown.
	BOP	d. **MAINTAIN** core exit T/Cs less than target temperature **USING** steam dumps or atmospheric reliefs.
	BOP	17. **CHECK** Ruptured S/G(s) pressure STABLE or RISING.
	RO	18. **CHECK** RCS subcooling based on core exit T/Cs greater than 60°F.
	RO	19. **DEPRESSURIZE** RCS to minimize break flow and to refill pressurizer:
		a. **CHECK** normal pressurizer spray AVAILABLE.
	RO	b. **INITIATE** maximum available pressurizer spray.
	RO/ SRO	c. **CHECK** depressurization rate ADEQUATE.

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Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
Evaluator Note: **Critical Task is to depressurize the RCS to meet SI termination criteria prior to affected SG overfill.** **When the crew meets one of the three depressurization criteria and Pzr Spray and/or PORV valves are closed, critical task conditions are met.**		
Critical Task	RO	d. **CONTINUE** depressurization UNTIL any of the following conditions SATISFIED: • Both of the following: 1) RCS pressure less than Ruptured S/G(s) pressure **AND** 2) Pressurizer level greater than 10% [20% ADV]. **OR** • Pressurizer level greater than 65%. **OR** • RCS subcooling based on core exit T/Cs less than 40°F.
	RO	e. **CLOSE** spray valve(s): 1) Normal spray valves.
		2) Auxiliary spray valves.
	SRO	f. **GO TO** Caution prior to Step 22.

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Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
	CAUTION	• **Depressurizing the RCS using a pressurizer PORV may cause PRT rupture with resulting abnormal containment conditions.** • **Excessive cycling of a pressurizer PORV increases the potential for PORV failure.**
	NOTE	Upper head voiding may occur during RCS depressurization if no RCPs are running. This may result in rapidly rising pressurizer level.
	RO	20. **DEPRESSURIZE** RCS **USING** one pressurizer PORV to minimize break flow and to refill pressurizer: a. **CHECK** at least one pressurizer PORV AVAILABLE
	RO	b. **OPEN** one pressurizer PORV UNTIL any of the following conditions SATISFIED:
	RO	• Both of the following: 1) RCS pressure less than Ruptured S/G(s) pressure **AND** 2) Pressurizer level greater than 10% [20% ADV]. **OR** • Pressurizer level greater than 65%. **OR** • RCS subcooling based on core exit T/Cs less than 40°F.

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Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
	RO	c. **CLOSE** pressurizer PORV.
	RO	d. **CLOSE** spray valve(s):
		1) Normal spray valves
		2) Auxiliary spray valves.
	RO	b. **ENSURE** SI signal RESET.
	SRO	c. **STOP** any unloaded diesel generators and **PLACE** in standby **USING** EA-82-1, Placing D/Gs in Standby.
	RO	21. **CHECK** RCS pressure RISING.
	CAUTION	**Any delay in terminating SI after termination criteria are met may cause Ruptured S/G(s) overfill.**
	RO	22. **CHECK** if ECCS flow should be terminated:
		a. RCS subcooling based on core exit T/Cs greater than 40°F.
	BOP	b. Secondary heat sink:
		• Narrow range level in at least one Intact S/G greater than 10% [25% ADV]
		OR

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Event Description: #2 SGTR

Time	Position	Applicant's Actions or Behaviors
		• Total feed flow to S/Gs greater than 440 gpm AVAILABLE.
	RO	c. RCS pressure STABLE or RISING.
		d. Pressurizer level greater than 10% [20% ADV].
	RO	23. **STOP** the following ECCS pumps:
		a. **STOP** SI pumps and **PLACE** in A-AUTO.
		b. **CHECK** offsite power supplying shutdown boards.
		c. **STOP** all BUT one CCP and **PLACE** in A-AUTO.
	RO	24. **ISOLATE** CCPIT:
		a. **CLOSE** inlet isolation valves FCV-63-39 and FCV-63-40. b. **CLOSE** outlet isolation valves FCV-63-26 and FCV-63-25.
		END

Lead Examiner: Scenario may be terminated when the CCPIT is isolated.

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Event Description: **Equipment Verifications, ES-0.5**

Time	Position	Applicant's Actions or Behavior
		Equipment Verifications, ES-0.5
	BOP	1. CHECK ERCW system operation: • VERIFY at least four ERCW pumps RUNNING. • VERIFY D/G ERCW supply valves OPEN.
	BOP	2. **VERIFY** at least four ERCW pumps RUNNING
	BOP	3. **VERIFY** CCS pumps RUNNING: • Pump 1A-A (2A-A) • Pump 1B-B (2B-B) • Pump C-S.
	BOP	4. VERIFY EGTS fans RUNNING.
	BOP	5. VERIFY generator breakers OPEN.
	BOP	6. VERIFY AFW pumps RUNNING: • MD AFW pumps • TD AFW pump.
		NOTE AFW level control valves should NOT be repositioned if manual action has been taken to control S/G levels, to establish flow due to failure, or to isolate a faulted S/G.

Op Test No.: NRC Scenario # 4 Event # ES-0.5 Page 58 of 60

Event Description: **Equipment Verifications, ES-0.5**

Time	Position	Applicant's Actions or Behavior
Evaluator Note: #1 SG MDAFW Level Control Valve Fails Open; the crew will need to decide how control #1 SG to prevent overfill.		
	BOP	7. CHECK AFW valve alignment: a. VERIFY MD AFW LCVs in AUTO. b. VERIFY TD AFW LCVs OPEN. c. VERIFY MD AFW pump recirculation valves FCV-3-400 and FCV-3-401 CLOSED.
	BOP	VERIFY MFW Isolation: • MFW pumps TRIPPED • MFW regulating valves CLOSED • MFW regulating bypass valve controller outputs ZERO • MFW isolation valves CLOSED • MFW flow ZERO.
	BOP	MONITOR ECCS operation: VERIFY ECCS pumps RUNNING: • CCPs • RHR pumps • SI pumps
	BOP	VERIFY CCP flow through CCPIT. • CHECK RCS pressure less than 1500 psig. • VERIFY SI pump flow. • CHECK RCS pressure less than 300 psig. • VERIFY RHR pump flow.
	BOP	VERIFY ESF systems ALIGNED: • Phase A ACTUATED: o CONTAINMENT ISOLATION PHASE A TRAIN A alarm LIT [M-6C, B5]. o CONTAINMENT ISOLATION PHASE A TRAIN B alarm LIT [M-6C, B6]. o

Op Test No.: NRC Scenario # 4 Event # ES-0.5 Page 59 of 60

Event Description: **Equipment Verifications, ES-0.5**

Time	Position	Applicant's Actions or Behavior
		• Containment Ventilation Isolation ACTUATED: o CONTAINMENT VENTILATION ISOLATION TRAIN A alarm LIT [M-6C, C5]. o CONTAINMENT VENTILATION ISOLATION TRAIN B alarm LIT [M-6C, C6]. • Status monitor panels: o 6C DARK o 6D DARK o 6E LIT OUTSIDE outlined area o 6H DARK o 6J LIT. • Train A status panel 6K: o CNTMT VENT GREEN o PHASE A GREEN • Train B status panel 6L: o CNTMT VENT GREEN o PHASE A GREEN
	BOP	MONITOR containment spray NOT required: • Phase B NOT ACTUATED AND • Containment pressure less than 2.81 psig • Ensure Containment Spray is actuated
	BOP	VERIFY pocket sump pumps STOPPED: [M-15, upper left corner] • HS-77-410, Rx Bldg Aux Floor and Equipment Drain Sump pump A • HS-77-411, Rx Bldg Aux Floor and Equipment Drain Sump pump B.
	BOP	DISPATCH personnel to perform EA-0-1, Equipment Checks Following ESF Actuation.

Evaluator Note: **BOP completes ES-0.5 including Appendices A & B and reports completion (including any discrepancies and actions taken, i.e.: manual Auxiliary Feedwater LCV control per ES-0.5 Step 7) to SRO.**

Op Test No.: NRC Scenario # 4 Event # ES-0.5 Page 60 of 60

Event Description: **Equipment Verifications, ES-0.5**

Time	Position	Applicant's Actions or Behavior
END (ES-0.5, EQUIPMENT VERIFICATIONS)		
APPENDIX A **SECONDARY RAD MONITORS**		
	BOP	1. **CHECK** following rad monitors including available trends prior to isolation: • Condenser exhaust recorder RR-90-119 • S/G blowdown recorder RR-90-120 • Main steam line rad monitors • Post-Accident Main Steam Line rad recorder RR-90-268B points 3 (blue), 4 (violet), 5 (black), and 6 (brown). [M-31 (back of M-30)]
		2. **IF** secondary radiation is HIGH, **THEN** **ENSURE** Unit Supervisor notified.
END OF TEXT		
APPENDIX B **CONTAINMENT RAD MONITORS**		
	BOP	1. **CHECK** following rad monitors: • Upper containment high range rad monitors RM-90-271 and RM-90-272 NORMAL [M-30] • Lower containment high range rad monitors RM-90-273 and RM-90-274 NORMAL [M-30] • Containment rad recorders RR-90-112 and RR-90-106 NORMAL [M-12] (prior to isolation).
	BOP	2. **IF** secondary radiation is HIGH, **THEN** **ENSURE** Unit Supervisor notified.
END OF TEXT		

DELTA TIME (hrs)	REACTOR POWER (%)	POWER DEFECT (pcm)	ASSUMED ROD HT (steps)	INSERTED WORTH (pcm)	EXPECTED XENON (pcm)	DELTA RHC BORON (pcm)	BORON CONC (ppm)	DELTA PPM (ppm)	ECOMMEN DILUTION (gal)	RECOMME BORATION (gal)	IODINE CONC (% eq)
0	100.0	1682.7	216.0	-26.9	-2683.0	---	1123.0	---	---	---	100.0
1	92.0	1543.6	198.0	-126.5	-2700.0	-22.6	1126.5	3.5	0	40	99.6
2	92.0	1542.1	200.0	-114.0	-2724.9	10.9	1124.8	-1.7	97	0	98.9
3	100.0	1681.9	212.0	-43.2	-2724.3	68.4	1114.2	-10.7	617	0	98.6
4	100.0	1686.9	215.0	-31.0	-2708.5	-22.9	1117.7	3.6	0	40	98.7
5	100.0	1685.2	215.0	-31.0	-2697.2	-13.1	1119.8	2.0	0	23	98.8
6	100.0	1684.3	215.0	-31.0	-2689.0	-9.1	1121.2	1.4	0	16	99.0
7	100.0	1683.6	215.0	-31.0	-2683.4	-6.3	1122.2	1.0	0	11	99.1
8	100.0	1683.1	215.0	-31.0	-2679.6	-4.3	1122.8	0.7	0	8	99.2
9	100.0	1682.8	215.0	-31.0	-2677.2	-2.8	1123.3	0.4	0	5	99.2
10	100.0	1682.6	215.0	-31.0	-2675.7	-1.6	1123.5	0.3	0	3	99.3
11	100.0	1682.5	215.0	-31.0	-2675.0	-0.8	1123.6	0.1	0	1	99.4
12	100.0	1682.4	215.0	-31.0	-2674.9	-0.2	1123.7	0.0	0	0	99.4
13	100.0	1682.4	215.0	-31.0	-2675.1	0.2	1123.7	0.0	2	0	99.5
14	100.0	1682.4	215.0	-31.0	-2675.5	0.5	1123.6	-0.1	4	0	99.5
15	100.0	1682.4	215.0	-31.0	-2676.1	0.7	1123.5	-0.1	6	0	99.6
16	100.0	1682.5	215.0	-31.0	-2676.8	0.8	1123.4	-0.1	7	0	99.6
17	100.0	1682.6	215.0	-31.0	-2677.6	0.8	1123.2	-0.1	7	0	99.7
18	100.0	1682.6	215.0	-31.0	-2678.4	0.9	1123.1	-0.1	8	0	99.7
19	100.0	1682.7	215.0	-31.0	-2679.2	0.9	1123.0	-0.1	8	0	99.7
20	100.0	1682.7	215.0	-31.0	-2680.0	0.8	1122.8	-0.1	7	0	99.8

6350	MWD/MTU
6740	BAT ppm

Hold Tavg = Tref +/- 1.5F

Total 714 147

Small hourly boration/dilution volumes may be accumulated for larger single additions

Reason for Maneuver	Periodic MT Valve Testing
Date	Today
RxEng Name	J Peabody
Comments	None

APPENDIX C

Time: Now Date: Today

Unit 1 MCR Checklist

Part 1 - Completed by Off-going Shift / Reviewed by On-coming Shift	
Mode 1, 100% Power **PSA Risk: Green** **Grid Risk: Green** **RCS Leakage ID .14 gpm, UNID .05 gpm**	**NRC phone Authentication Code** **Until 0800 A12B** **After 0800 C34D**

Common Tech Spec Actions

LCO/TRM	Equipment INOP	Time INOP	Owner	RTS
NONE	***NONE***	- - - -	- - - -	- - -

U-1 Tech Spec Actions

LCO/TRM	Equipment INOP	Time INOP	Owner	RTS
NONE	***NONE***	- - - -	- - - -	- - -

Protected Equipment

- ***NONE***

Shift Priorities

- ***Reduce power for 1-PI-OPS-047-002.0, STEAM INLET VALVE TESTING*** ***(Crew Briefing is complete; support personnel standing by)***

Part 2 – Performed by on-coming shift		
☒ Verify your current qualifications	☒ Review Operating Log since last held shift or 3 days, whichever is less	
☒ Standing Orders / Shift Orders	☒ TACF	☒ Immediate required reading
☒ LCO Actions		
Part 3 – Performed by both off-going and on-coming shift		
☒ Walk down of MCR Control Boards		

APPENDIX C

Time: Now Date: Today

MAIN CONTROL ROOM (7690)
• **Train A Week**
OUTSIDE (7666) [593-5214]
• **NONE**
AUXILIARY BUILDING (7775)
• **NONE**
TURBINE BUILDING (7771) (593-8455)
• **NONE**

UNIT ONE REACTIVITY BRIEF

Date: Today Time: Now

General Information

RCS Boron: **1093** ppm Today	BA Controller Setpoint: **27%** *	RCS B-10 Depletion: **7** ppm

Operable BAT: **A**	BAT A Boron: **6850**ppm	BAT C Boron: **6850**ppm	RWST Boron: **2601** ppm

Nominal Gallons per rod step from 219: **7** gallons of acid, **36** gallons of water

* Verify boric acid flow controller is set at Adjusted BA Controller Setting iaw 0-SO-62-7 section 5.1

Estimated values for a 1° Change in Tave **

Gallons of acid: **26**	Gallons of water: **138**	Rod Steps: **4**

Estimated rods/boron for emergency step power reduction **

(Assuming Xenon equilibrium and no reactivity effects due to Xenon. 2/3 total reactivity from rods, 1/3 from boron)

Power reduction amount	Estimated Final Rod Position	Estimated boron addition
10%	**198** Steps on bank D	**101** gallons
30%	**174** Steps on bank D	**295** gallons
50%	**152** Steps on bank D	**485** gallons

** These values are approximations and not intended nor expected to be exact. The values may be superseded by Rx Engineering or SO-62-7 calculated values. These values are calculated assuming 100% steady state power operation only. Engineering data last updated **one week ago**. Data Valid until **one week from now**.

Previous Shift Reactivity Manipulations

Number of dilutions: 0***	Number of borations: 0	Rod steps in: 0
Gallons per dilution: 0	Gallons per boration: 0	Rod steps out: 0
Total amount diluted: 0	Total amount borated: 0	Net change: 0 IN/Out

Current Shift Estimated Reactivity Manipulations

Number of dilutions: 0 *	Number of borations: 0 *	Rod steps in: 0 *
Gallons per dilution: 0 *	Gallons per boration: 0 *	Rod steps out: 0 *
Total expected dilution: 0 *	Total expected boration: 0 *	Net change: 0 In/Out

Remarks: * During Plant power reduction, Per RE Reactivity Spreadsheet
Rx Power – 100% MWD/MTU – 1000 Xenon & Samarium at Equilibrium
***The boron letdown curve is flat for the next 25 EFPD.

Next Unit 1 Flux Map is scheduled - three weeks from now
Unit 1 M-P is 0 PPM

Unit Supervisor: _____
Name/Date

Operations Chemistry Information

Boron Results					
Sample Point	**Units**	**Boron**	**Date / Time**	**Goal**	**Limit**
U1 RCS	ppm	1093	Today / Now	Variable	Variable
U2 RCS	ppm	648	Today / Now	Variable	Variable
U1 RWST	ppm	2601	Today / Now	2550 - 2650	2500 - 2700
U2 RWST	ppm	2569	Today / Now	2550 - 2650	2500 - 2700
BAT A	ppm	6850	Today / Now	Variable	Variable
BAT B	ppm	6850	Today / Now	Variable	Variable
BAT C	ppm	6850	Today / Now	Variable	Variable
U1 CLA #1	ppm	2556	Today / Now	2470-2630	2400-2700
U1 CLA #2	ppm	2575	Today / Now	2470-2630	2400-2700
U1 CLA #3	ppm	2591	Today / Now	2470-2630	2400-2700
U1 CLA #4	ppm	2589	Today / Now	2470-2630	2400-2700
U2 CLA #1	ppm	2531	Today / Now	2470-2630	2400-2700
U2 CLA #2	ppm	2650	Today / Now	2470-2630	2400-2700
U2 CLA #3	ppm	2522	Today / Now	2470-2630	2400-2700
U2 CLA #4	ppm	2526	Today / Now	2470-2630	2400-2700
Spent Fuel Pool	ppm	2547	Today / Now	$\geq$ 2050	$\geq$ 2000
Lithium Results				**Goal**	**Midpoint**
U1 RCS Lithium	ppm	1.1	Today / Now	>1	>1
U2 RCS Lithium	ppm	2.43	Today / Now	2.18-2.48	2.33

Primary to Secondary Leakrate Information (Total CPM RM-90-99/119)					
Indicator	**Units**	**U1**	**Date / Time**	**U2**	**Date/Time**
SI 50 S/G Leakage?	Yes/No	No	Today / Now	No	Today / Now
SI 137.5 CVE Leakrate	gpd	< 0.1	Today / Now	< 0.1	Today / Now
5 gpd leak equivalent	cpm	115	Today / Now	111	Today / Now
30 gpd leak equivalent	cpm	492	Today / Now	464	Today / Now
50 gpd leak equivalent	cpm	793	Today / Now	747	Today / Now
75 gpd leak equivalent	cpm	1170	Today / Now	1100	Today / Now
CVE Air Inleakage	cfm	10	Today / Now	12.5	Today / Now
Bkgd on 99/119	cpm	50	Today / Now	40	Today / Now
Correction Factor 99/119	cpm/gpd	15	Today / Now	14.13	Today / Now

Steady state conditions are necessary for an accurate determination of leak rate using the CVE Rad Monitor