Facility: **NRC Exam 1 August 2010** Scenario No.: **1** Op Test No.: **1**

Examiners: _____ Operators: _____ **SRO**

_____ _____ **RO**

_____ _____ **BOP**

Initial Conditions: 100% power, BOL. RCS boron is 1031 ppm. Control Bank D is at 220 steps.

Turnover: Train A/Channel I Work Week. Perform a load reduction to 93% to support turbine valve tests and EHC testing. 1A Containment Spray pump out-of-service for pump bearing replacement. Expected return to service in 12 hours. LCO 3.6.6.A was entered 4 hours ago. A Severe Thunderstorm Warning has been issued for Rhea, Meigs McMinn Counties for the next 2 hours.

Event No.	Malf. No.	Event Type*	Event Description
1	n/a	N-BOP R-RO	Reduce power to perform turbine valve testing and EHC calibration using GO-4, "Normal Power Operations, "and 1-TRI-47-3,"Main Turbine Steam Inlet Valve Testing."
2	rx02d	I-RO TS-SRO	Loop 4 RTD fails high, causing rod insertion. Requires AOI-2, Malfunction of Reactor Control System," entry and a Tech Spec evaluation.
3	rw14a	C-BOP TS-SRO	1A ERCW header breaks in the Intake Pumping Station. Requires AOI-13, "Loss of Essential Raw Cooling Water," entry and a Tech Spec evaluation.
4	rx20	I-BOP	Steam Pressure transmitter, 1-PT-1-33 fails low, requiring manual control of main feedwater pump speed, and AOI-16, "Loss of Normal Feedwater," entry.
5	cv11	I-RO	1-LT-62-129 fails high, requiring entry into ARI 109-A, VCT LEVEL HI/LO, and manual actions to ensure VCT level is maintained properly.
6	rw09 th04b	M-All	Raw cooling water temperature control valve to the Stator Water Cooler fails closed. Requires a manual trip of the reactor/turbine due to high stator water temperature. A vapor space break develops 15 seconds after the reactor trip.
7	rp02b	I-RO	Automatic SI fails to actuate, requiring manual initiation.
8	ed01	M-All	Loss of offsite power which occurs 10 seconds after the safety injection is manually initiated.
9	si08i si08j	C-BOP	1A-A DG and 1B-B DG fail to automatically start on a blackout or safety injection signal. Requires an emergency start from panel 1-M-1 or from panel 0-M-26.

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

Scenario 1 - Summary

Initial Condition	100% power, BOL. RCS boron is 1031 ppm. Control Bank D is at 220 steps.

Turnover	Train A/Channel I Work Week. Perform a load reduction to 93% to support turbine valve tests and EHC testing. 1A Containment Spray pump out-of-service for pump bearing replacement. Expected return to service in 12 hours. LCO 3.6.6.A was entered 4 hours ago. A Severe Thunderstorm Warning has been issued for Rhea, Meigs McMinn Counties for the next 2 hours.

Event 1	Reduce power to perform turbine valve test using GO-4, "Normal Power Operations, "and 1-TRI-47-3,"Main Turbine Steam Inlet Valve Testing."
Event 2	Loop 4 RTD fails high causing the Rod Control System to detect a large mismatch between Auctioneered HI Tavg and T-reference and insert rods 72 steps per minute. The SRO enters AOI-2, "Malfunction of Reactor Control System," and directs the RO to defeat the Loop 4 temperature functions. The SRO evaluates conditions and enters Tech Specs LCO 3.3.1, Reactor Trip System (RTS) Instrumentation Conditions W, X and V; LCO 3.3.2, ESFAS Instrumentation, Condition N.
Event 3	1A ERCW header breaks in the Intake Pumping Station (IPS). The BOP will dispatch an AUO to the IPS. The SRO will enter and direct actions of AOI-13, "Loss of Essential Raw Cooling Water," Section 3.5, "Supply Header Rupture in IPS." The SRO evaluates conditions and enters Tech Specs LCO 3.0.3, based on the cross-connection of the A and B ERCW trains.
Event 4	Steam Pressure transmitter, 1-PT-1-33 fails low, requiring manual control of the main feedwater pump master controller, 1-PC-46-20. AOI-16, "Loss of Normal Feedwater," Section 3.7, "Failure of MFW Pump Control" will be implemented. Manual control of the main feedwater pump master controller will be required for the remainder of power operations.
Event 5	1-LT-62-129A VCT LEVEL fails high. VCT level indication is off-scale high. 1-LCV-62-118 is diverted to the Holdup Tank. CVCS VCT to RWST low-level transfer partial logic is defeated. Auto makeup to the VCT remains operable, but VCT level cannot be maintained without aligning the divert valve to the VCT.
Event 6	Raw cooling water temperature control valve to the Stator Water Cooler fails closed. Requires a manual trip of the reactor/turbine due to high stator water temperature. A PZR vapor space break develops 15 seconds after the reactor trip. Requires manual initiation of safety injection.
Event 7	Automatic SI fails to actuate, requiring manual initiation.
Event 8	Loss of offsite power occurs 10 seconds after the safety injection is manually initiated.
Event 9	1A-A DG and 1B-B DG fail to automatically start on a blackout or safety injection signal. Requires an emergency start from panel 1-M-1 or from panel 0-M-26.

Scenario 1 - Critical Task Summary

Critical Task 1 *from WOG ERG Critical Task List, E-0, D*	*Manually actuate at least one train of SIS-actuated safeguards before any of the following:* • *Transition to any E-1 series, E-2 series, or E-3 series procedure or transition to any FRG* • *Completion of step 5.a of ES-0.1*
Critical Task 2 *from WOG ERG Critical Task List, E-0, C.*	*Energize at least one ac emergency bus before transition out of E-0, unless the transition is to ECA-0.0, in which case the critical task must be performed before placing safeguards equipment handswitches in the pull-to-lock position.* *Guideline ECA-0.0 is developed and structured to address the condition where all ac emergency power is lost. It is entered on the symptom of all ac emergency busses being de-energized. Its objective is to cope with the loss of ac emergency power until at least one ac emergency bus can be energized. ECA-0.0 should not be entered if at least one ac emergency bus is energized since the other optimal recovery guidelines and function restoration guidelines contain guidance that accommodates multiple failures.*

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Event Description: Reduce power using GO-4, "Normal Power Operations," to support valve testing per 1-TRI-47-

Time	Position	Applicant's Actions or Behavior
EXAMINER: The following actions are taken from GO-4, "Normal Power Operation," Section 5.3, "Unit Shutdown from 100% to 30% Reactor Power," beginning at Step 12, as indicated in the Shift Turnover.		
		NOTES 1) Turbine maybe operated in IMP IN above 30% turbine load as long as IMP IN does NOT cause unit instability IMP IN will control turbine load as a percentage of impulse pressure that correlates to % load vs. % of valve opening in IMP OUT. This will allow for a more linear load ascension 2) Turbine load change may be stopped by depressing the HOLD push button, using VPL, or by depressing the MANUAL push button
	BOP	[12] **IF** desired to operate in IMP IN, **THEN OBTAIN** Unit SRO concurrence to operate in IMP IN **AND PLACE** Turbine in IMP IN.
EXAMINER: The following actions are taken from SOI-62.02, "Boron Concentration Control," Section 6.7, Minor Boration."		
		NOTES 1) Section 6.7, may be reproduced, laminated, displayed, reused, etc. as desired. 2) Minor Boration is defined as the addition of Boric Acid done several times each shift early in core life, to compensate for burnable poison burn-up, and maintain Tavg on program.
	RO	[1] **ENSURE** 1-HS-68-341H, BACKUP HEATER C [1-M-4], is ON, to equalize RCS-Pzr CB.
	RO	[2] **ADJUST** 1-FC-62-139, BA TO BLENDER [1-M-6], for desired flow rate.
	RO	[3] **ADJUST** 1-FQ-62-139, BA BATCH COUNTER [1-M-6], for required quantity.
	RO	[4] **PLACE** 1-HS-62-140B, VCT MAKEUP MODE [1-M-6], in BOR.
	RO	[5] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL [1-M-6], to START. [5.1] **CHECK** Red light is LIT.
	RO	[6] **MONITOR** the following parameters:

Instrument	Location	Parameters
1-PI-62-122	1-M-6	VCT PRESS
1-LI-62-129A	1-M-6	VCT LEVEL
1-FI-62-139	1-M-6	BA TO BLENDER FLOW
1-FQ-62-139	1-M-6	BA BATCH COUNTER
1-FI-62-142	1-M-6	PW TO BLENDER FLOW
1-FQ-62-142	1-M-6	PW BATCH COUNTER
1-LI-62-238	1-M-6	BAT A LEVEL
1-LI-62-242	1-M-6	BAT C LEVEL

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Event Description: Reduce power using GO-4, "Normal Power Operations," to support valve testing per 1-TRI-47-

Time	Position	Applicant's Actions or Behavior
	RO	[7] **WHEN** Boration is COMPLETE, **THEN PLACE** 1-HS-62-140B, VCT MAKEUP MODE, in AUTO.
	RO	[8] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL, to START. [8.1] **CHECK** Red light is LIT.
	RO	[9] **RETURN** 1-FC-62-139, BA TO BLENDER [1-M-6], to desired flow rate.
EXAMINER: The following actions are taken from GO-4, "Normal Power Operation," Section 5.3, "Unit Shutdown from 100% to 30% Reactor Power."		
	BOP	[13] **INITIATE** load reduction by PERFORMING the following on the Turbine EHC panel: [13.1] **IF** during any of the following steps the REFERENCE changes in an undesired manner **THEN ADJUST VPL** to stop turbine load rise. **OR** **PUSH** TURBINE MANUAL to place the turbine control mode in manual mode and proceed to section 5.6. [13.2] **PUSH** REFERENCE CONTROL ∇ (lower) button to set desired load in SETTER display. [13.3] **SET** LOAD RATE as required. [13.4] **PUSH** GO button. [13.5] **MONITOR** Generator Megawatts DROPPING. [13.6] **CHECK** that load change has **STOPPED** when reference display equals setter **OR** **IF** desired to stop the load change, **THEN** **STOP** the load change by **DEPRESSING** the HOLD pushbutton [13.7] **WHEN** desired to resume the load change, **THEN PRESS** the GO push button and continue to monitor load. [13.8] **ADJUST** VALVE POSITION LIMIT to ≤ 5% above the Gov Control Indication or as needed. [13.9] **REPEAT** Steps 5.3[13.2] to 5.3[13.5] to achieve desired load.
CAUTION Do not exceed load rate of 5%/minute, or 10% step change		

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Event Description: Reduce power using GO-4, "Normal Power Operations," to support valve testing per 1-TRI-47-

Time	Position	Applicant's Actions or Behavior
	RO	[14] **MONITOR** the following during the load reduction: [14.1] TAVG following TREF program. [14.2] All RPIs, Step Counters, Loop ΔT, and NIS for correct power distribution, quadrant power tilts, rod insertion, rod misalignment, inoperable RPIs, and inoperable rods.
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	SRO	**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).
Cue Simulator Operator to insert Event 2.		

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Event Description: Loop 4 RTD fails high, causing rod insertion. Requires AOI-2 entry and a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
Indications: 93A, "RCS LOOP ΔT DEVIATION" 93F, "EAGLE PROC PROT CH-IV RTD FAILURE" 94A, "T AVG-T REF DEVIATION" 94B, "T AVG - TAUCT DEVIATION" 110F, "PROT SET TROUBLE" If in AUTO at the time of the failure, rods inserting at 72 steps per minute, as indicated by GREEN indicating light on 1-M-4 and CERPI indication of rod speed.		
	RO	Diagnoses and announces continuous rod insertion.
	RO	May place rods in MANUAL to stop the rod insertion.
	RO	May place 1-HIC-62-93A, CHARGING FLOW PZR LEVEL CONTROL in MANUAL to control pressurizer level.
	SRO	Enters and directs actions of AOI-2, "Malfunction of Reactor Control System," Sub Section 3.2, "Continuous Rod Withdrawal/Insertion."
EXAMINER: The following actions are taken from AOI-2, "Malfunction of Reactor Control System," Sub Section 3.2, "Continuous Rod Withdrawal/Insertion."		
	RO	1. **PLACE** control rods in MAN.
	RO	2. **CHECK** control rod movement STOPPED.
	RO	3. **MAINTAIN** T-avg on PROGRAM. (Reference Attachment 1) • **USE** control rods. OR • **ADJUST** turbine load.
	RO	4. **CHECK** loop T-avg channels NORMAL.
	RO	**4. RESPONSE NOT OBTAINED:** **DEFEAT** failed loop ΔT and loop T-avg channels by placing 1-XS-68-2D, ΔT CHANNEL DEFEAT, and 1-XS-68-2M, TAVG CHANNEL DEFEAT in failed channel position then PULL. **ENSURE** TR-68-2A placed to operable channel using.1-XS-68-2B, ΔT RCDR TR-68-2A LOOP SELECT [1-M-5]. **NOTIFY** Maintenance to implement IMI-160 for failed channel. **WHEN** at least 3 minutes have elapsed since failed T-avg channel is defeated, **THEN** a) **ENSURE** T-avg and T-ref within 1°F. b) **ENSURE** zero demand on control rod position indication [1-M-4]. c) **PLACE** rods in AUTO.

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Event Description: Loop 4 RTD fails high, causing rod insertion. Requires AOI-2 entry and a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
	RO	5. **CHECK** Auct Tavg NORMAL on 1-TR-68-2B.
EXAMINER: The SRO may have interpreted this step to be the conditions at the time of the failure. If so, the RNO may be entered.		
	RO	**5. RESPONSE NOT OBTAINED:** **CONTROL** pzr level in MAN 1-FCV-62-93. (Reference Attachment 1) ***1-HIC-62-93A may have already been placed in MANUAL upon discovery of failure, and actions initiated to control level may be in progress.***
	RO	6. **CHECK** NIS power range channels NORMAL.
	RO	7. **CHECK** the following: • Turbine impulse pressure channel 1-PI-1-73, NORMAL. • Tref and Auct Tavg NORMAL on 1-TR-68-2B (Reference Attachment 1)
	RO	8. **MONITOR** core power distribution parameters: • Power range channels. • ΔFlux Indicators. • T-avg. • Loop ΔT. • Incore TCs. • Feed flow/Steam flow.
	SRO	9. **INITIATE** repairs to failed equipment.
EXAMINER: If the turbine valve position limit light is lit, the crew will use one of the following procedures/methods to clear the limit: **SOI-47.02,"Turbo-Generator Startup Operation," Attachment 1, "Steps for Coming Off Valve Position Limiter Following a Runback."** **AOI-37, "Turbine Runback."** **AOI-16, "Loss of Normal Feedwater."** **The listed actions are taken from SOI-47.02, Attachment 1.**		
		[1] **WHEN** directed by SRO, remove unit from influence of valve position limiter.
		[2] **CHECK** VALVE POS LIMIT red light LIT.
		[3] **PUSH** REFERENCE CONTROL ∇ (lower) button to an indication in SETTER display slightly less than indicated on VALVE POSITION LIMIT meter
		[4] **PUSH** REFERENCE CONTROL "GO" button.

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Event Description: Loop 4 RTD fails high, causing rod insertion. Requires AOI-2 entry and a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
		[5] **SET** LOAD RATE as desired (up to 200% per minute) until the REFERENCE display is slightly greater than the VALVE POSITION LIMIT meter indication, **THEN REDUCE** LOAD RATE to 10% or less.
		[6] **WHEN** VALVE POS LIMIT red light **NOT** LIT, **THEN PUSH** REFERENCE CONTROL "HOLD" button.
		[7] **IF** VALVE POS LIMIT red light does **NOT** clear, **THEN REPEAT** Steps 1.0[3] through 1.0[6] at a LOAD LIMIT of 10% or less until VALVE POS LIMIT red light **NOT** LIT.
		[8] **RETURN TO** instruction in effect.

EXAMINER: The following actions are taken from AOI-2, "Malfunction of Reactor Control System," Sub Section 3.2, "Continuous Rod Withdrawal/Insertion."

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Event Description: Loop 4 RTD fails high, causing rod insertion. Requires AOI-2 entry and a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
	SRO	10. **REFER TO** Tech Specs: • 3.1.1, Shutdown Margin - ***Not applicable.*** • 3.1.5, Rod Group Alignment Limits - ***Not applicable.*** • 3.1.6, Shutdown Bank Insertion Limits - ***Not applicable.*** • 3.1.7, Control Bank Insertion Limits - ***Not applicable.*** • 3.2.1, Heat Flux Hot Channel Factor - ***Not applicable.*** • 3.2.2, Nuclear Enthalpy Rise Hot Channel Factor - ***Not applicable.*** • 3.2.4, Quadrant Power Tilt Ratio - ***Not applicable.*** • 3.2.3, Axial Flux Difference - ***Not applicable.*** • 3.3.1-1, "Rx Trip System (RTS)" **Function 6. Overtemperature ΔT** ***Condition W. Place channel in trip within 72 hours OR be in Mode 3 within 78 hours.*** **Function 7. Overpower ΔT** ***Condition W. Place channel in trip within 72 hours OR reduce THERMAL POWER to <P-7.*** **Function 13. b. SG Water Level - Low-Low Coincident with Vessel ΔT Equivalent to power > 50% RTP with no time delay (Ts and Tm = 0).** ***Condition V - Set the Trip Time Delay threshold power level for (TS) and (TM) to 0% power within 72 hours OR be in Mode 3 within 78 hours.*** • 3.3.2-1, "ESFAS Instrumentation. **Function 6. Auxiliary Feedwater** **b. 2. SG Water Level - Low-Low Coincident with Vessel coincident with Vessel ΔT equivalent to power > 50% RTP with no time delay (Ts and Tm = 0)** ***Condition N - Set the Trip Time Delay threshold power level for (Ts) and (Tm) to 0% power within 72 hours OR be in MODE 3 within 78 hours.***
CAUTION **Allowing at least 5 minutes between any rod control input (i.e., T-avg, T-ref, or NIS) changes and placing rods in AUTO, will help prevent undesired control rod movement.**		
	SRO	11. **NOTIFY** Chemistry of any reactor power changes greater than 15% in one hour.
	SRO	12. **IF** loop ΔT and loop Tavg channels were defeated due to Tavg channel failure, and Tavg channel has been repaired, **THEN PUSH IN** 1-XS-68-2D, ΔT CHANNEL DEFEAT, and 1-XS-68-2M, TAVG CHANNEL DEFEAT, and select away from all ΔT and Tavg channels. ***SRO determines that step is N/A since the Tavg channel has not been repaired.***

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Event Description: Loop 4 RTD fails high, causing rod insertion. Requires AOI-2 entry and a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
	RO	13. **WHEN** conditions allow auto rod control, **THEN:** a. **ENSURE** T-avg and T-ref within 1°F. b. **ENSURE** zero demand on control rod position indication [1-M-4]. c. **PLACE** rods in AUTO.
	RO	14. **WHEN** conditions allow auto pzr level control, **THEN ENSURE** pzr level returned to normal program, AND **PLACE** 1-FCV-62-93 in AUTO
	SRO	15. **RETURN TO** Instruction in effect.
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	SRO	**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).
Cue Simulator Operator to insert Event 3.		

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Event Description: 1A ERCW supply header ruptures in the Intake Pumping Station. AOI-13 entry and a Tech Spec evaluation are required.

Time	Position	Applicant's Actions or Behavior
Indications: 225-E TR A/B ERCW TO C&SS COMPR FLOW HI 223-A ERCW HDR A SUP PRESS LO 223-B ERCW PMP A-A DISCH PRESS LO 226-B ERCW PMP D-A DISCH PRESS LO 170-E IPS VLV & STRNR ROOM A SUMP LEVEL HI		
	BOP	Diagnoses and announces the 1A ERCW header rupture in the Intake Pumping Station.
	BOP	May dispatch the Outside Routine AUO to the Intake Pumping Station to determine location of rupture.
	SRO	Enters and directs actions of AOI-13, "Loss of Essential Raw Cooling Water," Section 3.5, "Supply Header Rupture at IPS."
EXAMINER: The following actions are taken from ARI 223-A, "ERCW HDR A SUP PRESS LO."		
	BOP	[1] **CHECK** 0-PI-67-18A, A ERCW SUP HDR PRESS [0-M-27A].
	BOP	[2] **DISPATCH** Operator to check ERCW Train A pumps.
	SRO	[3] **CHECK** valve alignment to ERCW Hdr A per SOI-67.01, *ESSENTIAL RAW COOLING WATER SYSTEM.*
	SRO	[4] **REFER TO** AOI-13, LOSS OF ESSENTIAL RAW COOLING WATER.
EXAMINER: The following actions are taken from AOI-13, "Loss of Essential Raw Cooling Water," Sub Section 3.5, "Supply Header Rupture at IPS."		
CAUTION This Section applies to a header break prior to the ERCW Strainer inlet valves or as directed by another section in this procedure.		
	BOP	1. **DISPATCH** personnel to determine location of rupture. ***Report from the field - 1A strainer room flooded, appears ruptured***
	BOP	2. **DISPATCH** AUO, with a radio, to the Rx MOV Bds.
NOTE MOVs with power normally removed may not travel to full closed position under high flow conditions; local verification of isolation may be required.		
	BOP	3. **CHECK** Train A Supply Header pressure at expected values for existing plant conditions.

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Event Description: 1A ERCW supply header ruptures in the Intake Pumping Station. AOI-13 entry and a Tech Spec evaluation are required.

Time	Position	Applicant's Actions or Behavior
	BOP	3. **RESPONSE NOT OBTAINED:** **PERFORM** the following: a. **UNLOCK**, and **CLOSE** bkr on Rx MOV Bd 1A2-A c/7B, 1-FCV-67-22. b. **UNLOCK**, and **CLOSE** bkr on Rx MOV Bd 1A2-A c/11B, 1-FCV-67-147. c. **UNLOCK**, and **CLOSE** bkr on Rx MOV Bd 1A2-A c/15E, 1-FCV-67-458. d. **UNLOCK**, and **CLOSE** bkr on Rx MOV Bd 2A2-A c/7B, 2-FCV-67-22. e. **ENSURE** 1-FCV-67-223, ERCW Hdr 1B To 2A Xtie, OPEN. f. **ENSURE** 2-FCV-67-223, ERCW Hdr 2A To 1B Xtie, OPEN. g. **OPEN** 1-FCV-67-458, CCS Hx A Sup From Hdr 1B. h. **STOP**, and **PULL TO LOCK** all Tr A ERCW Pumps. i. **CLOSE** 1-FCV-67-22, Strainer 1A-A Inlet. j. **CLOSE** 2-FCV-67-22, Strainer 2A-A Inlet. k. **START** additional Tr B ERCW Pumps as required. l. **OPEN** 1-FCV-67-147, CCS Hx C Sup From Hdr 1A. m. **ENSURE** 2-FCV-67-147, CCS Hx C Sup From Hdr 2B, is OPEN. n. **GO TO** Step 5.
NOTE 1 With ruptured header strainer inlet valves closed, the flow indicators on the isolated supply headers will be off-scale low. **NOTE 2** With ERCW headers cross-tied, evaluate LCO 3.0.3 applicability.		
	BOP	5. **CHECK** in-service header(s) flow(s) and pressure(s) return to expected values for existing plant conditions.
	BOP	6. **CHECK** pump amps within limits.

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Event Description: 1A ERCW supply header ruptures in the Intake Pumping Station. AOI-13 entry and a Tech Spec evaluation are required.

Time	Position	Applicant's Actions or Behavior
	SRO	7. **REFER TO** Tech Specs: • 3.0.3, Applicability ***Since the ERCW headers are cross-connected, entry into LCO 3.0.3 is required.*** • 3.4.6, RCS Loops-Mode 4 - ***Not applicable.*** • 3.7.8, Essential Raw Cooling Water System (ERCW) ***Entered, but LCO 3.0.3 is most limiting.*** ***Condition A. One ERCW train inoperable, other than for Condition C, 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources-Operating," for emergency diesel generator made inoperable by ERCW. Restore ERCW train to OPERABLE status within 72 hours*** • 3.8.1, AC Sources-Operating ***Condition C. Two required DGs in Train A inoperable may be entered. However, LCO 3.0.3 is the most limiting and a Safety Function Determination would be required in this situation.*** • OR 14.10 Fire Safe Shutdown Equipment ***14.10 With one or more of the breakers and/or valves specified in design output documents not in the noted position or condition, return the breakers and/or valve to the required position within 30 days.***
	SRO	8. **EVALUATE** ERCW availability to DGs. ***SRO may contact Work Control or Shift Manager to perform this evaluation.***
	SRO	9. **INITIATE** repair.
	SRO	10. **IF** ERCW to in-service CCS heat exchanger was interrupted, **THEN NOTIFY** Duty System Engineer to initiate evaluation for effect on CCS equipment and piping.
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	SRO	**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).
Cue Simulator Operator to insert Event 4.		

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Event Description: Steam Pressure transmitter, 1-PT-1-33 fails low, requiring manual control of main feedwater pump speed, and AOI-16 entry.

Time	Position	Applicant's Actions or Behavior
Indications: 63-F."SG LEVEL DEVIATION" MFP speed dropping. Main Feed Reg valves fully open. All SG levels dropping.		
	BOP	Diagnoses and announces failure of 1-PT-1-33.
	RO	May place control rods in MANUAL to stabilize the reactor during the feedwater transient.
	BOP	May place Main Feedwater Pump Master controller, 1-PC-46-20, in MANUAL and raise speed.
	SRO	Enters and directs actions of AOI-16, "Loss of Normal Feedwater," Sub Section 3.7, "MFW pump speed control circuit failure."
EXAMINER: The following actions are taken from AOI-16, "Loss of Normal Feedwater," Sub Section 3.7, "MFW pump speed control circuit failure."		
	BOP	1. **CHECK** MFWPT speed controller(s) NORMAL.
	BOP	1. **<u>RESPONSE NOT OBTAINED:</u>** **CONTROL** MFP speed using MANUAL control of master controller or individual controller(s) as required. (ρ) **IF** MANUAL control of individual MFWPT controller is ineffective, **THEN TRIP** affected MFWPT, and **GO TO** Section 3.4 or 3.5 as applicable.
	RO	2. **PLACE** control rods in MANUAL.
	BOP	3. **CHECK** MFW pumps recirc valves NORMAL.
	RO	4. (ρ) ENSURE T-avg and T-ref within 3°.
	BOP	5. **MAINTAIN** MFWP discharge press on PROGRAM.
	BOP	6. **ENSURE** S/G levels return to PROGRAM.
	BOP	7. **CHECK** steam dump mode in T-AVG position.
	SRO	8. **INITIATE** repairs to failed equipment.
	RO	9. (ρ) **IF** desired to place control rods in AUTO, **THEN ENSURE** T-avg and T-ref within 1° and **PLACE** control rods in auto.
	SRO	10. **WHEN** MFP pump control repairs completed, **THEN, PLACE** MFP speed control in AUTO. ***1-PT-1-33 will NOT be repaired, so MFP speed control will remain in MANUAL for the duration of the scenario.***
	SRO	11. **RETURN TO** Instruction in effect.

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Event Description: Steam Pressure transmitter, 1-PT-1-33 fails low, requiring manual control of main feedwater pump speed, and AOI-16 entry.

Time	Position	Applicant's Actions or Behavior
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	SRO	**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).
Cue Simulator Operator to insert Event 5.		

Op Test No.: NRC Scenario # 1 Event # 5 Page 14 of 55

Event Description: 1-LT-62-129 VCT LEVEL fails high, requiring entry into ARI 109-A, VCT LEVEL HI/LO.

Time	Position	Applicant's Actions or Behavior
Indications: 109-A VCT LEVEL HI/LO 1-LI-62-129A, VCT LEVEL indication is off-scale high.		
	RO	Diagnoses and announces failure of 1-LT-62-129A high.
	RO	May place 1-LCV-62-118, LETDOWN DIVERT TO HUT to the "VCT" position.
	SRO	Enters and directs actions of ARI 109 A, VCT LEVEL HI/LO.
EXAMINER: The following actions are taken from ARI 109-A, VCT LEVEL HI/LO.		
CAUTION 1 If either VCT level transmitter fails high, then auto swap over to RWST on low level is disabled. **CAUTION 2 1-LT-62-129A failing high will divert letdown flow but will not prevent auto makeup. 1-LI-62-129 will indicate offscale high; however, computer point L0112A will indicate actual level.** **CAUTION 3 1-LT-62-130A failing high will divert letdown and prevent auto makeup; however, 1-LI-62-129 will indicate actual level.**		
		[1] IF high level, **THEN** **[a] ENSURE** 1-LCV-62-118 diverted to HUT and **OPEN**. **[b] ENSURE** NO VCT makeup in progress.
		[2] IF low level, **THEN** • **ENSURE** 1-LCV-62-118 aligned to VCT. • **INITIATE** makeup in accordance with SOI-62.02, *BORON CONCENTRATION CONTROL.* • **ENSURE** suction to the Centrifugal Charging Pump swaps over to the RWST at 7% VCT level.
		[3] VERIFY letdown and charging in service and that Reactor Coolant Filter is not clogged.
		[4] IF 1-LCV-62-118 diverted to HUT due to instrument failure, **THEN** **[a] PLACE** 1-HS-62-118 in VCT position until repairs completed. **[b] PLACE** 1-HS-62-118 in P-AUTO position when repairs completed.
		[5] IF RCS leakage is suspected, **THEN GO TO** AOI-6, *SMALL REACTOR COOLANT SYSTEM LEAK.*
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.

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Event Description: 1-LT-62-129 VCT LEVEL fails high, requiring entry into ARI 109-A, VCT LEVEL HI/LO.

Time	Position	Applicant's Actions or Behavior
	SRO	**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).
Cue Simulator Operator to insert Event 6. The remaining malfunction will enter 10 seconds after the reactor trip initiation.		

Op Test No.:	NRC	Scenario #	1	Event #	6, 7, 8, and 9	Page	16	of 55

Event Description: Raw cooling water temperature control valve to the Stator Water Cooler fails closed. 15 seconds after the trip, a PZR vapor space break occurs, requiring a manual safety injection and entry into E-0. 10 seconds after the SI, offsite power is lost, and the DGs fail to auto start.

Time	Position	Applicant's Actions or Behavior
Indications: 22-E, "GEN AUX PNL 1-L-39 ALARM" 1-C, "STATOR TEMP HI" 1-B, "STATOR COOLING FAILURE"		
	BOP	Diagnoses and announces the loss of Raw Cooling water.
	BOP	Dispatches an AUO to investigate 22-E, GEN AUX PNL 1-L-39 ALARM.
	SRO	May direct reactor trip based on stator cooling water alarms, however, an automatic trip may take place before the alarm can be validated using ICS.
EXAMINER: This event will cause a reactor trip after approximately 2 minutes. The operators will dispatch personnel to investigate the reason for the loss of Raw Cooling Water, but will not have time to implement AOI-46, "Loss of Raw Cooling Water."		
EXAMINER: The following actions are taken from ARI 22-E, "GEN AUX PNL 1-L-39 ALARM"."		
	BOP	[1] **DISPATCH** Operator to determine cause of alarm.
	BOP	[2] **REFER TO** ARI-1-L-39, ANNUNCIATOR RESPONSE INSTRUCTION.
EXAMINER: The following actions are taken from ARI 1-C, "STATOR TEMP HI."		
	SRO	**[1] INITIATE** stator temperature monitoring per SOI-35.01, Generator Hydrogen Cooling System.
	BOP	**[2] ENSURE** generator operating within capability curve limits.
	SRO	**[3] CONSIDER** load reduction per GO-4, Normal Power Operation, to keep temperature within limits.
	BOP	**[4] DISPATCH** Operator to investigate and check proper operation of 1-TCV-24-52.
	BOP	**[5] IF** 1-TCV-24-52 not controlling temperature properly, **THEN THROTTLE OPEN** 1-BYV-24-926, STATOR COIL HS 1A/1B TEMP CNTL VLV BYPASS.
	BOP	**[6] MONITOR** stator coil discharge temperature on Plant Computer point, T3098A.
	SRO	**[7] IF** alarm is due to loss or partial loss of Raw Cooling Water, **THEN REFER TO** AOI-46, Loss of Raw Cooling Water.
EXAMINER: The following actions are taken from ARI 1-B, "STATOR COOLING FAILURE."		
	BOP	**[1] DISPATCH** Operator to Panel 1-L-39 to determine cause of

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Event Description: Raw cooling water temperature control valve to the Stator Water Cooler fails closed. 15 seconds after the trip, a PZR vapor space break occurs, requiring a manual safety injection and entry into E-0. 10 seconds after the SI, offsite power is lost, and the DGs fail to auto start.

Time	Position	Applicant's Actions or Behavior
		alarm and initiate corrective action.
	SRO/BOP	**[2] REDUCE** unit load to less than 15% of rated power.
	SRO	**[3] IF** turbine trips above 50% power, **THEN ENSURE** reactor trip, and **GO TO** E-0, Reactor Trip Or Safety Injection.
	SRO	**[4] IF** turbine trips below 50% power, **THEN GO TO** AOI-17, Turbine Trip.
	SRO	**[5] IF** alarm is due to loss or partial loss of Raw Cooling Water, **THEN REFER TO** AOI-46, Loss of Raw Cooling Water.
	SRO	**[6] NOTIFY** Work Control to initiate corrective action, if necessary.
EXAMINER: The following actions are taken from E-0, "Reactor Trip or Safety Injection."		
NOTE 1 Steps 1 thru 4 are **IMMEDIATE ACTION STEPS.**		
NOTE 2 Status Trees / SPDS should be monitored when transitioned to another instruction.		
	RO	1. **ENSURE** reactor trip: • Reactor trip and bypass breakers OPEN. • RPIs at bottom of scale. • Neutron flux DROPPING.
	RO	2. **ENSURE** Turbine Trip: • All turbine stop valves CLOSED.
	RO	3. **CHECK** 6.9 kV shutdown boards: a. At least one board energized from: CSST (offsite), OR D/G (blackout).

Critical Task 2

WOG Critical Task List, E-0, C.

Energize at least one ac emergency bus before transition out of E-0, unless the transition is to ECA-0.0, in which case the critical task must be performed before placing safeguards equipment handswitches in the pull-to-lock position.

Guideline ECA-0.0 is developed and structured to address the condition where all ac emergency power is lost. It is entered on the symptom of all ac emergency busses being de-energized. Its objective is to cope with the loss of ac emergency power until at least one ac emergency bus can be energized. ECA-0.0 should not be entered if at least one ac emergency bus is energized since the other optimal recovery guidelines and function restoration guidelines contain guidance that accommodates multiple failures.

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Event Description: Raw cooling water temperature control valve to the Stator Water Cooler fails closed. 15 seconds after the trip, a PZR vapor space break occurs, requiring a manual safety injection and entry into E-0. 10 seconds after the SI, offsite power is lost, and the DGs fail to auto start.

Time	Position	Applicant's Actions or Behavior
Critical Task 2	RO	3. **RESPONSE NOT OBTAINED:** **RESTORE** power to at least one train of shutdown boards: 1) **EMERGENCY START** D/G [1-M-1]. 2) **IF** both trains shutdown boards remain de-energized, **THEN PLACE** 6.9kV SD Bd transfer switch in MAN [1-M-1], and **CLOSE** supply breaker from energized source. **IF** power can **NOT** be restored to at least one train of shutdown boards, **THEN** ** **GO TO** ECA-0.0, Loss of Shutdown Power.
	RO	4. **CHECK** SI actuated: a. Any SI annunciator LIT. b. Both trains SI **ACTUATED**. • 1-XX-55-6C • 1-XX-55-6D
EXAMINER: A PZR vapor space break occurs 10 seconds after the reactor trip, and automatic safety injection actuation fails to occur. Performance of Step 4 RNO actions is expected.		
Critical Task 1 *from WOG Critical Task List, E-0, D* *Manually actuate at least one train of SIS-actuated safeguards before any of the following:* • *Transition to any E-1 series, E-2 series, or E-3 series procedure or transition to any FRG* • *Completion of step 5.a of ES-0.1*		
Critical Task 1 ***Manually initiate SI (Auto SI failure).***	SRO/RO	4. **RESPONSE NOT OBTAINED:** **DETERMINE** if SI required: a. **IF** ANY of the following exists: • S/G press less than 675 psig, OR • RCS press less than 1870 psig, OR • Cntmt press greater than 1.5 psig **THEN ACTUATE** SI manually. **IF** SI **NOT** required, **THEN** ** **GO TO** ES-0.1, b. **ACTUATE** SI manually.
EXAMINER: The following actions are taken from ECA-0.0, "Loss of Shutdown Power," and will not be used if the DGs are started during the performance of E-0.-		
NOTE • Steps 1 and 2 are IMMEDIATE ACTION STEPS. • Status Trees should be monitored for information only. The FRs should NOT be implemented.		

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Event Description: Raw cooling water temperature control valve to the Stator Water Cooler fails closed. 15 seconds after the trip, a PZR vapor space break occurs, requiring a manual safety injection and entry into E-0. 10 seconds after the SI, offsite power is lost, and the DGs fail to auto start.

Time	Position	Applicant's Actions or Behavior
	RO	1. **ENSURE** reactor trip: • Reactor trip and bypass breakers OPEN. • RPIs at bottom of scale. • Neutron flux DROPPING.
	BOP	2. **ENSURE** turbine trip: • All turbine stop valves CLOSED.
	RO	3. **ENSURE** RCPs STOPPED, and Momentarily **PLACE** Handswitches in STOP to break seal-in.
	RO	4. **ENSURE** RCS isolated: a. **CHECK** pzr PORVs CLOSED. b. **ENSURE** letdown orifice valves CLOSED. c. **ENSURE** letdown isolation valves CLOSED: • 1-FCV-62-69. • 1-FCV-62-70. d. **ENSURE** excess letdown isolation valves CLOSED: • 1-FCV-62-54. • 1-FCV-62-55.
	BOP	5. **ENSURE** TD AFW pump operation: a. **ENSURE** flow greater than 410 gpm. b. **IF** loss of control air is imminent, **THEN DISPATCH** operator to locally control S/G levels USING SOI-3.02, Auxiliary Feedwater System.
Critical Task 2 *WOG Critical Task List, E-0, C.* *Energize at least one ac emergency bus before transition out of E-0, unless the transition is to ECA-0.0, in which case the critical task must be performed before placing safeguards equipment handswitches in the pull-to-lock position.* *Guideline ECA-0.0 is developed and structured to address the condition where all ac emergency power is lost. It is entered on the symptom of all ac emergency busses being de-energized. Its objective is to cope with the loss of ac emergency power until at least one ac emergency bus can be energized. ECA-0.0 should not be entered if at least one ac emergency bus is energized since the other optimal recovery guidelines and function restoration guidelines contain guidance that accommodates multiple failures.*		
Critical Task 2	BOP	6. **RESTORE** power to shutdown boards: a. **ENERGIZE** shutdown boards: 1) **EMERGENCY START** D/G. 2) **ENSURE** shutdown boards ENERGIZED. 3) **ENSURE** ERCW supply to running D/Gs. b. **IF** at least one shutdown board energized, **THEN RETURN TO** Instruction in effect, AND **IMPLEMENT** FRGs as necessary.

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Event Description: Raw cooling water temperature control valve to the Stator Water Cooler fails closed. 15 seconds after the trip, a PZR vapor space break occurs, requiring a manual safety injection and entry into E-0. 10 seconds after the SI, offsite power is lost, and the DGs fail to auto start.

Time	Position	Applicant's Actions or Behavior
EXAMINER: The following actions are taken from E-0, "Reactor Trip or Safety Injection," since E-0 was the procedure in effect prior to the loss of power.		
NOTE 1 Steps 1 thru 4 are IMMEDIATE ACTION STEPS.		
NOTE 2 Status Trees / SPDS should be monitored when transitioned to another instruction.		
	RO	1. **ENSURE** reactor trip: • Reactor trip and bypass breakers OPEN. • RPIs at bottom of scale. • Neutron flux DROPPING.
	RO	2. **ENSURE** Turbine Trip: • All turbine stop valves CLOSED.
	RO	3. **CHECK** 6.9 kV shutdown boards: a. At least one board energized from: CSST (offsite), OR D/G (blackout).
	RO	4. **CHECK** SI actuated: a. Any SI annunciator LIT. b. Both trains SI **ACTUATED**. • 1-XX-55-6C • 1-XX-55-6D
EXAMINER: The following actions area continuation of E-0, "Reactor Trip or Safety Injection." If the crew does not implement ECA-0.0, "Loss of Shutdown Power," this step will be performed after Step 4 which appeared on Page 18 of 55.		
EXAMINER: Appendices A and B (E-0) are provided on pages 28 through 42.		
	BOP	5. **EVALUATE** support systems: • **REFER TO** Appendixes A and B (E-0), Equipment Verification pages 15-28.
	SRO	6. **ANNOUNCE** reactor trip and safety injection over PA system.
	RO	7. **ENSURE** secondary heat sink available with either: • Total AFW flow greater than 410 gpm, OR • At least one S/G NR level greater than 29% [39% ADV].

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Event Description: Raw cooling water temperature control valve to the Stator Water Cooler fails closed. 15 seconds after the trip, a PZR vapor space break occurs, requiring a manual safety injection and entry into E-0. 10 seconds after the SI, offsite power is lost, and the DGs fail to auto start.

Time	Position	Applicant's Actions or Behavior
	RO	8. **MONITOR** RCS temp stable at or trending to 557°F: • **IF** any RCP running, **THEN MONITOR** RCS Loop T-avg trending to 557°F. OR • **IF** NO RCP running, **THEN MONITOR** RCS Loop T-cold trending to 557°F.
		8. **RESPONSE NOT OBTAINED:** **IF** temp less than 557°F, **THEN ENSURE** steam dumps and S/G PORVs CLOSED. **IF** cooldown continues, **THEN:** • **PLACE** steam dump controls OFF. • **CONTROL** total AFW flow to maintain greater than 410 gpm UNTIL NR level in at least one S/G greater than 29% [39% ADV]. **IF** cooldown continues after AFW flow is controlled, **THEN** • **CLOSE** MSIVs. • **ENSURE** MSIV bypasses CLOSED. **IF** RCS temp greater than 564°F, **THEN ENSURE** either steam dumps or S/G PORVs OPEN.
	RO	9. **ENSURE** excess letdown valves CLOSED: • 1-FCV-62-54 • 1-FCV-62-55
	RO	10. **CHECK** pzr PORVs and block valves: a. Pzr PORVs CLOSED. b. At least one block valve OPEN.
		11. **CHECK** pzr safety valves CLOSED: • **EVALUATE** tailpipe temperatures and acoustic monitors.
		12. **CHECK** pzr sprays CLOSED.
NOTE **Seal injection flow should be maintained to all RCPs.**		
EXAMINER: Due to the loss of offsite power, the RCPs are off.		
		13. **CHECK** if RCPs should remain in service: a. Phase B signals DARK [MISSP]. b. RCS pressure greater than 1500 psig.

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Event Description: Raw cooling water temperature control valve to the Stator Water Cooler fails closed. 15 seconds after the trip, a PZR vapor space break occurs, requiring a manual safety injection and entry into E-0. 10 seconds after the SI, offsite power is lost, and the DGs fail to auto start.

Time	Position	Applicant's Actions or Behavior
		14. **CHECK** S/G pressures: • All S/G pressures controlled or rising. • All S/G pressures greater than 120 psig.
		15. **CHECK** for RUPTURED S/G • All S/Gs narrow range levels CONTROLLED or DROPPING. • Secondary side radiation NORMAL from Appendix A.
EXAMINER: 1B Containment Spray Pump will receive an automatic start signal prior to the loss of offsite power. When power is lost, the Containment Spray pump will be shed, and then reloaded after a 184 second time delay. The BOP will monitor this process during performance of E-0, Appendix A.		
		16. **CHECK** cntmt conditions: • Cntmt pressure NORMAL. • Radiation NORMAL from Appendix A. • Cntmt sump level NORMAL. • Cntmt temp ann window DARK [104-B].
		16. **RESPONSE NOT OBTAINED:** ** **GO TO** E-1, Loss of Reactor or Secondary Coolant.
EXAMINER: The following actions are taken from E-1, "Loss of Reactor or Secondary Coolant."		
EXAMINER: When the vapor space break occurs, containment temperature and pressure will rise sharply. 265-A UPPER CNTMT RE-271/272 RAD HI and 265-B LOWER CNTMT RE-273/274 are expected to alarm, since testing has shown rad monitor to give unreliable indication for up to 2 minutes following a rapid increase or decrease in containment temperature. The alarms will clear after the initial temperature transient.		
NOTE **Seal injection flow should be maintained to all RCPs.**		
	RO	1. **CHECK** if RCPs should remain in service: a. Phase B DARK [MISSP]. b. RCS pressure greater than 1500 psig.
	SRO	2. **REFER TO** EPIP-1, Emergency Plan Classification Flowchart.
NOTE **Time since initiation of event is defined by performance of Step 3.**		
	SRO	3. **RECORD** current time to mark initiation of LOCA and determination of time for hot leg recirc.

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Event Description: Raw cooling water temperature control valve to the Stator Water Cooler fails closed. 15 seconds after the trip, a PZR vapor space break occurs, requiring a manual safety injection and entry into E-0. 10 seconds after the SI, offsite power is lost, and the DGs fail to auto start.

Time	Position	Applicant's Actions or Behavior
	RO	4. **CHECK** S/G pressures: • All S/G pressures controlled or rising. • All S/Gs pressures greater than 120 psig.
	BOP	5. **MAINTAIN** Intact S/G NR levels: a. **MONITOR** levels greater than 29% [39% ADV]. b. **CONTROL** intact S/G levels between 29% and 50% [39% and 50% ADV].
EXAMINER: The status of secondary radiation may have already been reported by the BOP during performance of E-0 Appendix A.		
	BOP	6. **CHECK** secondary radiation: • S/G discharge monitors NORMAL. • Condenser vacuum exhaust rad monitors NORMAL. • S/G blowdown rad monitor recorders NORMAL trend prior to isolation.
	BOP	7. **ENSURE** cntmt hydrogen analyzers in service: • **PLACE** 1-HS-43-200A in ANALYZE [M-10]. • **PLACE** 1-HS-43-210A in ANALYZE [M-10]. • **CHECK** low flow lights not lit [M-10]. • Locally **CHECK** low analyzer temp lights NOT lit [North wall of Train A 480V SD Bd rm].
	RO	8. **MONITOR** pzr PORVs and block valves: a. Pzr PORVs CLOSED. b. At least one block valve OPEN.
EXAMINER: Containment pressure may not be below 2.0 psig when the operators evaluate this step initially. Since it is a continuous action step, when containment pressure does drop below 2.0 psig, the actions will be performed.		
	SRO	9. **DETERMINE** if cntmt spray should be stopped: a. **MONITOR** cntmt pressure less than 2.0 psig. b. **CHECK** at least one cntmt spray pump RUNNING. c. **RESET** cntmt spray signal. d. **STOP** cntmt spray pumps, and **PLACE** in A-AUTO. e. **CLOSE** cntmt spray discharge valves 1-FCV-72-2 and 1-FCV-72-39.
	RO	a. **RESPONSE NOT OBTAINED:** **WHEN** cntmt pressure is less than 2.0 psig, **THEN PERFORM** Sub steps 9b thru e.

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Event Description: Raw cooling water temperature control valve to the Stator Water Cooler fails closed. 15 seconds after the trip, a PZR vapor space break occurs, requiring a manual safety injection and entry into E-0. 10 seconds after the SI, offsite power is lost, and the DGs fail to auto start.

Time	Position	Applicant's Actions or Behavior
	BOP	10. **ENSURE** both pocket sump pumps STOPPED [M-15]: • 1-HS-77-410. • 1-HS-77-411.
	RO	11. **CHECK** SI termination criteria: a. **CHECK** RCS subcooling greater than 65°F [85°F ADV].
	SRO	a. **RESPONSE NOT OBTAINED:** ** **GO TO** Caution prior to Step 12.
CAUTION If offsite power is lost after SI reset, manual action will be required to restart the SI pumps and RHR pumps due to loss of SI start signal.		
	RO	12. **RESET** SI and **CHECK** the following: • SI ACTUATED permissive DARK. • AUTO SI BLOCKED permissive LIT.
	RO	13. **DETERMINE** if RHR pumps should be stopped: a. **CHECK** RCS pressure greater than 150 psig. b. **CHECK** RHR suction aligned from RWST. c. **CHECK** RCS pressure stable or rising. d. **STOP** RHR pumps and **PLACE** in A-AUTO. e. **MONITOR** RCS pressure greater than 150 psig.
	RO	14. **CHECK** pressure in all S/Gs controlled or rising.
	RO	15. **CHECK** RCS pressure stable or dropping.
	BOP	16. **MONITOR** electrical board status: a. **CHECK** offsite power available.
EXAMINER: AOI-35, "Loss of Offsite Power," steps are provided on Pages 43 through 47.		
	BOP	16. **RESPONSE NOT OBTAINED:** a. **RESTORE** offsite power USING AOI-35, Loss of Offsite Power.
EXAMINER: AOI-17, "Turbine Trip," BOP Realignment steps are provided on pages 48 through 54.		
	BOP	17. **INITIATE** BOP realignment: • **REFER TO** AOI-17, Turbine Trip.

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Event Description: Raw cooling water temperature control valve to the Stator Water Cooler fails closed. 15 seconds after the trip, a PZR vapor space break occurs, requiring a manual safety injection and entry into E-0. 10 seconds after the SI, offsite power is lost, and the DGs fail to auto start.

Time	Position	Applicant's Actions or Behavior
	BOP	18. **INITIATE** 480V board room breaker alignments USING the following: • Appendix A (E-1), CLA Breaker Operation. • Appendix B (E-1), Ice Condense AHU Breaker Operation. • Appendix C (E-1), 1-FCV-63-1 Breaker Operation. • Appendix D (E-1), 1-FCV-63-22 Breaker Operation.
	BOP	19. **DETERMINE** if hydrogen igniters should be energized: a. **CHECK** hydrogen analyzers in service. b. **CHECK** cntmt hydrogen less than 5% [M-10]. c. **ENERGIZE** hydrogen igniters [M-10]: • 1-HS-268-73 ON. • 1-HS-268-74 ON.
	RO	20. **ENSURE** RHR available for cntmt sump recirculation: • Power to at least one operable RHR pump AVAILABLE. • Cntmt sump valve 1-FCV-63-72 or 1-FCV-63-73 to operable RHR pump AVAILABLE.
EXAMINER: Appendix E (E-1), "Equipment Evaluation" is provided on page 55.		
	BOP	21. **EVALUATE** plant equipment status: • **REFER TO** Appendix E (E-1), Equipment Evaluation.
	BOP	22. **CHECK** Aux Bldg radiation for loss of RCS inventory outside cntmt: a. Area monitor recorders 1-RR-90-1 and 0-RR-90-12A Aux Bldg points NORMAL. b. Vent monitor recorder 0-RR-90-101 NORMAL trend prior to isolation.
	SRO	23. **NOTIFY** Chemistry of event status and plant conditions.
	SRO	24. **DETERMINE** if RCS cooldown and depressurization is required: a. **CHECK** RCS pressure greater than 150 psig. b. ** **GO TO** ES-1.2, Post LOCA Cooldown and Depressurization.
EXAMINER: The following actions are taken from ES-1.2, "Post-LOCA Cooldown and Depressurization."		
	SRO	1. **PREPARE** for switchover to RHR cntmt sump: a. **RESTORE** power to 1-FCV-63-1, RWST to RHR suction, USING Appendix A, (ES-1.2) 1-FCV-63-1 Breaker Operation. b. **WHEN** RWST level less than 34%, **THEN** ** **GO TO** ES-1.3, Transfer to Containment Sump.

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Event Description: Raw cooling water temperature control valve to the Stator Water Cooler fails closed. 15 seconds after the trip, a PZR vapor space break occurs, requiring a manual safety injection and entry into E-0. 10 seconds after the SI, offsite power is lost, and the DGs fail to auto start.

Time	Position	Applicant's Actions or Behavior
CAUTION **If offsite power is lost after SI reset, manual action will be required to restart the SI pumps and RHR pumps due to loss of SI start signal.**		
	RO	2. **RESET** SI, and **CHECK** the following: • SI ACTUATED permissive DARK. • AUTO SI BLOCKED permissive LIT.
	RO	3. **RESET** Phase A and Phase B.
	BOP	4. **ENSURE** cntmt air in service: a. Aux air press greater than 75 psig [M-15]. b. Cntmt air supply valves OPEN [M-15]: • 1-FCV-32-80. • 1-FCV-32-102. • 1-FCV-32-110.
	BOP	5. **MONITOR** electrical board status: a. **CHECK** offsite power available.
	SRO	5. **RESPONSE NOT OBTAINED:** a. **RESTORE** offsite power USING AOI-35, Loss of Offsite Power. ***AOI-35 is already in progress.***
NOTE **Backup heater C bank may need to be placed in AUX at the breaker compt to ensure it is turned OFF.**		
	RO	6. **ENSURE** pzr heaters off: • **PLACE** Backup heaters A-A OFF. • **PLACE** Backup heaters B-B OFF. • **PLACE** Backup heaters C OFF. • **PLACE** Control heaters D OFF.
	RO	7. **DETERMINE** if RHR pumps should be stopped: a. **CHECK** RHR suction aligned from RWST. b. **CHECK** RCS press: • RCS press greater than 150 psig. • RCS press stable or rising. c. **STOP** RHR pumps, and **PLACE** in A-AUTO. d. **MONITOR** RCS press greater than 150 psig.

Op Test No.: NRC Scenario # 1 Event # 6, 7, 8, and 9 Page 27 of 55

Event Description: Raw cooling water temperature control valve to the Stator Water Cooler fails closed. 15 seconds after the trip, a PZR vapor space break occurs, requiring a manual safety injection and entry into E-0. 10 seconds after the SI, offsite power is lost, and the DGs fail to auto start.

Time	Position	Applicant's Actions or Behavior
	RO	8. **MONITOR** Intact S/G NR levels: a. At least one intact S/G NR level greater than 29% [39% ADV]. b. **CONTROL** intact S/G levels between 29% and 50% [39% and 50% ADV].
	SRO	9. **EVALUATE** Motor-Driven AFW Pumps recirc flow per FOP.
NOTE **The following boration will result in a CB in the ACTIVE portion of the RCS which will be higher than the calculated cold shutdown CB.**		
	SRO	10. **INITIATE** RCS boration to cold shutdown boron concentration: a. **DETERMINE** cold shutdown CB: • **REFER TO** 1-SI-0-10, Shutdown Margin, OR REACTINW Computer Program. b. **INITIATE** RCS boration: • **REFER TO** SOI-62.02, CVCS Boron Concentration Control.
	SRO	11. **MONITOR** shutdown margin during RCS cooldown: a. **NOTIFY** Chemistry to monitor RCS boron concentration at the following sample points: • RCS hot leg. • CVCS letdown line.
NOTE **After the low steamline pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.**		
	SRO	12. **INITIATE** RCS cooldown to cold shutdown: a. **WHEN** RCS pressure is less than 1962 psig (P-11), **THEN** • **BLOCK** low pzr pressure SI. • **BLOCK** low steam pressure SI. b. **MAINTAIN** T-cold cooldown rate less than 100°F in one hour. ***SRO determines that the RCS has cooled down more than 100 °F in the last hour, and that an additional cooldown will not be accomplished at this time.***
EXAMINER: When Step 12 is addressed, and the SRO determines that a cooldown cannot be performed, inform the crew that another crew will take over from this point.		
END OF SCENARIO		

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

1.	**ENSURE** PCBs OPEN: • PCB 5084. • PCB 5088.	**OPEN** manually.
2	**ENSURE** AFW pump operation: • Both MD AFW pumps RUNNING. • TD AFW pump RUNNING. • LCVs in AUTO, or controlled in MANUAL.	**ESTABLISH** at least one train AFW operation.
3.	**ENSURE** MFW isolation: • MFW isolation and bypass isolation valves CLOSED. • MFW reg and bypass reg valves CLOSED. • MFP A and B TRIPPED. • Standby MFP STOPPED. • Cond demin pumps TRIPPED. • Cond booster pumps TRIPPED.	Manually **CLOSE** valves and **STOP** pumps, as necessary. **IF** any valves can **NOT** be closed, **THEN** **CLOSE** #1 heater outlet valves.

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

4. **MONITOR** ECCS operation:

a. Charging pumps RUNNING.	a. Manually **START** charging pumps.
b. Charging pump alignment: • RWST outlets 1-LCV-62-135 and 1-LCV-62-136 OPEN. • VCT outlets 1-LCV-62-132 and 1-LCV-62-133 CLOSED. • Charging 1-FCV-62-90 and 1-FCV-62-91 CLOSED.	b. **ENSURE** at least one valve in each set aligned.
c. RHR pumps RUNNING.	c. Manually **START** RHR pumps.
d. SI pumps RUNNING.	d. Manually **START** SI pumps.
e. BIT alignment: • Outlets 1-FCV-63-25 and 1-FCV-63-26 OPEN. • Flow thru BIT.	e. **ENSURE** at least one valve aligned, and flow thru BIT.
f. RCS pressure greater than 1650 psig.	f. **ENSURE** SI pump flow. **IF** RCS press drops to less than 150 psig, **THEN** **ENSURE** RHR pump flow.

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

5	**CHECK** cntmt isolation: a. Phase A isolation: • Train A GREEN. • Train B GREEN. b. Cntmt vent isolation: • Train A GREEN. • Train B GREEN.	**ACTUATE** Phase A and Cntmt Vent Isolation signal, **OR** Manually **CLOSE** valves and dampers as necessary.

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

6.	**CHECK** cntmt pressure: • Phase B DARK [MISSP]. • Cntmt Spray DARK [MISSP]. • Cntmt press less than 2.8 psig.	**PERFORM** the following: 1) **ENSURE** Phase B actuated. 2) **ENSURE** Cntmt Spray actuated. 3) **ENSURE** cntmt spray pumps running. 4) **ENSURE** cntmt spray flow. 5) **ENSURE** Phase B isolation: • Train A GREEN. • Train B GREEN • Manually **CLOSE** valves and dampers as necessary. 6) **STOP** all RCPs. 7) **ENSURE** MSIVs and bypasses CLOSED. 8) **PLACE** steam dump controls OFF. 9) **WHEN** 10 minutes has elapsed since Phase B actuated, **THEN** **ENSURE** air return fans start. 10) **USE** adverse cntmt [ADV] setpoints where provided.

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

7.	**CHECK** plant radiation NORMAL: • S/G blowdown rad recorder 1-RR-90-120 NORMAL prior to isolation [M-12]. • Condenser vacuum exhaust rad recorder 1-RR-90-119 NORMAL prior to trip [M-12]. • 1-RR-90-106 and 1-RR-90-112 radiation recorders NORMAL prior to isolation [M-12]. • S/G main steamline discharge monitors NORMAL [M-30]. • Upper and Lower containment high range monitors NORMAL [M-30]. • **NOTIFY** Unit Supervisor conditions NORMAL.	**NOTIFY** Unit Supervisor IMMEDIATELY.
8	**ENSURE** all D/Gs RUNNING.	**EMERGENCY START** D/Gs

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

9.	**ENSURE** ABGTS operation:	
	a. ABGTS fans RUNNING.	a. Manually **START** fans.
	b. ABGTS dampers OPEN: • FCO-30-146A. • FCO-30-146B. • FCO-30-157A. • FCO-30-157B.	b. Locally **OPEN** dampers.
10.	**ENSURE** at least four ERCW pumps RUNNING, one on each shutdown board preferred.	Manually **START** pumps as necessary.
11.	**ENSURE** ERCW supply valves OPEN to running D/Gs.	**IF** ERCW can **NOT** be aligned to running D/G, **THEN** **EMERGENCY STOP** affected D/G.
12.	**ENSURE** CCS HX C ALT DISCH TO HDR B, 0-FCV-67-152, is open to position A.	Manually **OPEN** 0-FCV-67-152 to position A.

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

13.	**CLOSE** CCS HX C DISCH TO HDR A, 0-FCV-67-144.	
14.	**MONITOR** EGTS operation: • EGTS fans RUNNING. • **ENSURE** dampers OPEN VERIFY filter bank dp between 5 and 9 inches of water.	Manually **START** fans **OPEN** dampers.
15.	**ENSURE** CCS pumps RUNNING: • 1A-A CCS pump. • 1B-B CCS pump. • C-S OR 2B-B CCS pump.	Manually **START** pumps as necessary.

NOTE
- The Upper and Lower Cntmt rad monitors sampling pumps should be shutdown if the sample flowpath is isolated.
- The following equipment is located on 1-M-9.

16.	**CHECK** CNTMT PURGE fans STOPPED:	**STOP** fans and **PLACE** handswitch in PULL-TO-LOCK.

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

17.	**CHECK** FUEL HANDLING EXH fans STOPPED, Fuel and Cask loading dampers CLOSED:	**STOP** fans and **PLACE** handswitch in PULL-TO-LOCK, manually **CLOSE** dampers.
18.	**ENSURE** AB GEN SUPPLY and EXH fans STOPPED.	**STOP** fans and **PLACE** handswitch in PULL-TO-LOCK.

NOTE • Dampers 1-HS-30-158 and 2-HS-30-270 remain open during ABI.

19.	**ENSURE** AB GEN SUP & EXH dampers CLOSED.	Manually **CLOSE** dampers.
20.	**ENSURE** MCR & SPREAD RM FRESH AIR dampers CLOSED: • FCV-31-3. • FCV-31-4.	Manually **CLOSE** dampers.

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

21.	**ENSURE** at least one CB EMER CLEANUP fan RUNNING and associated damper OPEN: • CB EMERG CLEANUP FAN A-A, OR Fan B-B RUNNING. • FCO-31-8, OPEN. OR FCO-31-7, OPEN.	Manually **START** fan. **NOTIFY** TSC if at least one damper NOT OPEN.
22.	**ENSURE** at least one CB EMER PRESS fan RUNNING and associated damper OPEN: • CB EMERG PRESS FAN A-A, OR FAN B-B RUNNING. • FCO-31-6, OPEN. OR FCO-31-5, OPEN.	Manually **START** fan. **NOTIFY** TSC if at least one damper NOT OPEN.

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

23.	**ENSURE** Control Building fans STOPPED and dampers CLOSED: • SPREADING ROOM SUPPLY and EXH FANS AND dampers. • TOILET & LKR RM EXHAUST FAN AND dampers.	Manually **STOP** fans. **NOTIFY** TSC if any damper NOT CLOSED.
24.	**INITIATE** Appendix B.	

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Step	Action/Expected Response	Response Not Obtained

APPENDIX B
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PHASE B PIPE BREAK CONTINGENCIES

1.	**CHECK** PHASE B actuated. (MISSP - 1-XX-55-6C, -6D)	**WHEN** PHASE B actuation occurs; **THEN** **GO TO** step 2.
2.	**ENSURE** 1-FCV-32-110 CLOSED. (CISP - 1-XX-55-6E) [A-train, window 13]	**DISPATCH** AUO to perform ATTACHMENT B1.
3.	**ENSURE** 1-FCV-67-107 CLOSED. (CISP - 1-XX-55-6E) [A -train, window 43]	**DISPATCH** AUO to perform ATTACHMENT B2.
4.	**ENSURE** 1-FCV-70-92 CLOSED. (CISP - 1-XX-55-6E) [A -train, window 73]	**DISPATCH** AUO to perform ATTACHMENT B3.
5.	**ENSURE** 1-FCV-70-140 CLOSED. (CISP - 1-XX-55-6F) [B -train, window 74]	**DISPATCH** AUO to perform ATTACHMENT B4.

ATTACHMENT B1
(E-0)
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CONTROL AIR ISOLATION

1. **CLOSE** 0-ISV-32-1013 - CONTROL AIR EL 713 AB HDR ISOL [A6/S EL. 713] (chain operated - behind Fuel and Waste Handling Bd. A).

2. **IF** 0 ISV 32 1013 CANNOT BE CLOSED,
   THEN:

   OPEN and **DISCONNECT** C&SS air compressor breakers:

   a) 0-BKR-32-25 - 480V SD BD 1A2-A, C/3D

   b) 0-BKR-32-26 - 480V SD BD 1B1-B, C/3D

   c) 0-BKR-32-27 - 480V AUX BLDG COM BD, C/6C

   d) 0-BKR-32-4900A - 480V TURB BLDG COM BD, C/6C

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ATTACHMENT B2
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ERCW ISOLATION

1. **UNLOCK AND CLOSE** 1-ISV-67-523B - LOWER CNTMT VENT CLR 1B &1D ERCW SUP ISOL [A2U/692] (U-1 penetration room - North of AB Pipe Chase Cooler 1B-B in overhead)

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ATTACHMENT B3
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CCS RETURN ISOLATION

1. **CLOSE** 1-ISV-70-700 RCP OIL COOLER CCS RETURN ISOLATION [A4/V EL. 710 U-1 Penetration Room] (approximately 10 ft. North of Penetration Room Cooler 1B-B on mezzanine above RHR Sump Valve Room)

ATTACHMENT B4
(E-0)
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CCS SUPPLY ISOLATION

1. **CLOSE** 1-ISV-70-516 REACTOR BUILDING CCS SUPPLY ISOLATION [A671 EL. 737] (Behind Elevator approximately 2 ft. west on mezzanine above "A" CCS Heat Exchanger)

3.3 **OPERATOR ACTIONS** (Loss Of Both 161 KV Power Supplies)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE Operation or realignment of any equipment which is in service (or removed from service) as directed by AOI-43 series of instructions requires Shift Manager approval.	
1. **CHECK** all 6.9 KV Shutdown Boards ENERGIZED.	**REFER TO** AOI-43 series
2. **ANNOUNCE** loss of power over PA.	
3. **CHECK** Station Service is supplied from USSTs.	**PERFORM** the following: a. **ENSURE** Reactor TRIPPED. b. ** **GO TO** E-0 Reactor Trip Or Safety Injection, WHILE continuing with this instruction.
4. **CHECK** duration of the power outage will be two hours or more.	** **GO TO** Step 6.
5. **CONTACT** the Operations Duty Specialist (ODS) to verify the Telecommunications backup D/G is supplying the telecommunications building equipment (their alarm should be clear).	**CONTACT** ODS or HELP line (4357) to dispatch personnel to ensure D/G to the communications building equipment operating properly.

3.3 **OPERATOR ACTIONS** (Loss Of Both 161 KV Power Supplies)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. **PERFORM** the following for each bus or board listed in the table below: a. **CLEAR** white disagreement lights. b. **PLACE** Auto transfer switches to MANUAL.	

BUS/BOARD	BREAKER I.D.	TRANSFER SW.
6.9 KV Common Board A	1526	1-XS-57-89 [1-M-1]
6.9 KV Common Board B	1626	2-XS-57-89 [2-M-1]
Start Bus A	1512	START BUS 1 [ECB]
Start Bus B	1612	START BUS 2 [ECB]
RCP Start Bus A	2512	RCP ST BUS A [ECB]
RCP Start Bus B	2612	RCP ST BUS B [ECB]

7. **CHECK** RCP's OFF.	** **GO TO** Step 9.
8. **PLACE** normal supply hand switch for each RCP to STOP (pushed in) position (spring return to mid-position).	
9. **PLACE** alternate supply hand switch for each RCP to MANUAL (pushed in) and then STOP position (spring return to mid-position).	
10. **CHECK** Unit in Mode 6	** **GO TO** ATTACHMENT 1 "Control Of Plant Systems During LOOP (Loss Of Offsite Power)", AND ** **GO TO** CAUTION prior to Step 12.

3.3 **OPERATOR ACTIONS** (Loss Of Both 161 KV Power Supplies)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11. **SUSPEND** core alterations.	
CAUTION **Deenergizing both 6.9Kv common boards will cause fire-RSW header pressure to drop quickly (loss of RCW pumps), deluge type fire protection valves may open.**	
12. **CHECK** 6.9 KV Common Board A transferred to alternate feed (USSTs).	**ENERGIZE** the deenergized 6.9 KV Common Board from the associated USST IF the Unit is not tripped.
13. **NOTIFY** Northeast Area Dispatcher [NEAD] of loss of 161Kv line(s), and request lines returned to service.	
14. **REFER TO** EPIP-1, Emergency Plan Classification Flowchart:	
a. **DETERMINE** classification of event, and	
b. **INITIATE** manning the TSC. (if necessary)	b. **IF** TSC is NOT to be manned, **THEN** **REFER TO** TI-128, and **PLACE** ERCW strainers & traveling screens in continuous backwash per SOI.67.01.
15. **CHECK** cooling water available to Secondary Systems (RCW Pumps running).	**PERFORM** controlled shutdown USING GO-4, GO-5, and GO-6 as applicable.

3.3 **OPERATOR ACTIONS** (Loss Of Both 161 KV Power Supplies)

	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16.	**DISPATCH** personnel to the following locations to inspect for equipment abnormalities: • Relay room. • 6.9KV CSST switchgear housing. • Start bus switchgear housing.	
17.	**CHECK** control air NORMAL: • Required compressors running [T4M/708]. • Pressure between 90 and 105 psig [T4M/708].	**REFER TO** AOI-10, Loss of Control Air.
18.	**CHECK** aux air header pressure greater than 75 psig [1-M-15].	**REFER TO** AOI-10, Loss of Control Air.
19.	**DISPATCH** AUO to D/G Bldg to monitor D/G conditions USING SOI-82 series, Appendix A, for operating parameters.	

3.3 **OPERATOR ACTIONS** (Loss Of Both 161 KV Power Supplies)

ACTION/EXPECTED RESPONSE **RESPONSE NOT OBTAINED**

NOTE Attachment 3 provides reference to applicable Tech Specs as well as recovery actions for loss of both 161KV lines.

20. **REFER TO** Attachment 3 for considerations for recovery from loss of both 161kV lines.

21. **DO NOT CONTINUE** this instruction UNTIL one 161KV power line has been reenergized

22. **ENSURE** station service returned to NORMAL, USING applicable sections from the following:

Bus or Board	Instruction
6.9Kv Start Buses	SOI-200.01
6.9Kv RCP Start Buses	SOI-200.02
6.9Kv Comm. Bds. A & B	SOI-200.03
6.9Kv Unit Bds.	SOI-201 series
6.9Kv RCP Bds.	SOI-202 series

23. **ENSURE** 6.9kV SD Bds returned to NORMAL with D/Gs removed from service after emergency start and returned to standby alignment, USING applicable sections from the following:

Diesel Generator	Instruction
1A-A	SOI-82.01
1B-B	SOI-82.02
2A-A	SOI-82.03
2B-B	SOI-82.04

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3.3 BOP Realignment

ACTION/EXPECTED RESPONSE | **RESPONSE NOT OBTAINED**

CAUTION **Performance of this instruction should not be allowed to delay or interfere with actions required by applicable emergency procedures or abnormal operating procedures.**

NOTE 1 Control room operators may initiate shutdown of pumps and equipment from the benchboard immediately after a trip. Performance of this instruction will subsequently verify proper secondary equipment alignment.

NOTE 2 Steps in this section and items in Attachment 1 may be performed out of sequence.

1. **DISPATCH** turbine building NAUO to perform Attachment 1.

2. **NOTIFY** condensate demineralizer NAUO prior to Operator initiated press changes in condensate.

3. **REMOVE** generator excitation from service:

   a. **PLACE** voltage regulator to TEST.

   b. **ZERO** exciter base adjuster.

   c. **OPEN** exciter field breaker.

   d. **PLACE** exciter regulator control to OFF.

3.3 BOP Realignment (Continued)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. **MONITOR** main turbine:	
a. **WHEN** less than 1500 rpm, **THEN**: • **ENSURE** seal oil backup pump RUNNING. • **ENSURE** turning gear oil pump RUNNING.	
b. **WHEN** less than 600 rpm, **THEN** **ENSURE** bearing lift oil pump RUNNING.	
c. **WHEN** turbine is at ZERO RPM, **THEN** **ENSURE** turbine on turning gear.	
d. **MAINTAIN** MTOT lube oil temp between 95° and 100°F (may require RCW isolation if TCV has excessive leakage).	
e. **MAINTAIN** GENERATOR H2 (Cold Gas) temp 95°F (may require RCW isolation if TCV has excessive leakage).	
f. **ENSURE** Gland Steam Spillover Bypass valve is CLOSED using 1-HS-47-191A.	

3.3 BOP Realignment (Continued)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **ALIGN** MSRs: a. **PUSH** RESET on MSR control panel. b. **CLOSE** MSR HP steam and bypass isol. c. **ENSURE** MSR warming valves CLOSED. d. **OPEN** MSR startup vents. e. **CLOSE** MSR operating vents.	
6. **CHECK** MSIVs OPEN.	**IF** vacuum is to be maintained, **THEN** **ENSURE** auxiliary boiler is aligned for steam seals.

3.3 **BOP Realignment** (Continued)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **ENSURE** adequate FW press: a. **ENSURE** two hotwell pumps RUNNING. b. **IF** FW isolation reset, **THEN** **ENSURE** one condensate booster pump RUNNING if needed for unit conditions. c. **ENSURE** CNDS demin pumps OFF. d. **STOP** #3 HDT pumps, and **CLOSE** the discharge valves to condensate heater strings. Notify NAUO performing Attachment 1 that #3 HDT pumps are stopped. e. **STOP** #7 HDT pumps, and **CLOSE** the discharge valves to condensate heater strings.	
8. **SHUTDOWN** any MFW pump NOT required.	
9. **SHUTDOWN** any RCW pumps NOT required.	
10. **SHUTDOWN** any CCW pumps NOT required.	

3.3 BOP Realignment (Continued)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11. **ALIGN** extraction steam valves and drain valves: a. **CLOSE** #1 and #2 Heater extraction steam valves. b. **ENSURE** turbine drain valves OPEN. c. **OPEN** MFW pump turbine drain valves.	
12. **PERFORM** as required: a. **OBTAIN** switching instructions from NEAD, and **OPEN** main generator PCB(s) MODs. b. **PULL-TO-LOCK** bus duct cooling fans. c. **VERIFY** MTOT and seal oil temps STABLE and trending to 95°F.	
13. **IF** MFW isolated to steam generators, **THEN** **REQUEST** Chem Lab sample condensate and feedwater prior to re-admitting water to S/Gs from condensate-feedwater system.	

3.3 BOP Realignment (Continued)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14. **IF** EGTS started, **THEN** **SHUTDOWN** one train after 30 minutes and place in P-AUTO: • **REFER TO** SOI-65.02, Emergency Gas Treatment System, section on Auto EGTS Actuation.	
15. **IF** ABGTS started, **THEN** **SHUTDOWN** one train after 30 minutes and place in P-AUTO: • **REFER TO** SOI-30.06, Auxiliary Building Gas Treatment System, section on Auto Start of ABGTS.	

CAUTION **Rx trip bkrs must be cycled to allow reset of MFW when isolated by SI, HI-HI S/G level, or flood level in MS valve vault room. If any SI signal is present with Auto SI blocked, cycling Rx trip bkrs will initiate SI actuation.**

16. **IF** MFW **NOT** in service,
THEN
ESTABLISH MFW:

- **REFER TO** Attachment 2, Establishing MFW Following Reactor Trip.

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3.3 **BOP Realignment** (Continued)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. **CHECK** S/G NR levels between 38% and 50%.	**IF** S/G level can **NOT** be maintained, **THEN** **START** M-D AFW pumps.
18. **RETURN TO** applicable Instruction.	

- END OF SUBSECTION -

WBN	LOSS OF REACTOR OR SECONDARY COOLANT	E-1 Rev 15

APPENDIX E
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EQUIPMENT EVALUATION

1. **EVALUATE** plant equipment and systems needed to support long term cooling and recovery actions, as time and personnel availability permits:

   a. Cntmt Isolation Status.

   b. Emergency Gas Treatment System:
   One train in operation, **REFER TO** SOI-65.02.

   c. Auxiliary Building Gas Treatment:
   One train in operation, **REFER TO** SOI-30.06.

   d. Auxiliary Building Isolation alignment:
   REFER TO SOI-30.06.

   e. Main Control Room Isolation alignment:
   REFER TO SOI-31.01.

   f. ERCW System:
   Both trains in operation.

   g. Component Cooling Water System:
   Both trains in operation.

Appendix A
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Reactivity Control Plan (Example Form)

Station: WBN Unit: 1 Cycle: 10 Burnup: 150 MWD/MTU Revision: 0

Preparer: _____/_____ Reviewer: _____/_____
/ Date RXE / Date

Approver: _____/_____ Authorizer: _____/_____
RXES or designee / Date Ops / Date

RXE support required Onsite? ☐Yes ☑No Describe: N/A

Title of Reactivity Control Plan: **Turbine Valve Testing (BOL)**

Assumptions:
1. Fuel is conditioned to 100% RTP.
2. Reactor ramped from 100% RTP to 93% RTP at 10%/hr.
3. Power held constant at 93% RTP for 8 hours.
4. Reactor power ramped to 100% RTP at 5%/hr.

Major Steps:
1. Unit is ramped from **100%** to **93%** at **10%**/hr.
2. Unit is maintained at ~**93%** RTP for **8** hrs.
3. Unit is ramped to **100%** at **5%**/hr.
4. Unit is maintained at **100%**.

Detailed Description:

NOTE: See attached plots.
NOTE: Allowing Tave drift will typically reduce the total amount of necessary boration and dilution.
NOTE: Use BEACONDH ICS Screen so long as DOGHOUSE ICS Screen shows AFD is within the +/- 3% band.
NOTE: Ramping linearly without holds will reduce the total amount of necessary boration and dilution.
NOTE: Fuel deconditioning does not apply to this downpower as the unit will be returned to 100% RTP within 24 hours, per TI-45.

Unit Ramped from 100% RTP to 93% RTP:

1. **INITIATE ramp to 93% RTP at 10%/hr.**
2. **BORATE 130 gal BA.**
3. **INSERT Control Bank D to 207 steps for AFD control.**

Unit Held at 93% RTP:

1. **DILUTE 374 gal PW for Xenon build-in.**
2. **MAINTAIN Control Bank D at 207 steps for AFD control.**
3. **BORATE 20 gal BA for Xenon burnout.**

Unit Ramped to 100% RTP:

1. **INITIATE ramp to 100% RTP at 5%/hr.**
2. **DILUTE 610 gal PW.**
3. **WITHDRAW Control Bank D to 216 steps.**

Turbine Valve Testing (BOL)
Continued

Full Power Maintenance:

1. BORATE 100 gal BA to compensate for Xenon burnout.
2. WITHDRAW AND MAINTAIN CBD at 220 steps.
3. DILUTE as necessary to compensate for Xenon build-in. Dilution rates may start out at ~25 gal PW per hour, but will taper off quickly as Xenon builds in.

Critical Parameter	Limit	Required Action
Rate of Power Increase	As specified in TI-45	Reduce ramp rate or hold power until limits satisfied.

Activated: _____/_____ Terminated: _____/_____
SM or US / Date SM or US / Date

SHIFT TURNOVER CHECKLIST
Page 1 of 2

SHIFT TURNOVER CHECKLIST

Page _____ of _____

- ☐ SM
- ☒ US/MCR Unit _____
- ☐ UO Unit _____
- ☐ AUO Station _____
- ☐ STA (STA Function)

Off-going - Name _____

On-coming - Name _____

Part 1 - Completed by off-going shift/Reviewed by on-coming shift:

- Abnormal equipment lineup/conditions:
  1A Containment Spray pump out-of-service for pump bearing replacement. Expected return to service in 12 hours. LCO 3.6.6.A was entered 4 hours ago. A Severe Thunderstorm Warning has been issued for Rhea, Meigs and McMinn Counties for the next 2 hours.

- SI/Test in progress/planned: (including need for new brief)
  1-TRI-47-3, "Main Turbine Steam Inlet Valve Testing."

- Major Activities/Procedures in progress/planned:
  100% power, BOL. RCS boron is 1031 ppm. Control Bank D is at 220 steps. Train A/Channel I Work Week. Perform a load reduction to 93% support turbine valve tests and EHC control calibrations. Currently in GO-4, "Normal Power Operation," Section 5.3, Unit Shutdown from 100% to 30% Reactor," at Step 12. Reactivity Plan for the power maneuver has been provided by Reactor Engineering.

- Radiological changes in plant during shift:
  None planned

Part 2 - Performed by on-coming shift

- ☐ A review of the Operating Log since last held shift or 3 days, whichever is less.
- ☐ A review of the Rounds sheets/Abnormal readings (AUOs only)

Review the following for changes since last shift turnover:

- ☐ Standing Orders
- ☐ LCO(s) in actions (N/A for AUOs)
- ☐ PER review (N/A for AUOs)
- ☐ TACFs (N/A for AUOs)
- ☐ Operator workarounds, burdens and other challenges
- ☐ Immediate required reading.

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

- ☐ A walkdown of the MCR control boards (N/A for AUOs)

Relief Time: _____ Relief Date: _____

SHIFT TURNOVER CHECKLIST

Page _____ of _____

- ☐ SM
- ☐ US/MCR Unit _____
- ☒ UO Unit _____
- ☐ AUO Station _____
- ☐ STA (STA Function)

Off-going - Name _____

On-coming - Name _____

Part 1 - Completed by off-going shift/Reviewed by on-coming shift:

- Abnormal equipment lineup/conditions:
  1A Containment Spray pump out-of-service for pump bearing replacement. Expected return to service in 12 hours. LCO 3.6.6.A was entered 4 hours ago. A Severe Thunderstorm Warning has been issued for Rhea, Meigs and McMinn Counties for the next 2 hours.

- SI/Test in progress/planned: (including need for new brief)
  1-TRI-47-3, "Main Turbine Steam Inlet Valve Testing."

- Major Activities/Procedures in progress/planned:
  100% power, BOL. RCS boron is 1031 ppm. Control Bank D is at 220 steps. Train A/Channel I Work Week. Perform a load reduction to 93% support turbine valve tests and EHC control calibrations. Currently in GO-4, "Normal Power Operation," Section 5.3, Unit Shutdown from 100% to 30% Reactor," at Step 12. Reactivity Plan for the power maneuver has been provided by Reactor Engineering.

- Radiological changes in plant during shift:

Part 2 - Performed by on-coming shift

- ☐ A review of the Operating Log since last held shift or 3 days, whichever is less.
- ☐ A review of the Rounds sheets/Abnormal readings (AUOs only)

Review the following for changes since last shift turnover:

- ☐ Standing Orders
- ☐ LCO(s) in actions (N/A for AUOs)
- ☐ PER review (N/A for AUOs)
- ☐ TACFs (N/A for AUOs)
- ☐ Operator workarounds, burdens and other challenges
- ☐ Immediate required reading.

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

- ☐ A walkdown of the MCR control boards (N/A for AUOs)

Relief Time: _____ Relief Date: _____

Facility: **Watts Bar NRC Exam 1 August 2010** Scenario No.: **2** Op Test No.: **1**

Examiners: _____ Operators: _____ **SRO**

_____ _____ **RO**

_____ _____ **BOP**

Initial Conditions: Train B/Channel II Work Week. Perform a load reduction to 75% power at 2%/minute to support removing the 1B MFP from service.

Turnover: 100% power, MOL. RCS boron is 747 ppm. Control Bank D is at 220 steps. Train B/Channel II Work Week. 1B MD AFW pump out-of-service for pump bearing replacement. Expected return to service in 18 hours. 1B MFP turbine and pump vibration alarms are currently lit and Operations Management has directed a load reduction to 75% using AOI-39 at 2%/minute to remove the MFP from service.

Event No.	Malf. No.	Event Type*	Event Description
1	n/a	N-BOP R-RO	Reduce power to shutdown 1B Main Feedwater Pump.
2	fw018b	C-BOP TS-SRO	1B Main Feedwater Pump vibrations increase, requiring the pump to be tripped. Entry into AOI-16, "Loss of Normal Feedwater," is required, and a Tech Spec evaluation of Axial Flux Difference must be conducted.
3	pic-1-13a open	C-BOP TS-SRO	SG 2 PORV controller fails, causing PORV to open. Entry into AOI-38, "Main Steam or Feedwater Line Leak," is required. Requires Tech Spec evaluation.
4	ed06a	C-RO TS-SRO	1A-A CCP trips on instantaneous overcurrent. Requires entry into AOI-20, "Malfunction of Pressurizer Level Control System." Requires Tech Spec evaluation.
5	rc13d	I-RO	Pressurizer Spray Valve 1-PCV-68-340D opens, requiring transfer of the controller to MANUAL to close of the valve. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System."
6	rc02d rp01c	M-All	RCP 4 trips, requiring a reactor trip. Crew enters FR-S.1."Nuclear Power Generation/ATWS."
7	rp55a rp55c	C-BOP	1A Motor Driven and the Turbine Driven Auxiliary Feedwater Pumps fail to automatically start, requiring manual starts.
8	hs-62-138a close	C-BOP	1-FCV-62-138 fails closed, requiring local operation to begin boration.
9	ms0d	M-All	Steam line break inside containment on SG 4. Requires entry into E-0, "Reactor Trip or Safety Injection and E-2, "Faulted Steam Generator Isolation.".

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

Scenario 2 - Summary

Initial Condition	Train B/Channel II Work Week. Perform a load reduction to 75% power at 2%/minute to support removing the 1B MFP from service.

Turnover	100% power, MOL. RCS boron is 747 ppm. Control Bank D is at 220 steps. Train B/Channel II Work Week. 1B MD AFW pump out-of-service for pump bearing replacement. Expected return to service in 18 hours. 1B MFP turbine and pump vibration alarms are currently lit and Operations Management has directed a load reduction to 75% using AOI-39 at 2%/minute to remove the MFP from service

Event 1	Reduce power to shutdown 1B Main Feedwater Pump.
Event 2	As power is reduced, 1B Main Feedwater Pump and Motor vibrations increase to 10 mils (indicated on the Integrated Computer System (ICS)), requiring the SRO to direct the BOP operator shutdown the pump. The SRO enters and directs the actions of AOI-16, "Loss of Normal Feedwater." The SRO enters Tech Spec LCO 3.2.3 Axial Flux Difference Condition A and informs the crew that AFD must be restored within 30 minutes. The SRO directs the RO to perform a boration to restore AFD to within limits. The SRO enters and exits LCO 3.4.1, RCS Pressure, Temperature and DNB Limits, Condition A.
Event 3	Controller 1-PIC-1-13A, SG 2 PORV PCV-1-12, fails causing the PORV to open. The BOP reports the PORV open. The SRO enters AOI-38, "Main Steam or Feedwater Line Break," and directs the BOP to close the PORV. The SRO evaluates conditions and enters Tech Spec 3.7.4, Atmospheric Dump Valves, Condition A.
Event 4	1A-A CCP trips on instantaneous overcurrent. The SRO enters AOI-20, "Malfunction of Pressurizer Level Control System," and directs actions for the 1A-A CCP. The SRO evaluates conditions and enters LCO 3.5.2.ECCS - Operating, Condition A and Tech Requirement 3.1.4, Charging Pumps -Operating.
Event 5	Controller 1-PIC-68-340D, Loop 1 Spray Control fails, causing the spray valve to open. The RO reports the spray valve open and closes the valve using the controller in MANUAL. The SRO enters and directs actions of AOI-18, "Malfunction of Pressurizer Pressure Control System." The SRO enters and exits LCO 3.4.1, RCS Pressure, Temperature and DNB Limits, Condition A.
Event 6	RCP 4 trips, requiring a reactor trip. The reactor does NOT trip. RO and BOP take immediate operator actions associated with FR-S.1, Nuclear Power Generation/ATWS. The SRO enters and directs actions of FR-S.1.
Event 7	1A Motor Driven and the Turbine Driven Auxiliary Feedwater Pumps fail to automatically start, requiring manual starts.
Event 8	1-FCV-62-138 fails to open, requiring local operation to begin boration. Performance of FR-S.1 steps direct the BOP to contact an AUO to locally attempt to open 1-FCV-62-138. Report from the field is that 1-FCV-62-138 is mechanically bound. BOP directs 1-ISV-62-929 Boration Valve to be closed.
Event 9	Steam line break inside containment. Requires transition from FR-S.1, "Nuclear Power Generation/ATWS," to E-0, "Reactor Trip or Safety Injection," and a transition to E-2, "Faulted Steam Generator Isolation." The scenario is terminated upon transition to ES-1.1, "SI Termination," from E-2, "Faulted Steam Generator Isolation," or E-1, "Loss of Reactor or Secondary Coolant."

Scenario 2 - Critical Task Summary

Critical Task 1 *From WOG Critical Task List for FR-S.1. C*	*Insert negative reactivity into the core by at least one of the following methods before completing the immediate-action steps of FR-S.1:* • *Insert RCCAs* *Reactor trip must be verified to ensure that the only heat being added to the RCS is from decay heat and reactor coolant pump heat. The safeguards systems that protect the plant during accidents are designed assuming that only decay heat and pump heat are being added to the RCS. If the reactor cannot be tripped, then the control rods should be manually inserted into the core in order to decrease reactor power.*
Critical Task 2 *From WOG Critical Task List for FR-S.1, A*	*Manually trip the main turbine.* *The turbine is tripped to prevent an uncontrolled cooldown of the RCS due to steam flow that the turbine would require. For an ATWS event where a loss of normal feedwater has occurred, analyses have shown that a turbine trip is necessary (within 30 seconds) to maintain SG inventory.*
Critical Task 3 *From WOG Critical Task List for FR-S.1, B*	*Manually start the AFW pumps.* *The MD AFW pumps start automatically on an SI signal and SG low level to provide feed to the SGs for decay heat removal. If SG levels drop below the appropriate setpoint, the turbine-driven AFW pump will also automatically start to supplement the MD pumps. The ATWS analyses have shown that actuation of AFW within 60 seconds after the failure to scram provides acceptable results.*
Critical Task 4 *From WOG Critical Task List for E-2, A*	*Isolate the faulted SG before transition out of E-2.* *Isolation of the feedwater to the faulted SG maximizes the cooldown capability of the non-faulted loops following a feedline break and minimizes the RCS cooldown and mass and energy release following a steamline break. Isolation of steam paths from the faulted SG also minimizes the RCS cooldown and mass and energy release to containment. In addition, isolation of these steam paths could isolate the break.*

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

Event Description: Reduce power to shutdown 1B Main Feedwater Pump.

Time	Position	Applicant's Actions or Behavior
EXAMINER: The following actions are from AOI-39, "Rapid Load Reduction," Section 3.2, "Power Reduction From Greater than 50% Power."		
CAUTION Condenser Backpressure limits are on previous page.		
CAUTION TURBINE MANUAL Operation requires continuous operator monitoring and control.		
CAUTION LOSS OF CONDENSER VACUUM may be made worse if steam dumps are actuated. AOI-11 requires T-ave and T-ref be maintained within 3°F.		
NOTE If the initiating condition is corrected, the power reduction may be terminated.		
	SRO RO	1. **ESTABLISH** a turbine load reduction rate less than or equal to 5%/min: a. **PLACE** turbine in IMP IN b. **SET** a desired load in the SETTER with the REFERENCE CONTROL. c. **SET** the LOAD RATE at less than or equal to 5%/min. d. **DEPRESS** GO pushbutton.
CAUTION	Over boration may result in excessive rod withdrawal or Tavg lower than desired for at power conditions.	
NOTE	• Rod Control should remain in automatic for Tavg Control • Reactivity Briefing Sheet, "Thumb Rules" (page 3), lists boration flows and volumes for different reduction rates. • Effect of boration will lag behind turbine load reduction and can be compensated for by temporarily increasing boric acid flow rate above recommended rate.	
	RO	**2. INITIATE** a manual boration: a. DETERMINE recommended boration flow rate and volume from Reactivity Briefing Sheet: b. INITIATE normal boration: 1) ADJUST BA flow controller, 1-FC-62-139, to desired flow rate. 2) ADJUST BA batch counter 1-FQ-62-139 to required quantity. 3) PLACE mode selector 1-HS-62-140B to BOR. 4) PLACE VCT makeup control 1-HS-62-140A, to START. 5) VERIFY desired boric acid flow indicated on 1-FI-62-139.
EXAMINER: The following actions are taken from SOI-62.02,"Boron Concentration Control," Section 6.7, "Minor Boration."		

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

Event Description: Reduce power to shutdown 1B Main Feedwater Pump.

Time	Position	Applicant's Actions or Behavior
NOTES 1) Section 6.7, may be reproduced, laminated, displayed, reused, etc. as desired. 2) Minor Boration is defined as the addition of Boric Acid done several times each shift early in core life, to compensate for burnable poison burn-up, and maintain Tavg on program.		
	RO	[1] **ENSURE** 1-HS-68-341H, BACKUP HEATER C [1-M-4], is ON, to equalize RCS-Pzr CB.
	RO	[2] **ADJUST** 1-FC-62-139, BA TO BLENDER [1-M-6], for desired flow rate.
	RO	[3] **ADJUST** 1-FQ-62-139, BA BATCH COUNTER [1-M-6], for required quantity.
	RO	[4] **PLACE** 1-HS-62-140B, VCT MAKEUP MODE [1-M-6], in BOR.
	RO	[5] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL [1-M-6], to START. [5.1] **CHECK** Red light is LIT.
	RO	[6] **MONITOR** the following parameters:

Instrument	Location	Parameters
1-PI-62-122	1-M-6	VCT PRESS
1-LI-62-129A	1-M-6	VCT LEVEL
1-FI-62-139	1-M-6	BA TO BLENDER FLOW
1-FQ-62-139	1-M-6	BA BATCH COUNTER
1-FI-62-142	1-M-6	PW TO BLENDER FLOW
1-FQ-62-142	1-M-6	PW BATCH COUNTER
1-LI-62-238	1-M-6	BAT A LEVEL
1-LI-62-242	1-M-6	BAT C LEVEL

	RO	[7] **WHEN** Boration is COMPLETE, **THEN** **PLACE** 1-HS-62-140B, VCT MAKEUP MODE, in AUTO.
	RO	[8] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL, to START. [8.1] **CHECK** Red light is LIT.
	RO	[9] **RETURN** 1-FC-62-139, BA TO BLENDER [1-M-6], to desired flow rate.
EXAMINER: The following actions are from AOI-39, "Rapid Load Reduction," Section 3.2, "Power Reduction From Greater than 50% Power."		
NOTE AFD green target band can be monitored using ICS Turn On code DOGHOUSE.		
	RO	**3. MONITOR** rod position: • Rods above Lo-Lo insertion limit • AFD within Target Band

Op Test No.: NRC Scenario # 2 Event # 1 Page 3 of 47

Event Description: Reduce power to shutdown 1B Main Feedwater Pump.

Time	Position	Applicant's Actions or Behavior
	SRO	**4. REFER** to EPIP-1, Emergency Plan Classification Flowchart. **EXAMINER**: Step is N/A for given conditions.
	SRO	**5. NOTIFY** the Load Coordinator of the required load reduction and expected ramp rate.
NOTE If reactor power is stabilized at a lower level a drop in Tavg will occur due to Xenon build up. Dilution may be required to maintain power level.		
	SRO RO	**6. MONITOR** Tavg and Tref: ▪ Tavg trending to Tref. ▪ Mismatch less than 5°F.
	SRO	**7. CHECK** rate of power reduction is rapid enough for existing plant conditions.
	SRO	**8. NOTIFY** Cnds Demin AUO of impending pmp shutdowns.
	SRO	**9. WHEN** rated thermal power change exceeds 15% in one hour, **NOTIFY** Chemistry to initiate 1-SI-68-128.
EXAMINER: Further steps of AOI-39, "Rapid Power Reduction" are not included, since the crew will only reduce power to 85%, and the remainder of AOI-39 steps are power level dependent. Simulator Operator enters Event 2.		
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	SRO	**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).
Cue Simulator Operator to modify the severity of malfunction fw18b to 100 to increase 1B MFP vibrations to greater than 10 mils after applicants have decreased power by approximately 5%.		

Op Test No.:	NRC	Scenario #	2	Event #	2	Page	4	of 47

Event Description: 1B Main Feedwater Pump vibrations increase, requiring the pump to be tripped. Entry into AOI-16 is required, and a Tech Spec evaluation of Axial Flux Difference must be conducted.

Time	Position	Applicant's Actions or Behavior
Indications: Main Feedwater Pump 1B vibrations are sufficiently high at the beginning of the scenario for 53-D, "TURBINE VIBRATION HI", and 54-D, "PUMP VIBRATION HI" to be LIT. When the severity of the vibration malfunction is raised, the ICS display will indicate 1B Main Feedwater pump and turbine and bearing vibrations are above the criteria for stopping the MFP.		
	BOP	Diagnoses and announces 1B MFP vibrations rising above setpoints for pump removal.
	BOP	May trip 1B Main Feedwater pump, to comply with ARI 53-D and 54-D corrective actions and directions provided in the Shift Turnover Instructions.
	SRO	Enter and direct actions of AOI-16, "Loss of Normal Feedwater," Sub Section 3.5, "MFWP TRIP greater than or equal to 800 MWe (67% Turbine Load)."
EXAMINER: The following actions are taken from AOI-16, "Loss of Normal Feedwater," Sub Section 3.5, "MFWP TRIP greater than or equal to 800 MWe (67% Turbine Load)."		
EXAMINER: During the runback, it is likely that RCS pressure will drop below the DNB limit of Tech Spec LCO 3.4.1 (2214 psig). The RO will notify the SRO of the entry, and report when pressure returns above 2214 psig.		
	BOP	1. (ρ) **IF** loss of S/G level is imminent, **THEN TRIP** reactor, and ** **GO TO** E-0, Reactor Trip or Safety Injection.
	BOP	2. **CHECK** turbine load less than or equal to 1000 MWe (85%).
	BOP-	3. **PLACE** tripped MFP recirc valve controller in MANUAL, and **CLOSE** recirc valve.
	BOP	4. **CHECK** turbine load less than 800 MWe (67%),
	BOP	4. **RESPONSE NOT OBTAINED:** **ENSURE** Standby MFWP running. ***Since the standby MFWP is running, the portion of the RNO addressing actions to reduce load further are not provided.***
	BOP	5. **ENSURE** MFWP speed rising to control S/G Δ-P and levels on program.
CAUTION Continued load reductions below 800 MWe should be done using normal turbine controls at less than or equal to 5% min.		
	BOP	6. **ENSURE** adequate feed flow for existing conditions: • Feed flow greater than or equal to steam flow. • S/G levels returning to program.
	RO	7. **ENSURE** T-avg and T-ref within 3°.

Op Test No.:	NRC	Scenario #	2	Event #	2	Page	5	of 47

Event Description: 1B Main Feedwater Pump vibrations increase, requiring the pump to be tripped. Entry into AOI-16 is required, and a Tech Spec evaluation of Axial Flux Difference must be conducted.

Time	Position	Applicant's Actions or Behavior
CAUTION Runback may result in exceeding Tech Spec 3.2.3 limits on Axial Flux Difference (AFD).		
	SRO	8. **MONITOR** AFD within limits of LCO 3.2.3.
	SRO	8. **RESPONSE NOT OBTAINED:** (ρ) **INITIATE** boration to return AFD within limits. ***After the runback occurs, the SRO will enter Tech Spec LCO 3.2.3, Axial Flux Difference, Condition A, requiring power to be reduced to less than 50% RTP if AFD is not restored to within limits within 30 minutes. Boration will be in accordance with TI-7.012, approximately 262 gallons of boron.*** ***The crew may place control rods in MANUAL and begin a series of controlled rod withdrawals in order to return AFD to within limits as the boration is taking place.***
	BOP	9. **IF** feed flow greater than 40%, **THEN ENSURE** tripped MFWP turbine condenser valves CLOSED: • Pump A, 1-FCV-2-205 and -210, OR • Pump B, 1-FCV-2-211 and -216. ***Since the 1B MFP was tripped, 1-FCV-2-211 and 1-FCV-2-216 will be verified closed.***
	BOP	10. **MONITOR** reg valves controlling S/G levels on program.
	BOP	11. **LOCALLY MAINTAIN** oil temp between 110 to 130°F on running Standby MFP using 1-THV-24-948 ***Report from the field will state that current temperature is 120°F***
	BOP	12. **IF** C-7 LOSS OF LOAD STM DUMP INTERLOCK annunciator LIT [66E], **THEN** a. **ENSURE** steam dump valves have zero demand. b. **RESET** loss-of-load interlock with steam dump mode switch.
	SRO	13. **ENSURE** Condensate System Pumps in service as necessary: • **REFER TO** GO-4, Normal Power Operation.
	SRO	14. **IF** reactor power dropped by greater than or equal to 15% in one hour, **THEN NOTIFY** Chemistry to initiate power change sampling requirements.
	BOP	15. **CHECK** VALVE POS LIMIT LIT.

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

Event Description: 1B Main Feedwater Pump vibrations increase, requiring the pump to be tripped. Entry into AOI-16 is required, and a Tech Spec evaluation of Axial Flux Difference must be conducted.

Time	Position	Applicant's Actions or Behavior
	BOP	16. **RETURN** valve position limiter to normal: a. **ENSURE** turbine in IMP OUT b. (ρ) **REDUCE** turbine load setpoint using REFERENCE CONTROL ∇ (lower) AND GO button until VALVE POS LIMIT LIGHT not LIT, c. **SET** valve position limiter to 95%.
	SRO	17. **INITIATE** repairs on failed pump.
	SRO	18. **RETURN TO** Instruction in effect.
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	SRO	**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).
Cue Simulator Operator to insert Event 3.		

Op Test No.: NRC Scenario # 2 Event # 3 Page 7 of 47

Event Description: SG 2 PORV controller fails, causing PORV to open. Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
Indications: RED indicating light on 1-HS-1-12 LIT. RCS temperature dropping. Reactor power rising on all power range monitors.		
	BOP	Diagnose and announce failure of SG PORV 1-PCV-1-12 open.
	BOP	May place 1-PIC-1-13A PORV controller in MANUAL and attempt to close.
	BOP	May transfer handswitch 1-HS-1-13 from P-AUTO to CLOSE.
	SRO	Enters and directs actions of AOI-38, "Main Steam or Feedwater Line Break."
EXAMINER: The following actions are taken from AOI-38, "Main Steam or Feedwater Line Break."		
	SRO	1. **IF** leak threatens personnel safety, **THEN:** a. **TRIP** Rx. b. **CLOSE** the following: • MSIVs. • MSIV bypass valves. c. ** **GO TO** E-0, Reactor Trip or Safety Injection.
	BOP	2. **CHECK** S/G PORVs CLOSED.
	BOP	2. **<u>RESPONSE NOT OBTAINED:</u>** **IF** S/G press less than 1130 psig, **THEN CLOSE** S/G PORV or local isolation valve.
	BOP	3. **CHECK** steam dump valves CLOSED.
	RO	4. **CHECK** reactor power less than or equal to 100%: • Loop ΔT. • NIS power range monitors
	RO	5. **ENSURE** T–avg and T–ref. within 3°F.

NOTE

- It is a normal condition for Turbine load and Rx power to exhibit a nominal mismatch for loads less than 50%.
- Hotwell makeup will rise following a rapid runback. The makeup flow should be allowed to stabilize before making any determination of leak size.

Op Test No.: NRC Scenario # 2 Event # 3 Page 8 of 47

Event Description: SG 2 PORV controller fails, causing PORV to open. Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
	BOP	6. **MONITOR** leak less than 3% of required steam or FW flow: **IF** power greater than 50%, **THEN COMPARE** turbine load to reactor power and ΔT. • **OBSERVE** steam and FW flow recorders. • **OBSERVE** hotwell level makeup less than 950 gpm.
	BOP	7. **MONITOR** CST volume greater than 200,000 gallons.
	BOP	8. **ENSURE** SG levels on program.
CAUTION **FW or condensate leaks upstream of the FW isol valves should be promptly dealt with to limit hazards to Turbine Bldg personnel.**		
	BOP	9. **DISPATCH** personnel to perform secondary plant inspection for main steam and feedwater leaks.
	BOP	10. **CHECK** Cntmt conditions NORMAL: • Pressure (1-PDR-30-133 between -0.1 and +0.3 psig). • Temperature (Window 104-B DARK). • Humidity (Window 103-B DARK). • Sump level (Window 127-E DARK).
	RO	11. **MONITOR** Cntmt press stable or dropping.
	BOP	12. **IDENTIFY** leak location based upon ANY of the following: a. FW/Steam flow recorder. b. SG enclosure temperatures high: • T1002A for 2 and 3. • T1003A for 1 and 4. c. Local indication of break in any of the following: • Main steam lines. • Main feed lines. • Other secondary piping. • S/G safety valves.
	BOP	13. **ANNOUNCE** steam leak and give possible location.
	BOP	14. **ISOLATE** leak if possible. ***Step 2 RNO isolated the leak.***

Op Test No.: NRC Scenario # 2 Event # 3 Page 9 of 47

Event Description: SG 2 PORV controller fails, causing PORV to open. Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
	SRO	15. **IF** operation can continue, **THEN RETURN TO** Instruction in effect. ***Evaluates Tech Specs and determines that LCO 3.7.4, Atmospheric Dump Valves (ADVs) Condition A is applicable.*** ***Condition A states that with one required ADV line inoperable restore the required ADV to OPERABLE status within 7 days.***
	CREW	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	CREW	**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).
Console Operator: When directed, initiate Event 4.		

Op Test No.: NRC Scenario # 2 Event # 4 Page 10 of 47

Event Description: 1A-A Charging Pump trip.

Time	Position	Applicant's Actions or Behavior
Indications: 15-E M-1 THRU M-6 MOTOR TRIPOUT 108-A CHARGING FLOW HI/LO 1-FI-62-93A CHARGING FLOW indicating a drop in flow. RCP Seal Supply flow indications indicating a drop in flow.		
	RO	Diagnoses and announces the 1A-A CCP trip.
	RO	May isolate letdown, since charging flow has been lost.
	SRO	Enters and directs actions of AOI-20,"Malfunction of Pressurizer Level Control System."
EXAMINER: The following actions are taken from AOI-20,"Malfunction of Pressurizer Level Control System."		
CAUTION Charging and letdown must be in service together. If letdown isolates or charging is lost, the other must be isolated.		
	RO	1. **CHECK** pzr level program signal NORMAL: • 1-LR-68-339 (green pen).
NOTE 1-XS-68-339E selects one channel to control level to program and one backup channel for control interlocks.		
	RO	2. **CHECK** if 1-XS-68-339E is selected to FAILED channel (control or backup): • LI-68-339, OR • LI-68-320, OR • LI-68-335.
	SRO	2. **RESPONSE NOT OBTAINED:** **IF** pzr level is low **OR** dropping, **THEN** ** **GO TO** Step 12. ***With no charging pump in service the PZR level trend is dropping, so Step 12 will be taken.***
		12. **CHECK** any charging pump RUNNING.
EXAMINER: Actions to isolate letdown may have been taken when 1A-A CCP tripped.		

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Event Description: 1A-A Charging Pump trip.

Time	Position	Applicant's Actions or Behavior
	RO	12. **RESPONSE NOT OBTAINED:** **PERFORM** the following: a. **ISOLATE** letdown: • **CLOSE** letdown orifice(s). • **CLOSE** 1-FCV-62-69. • **CLOSE** 1-FCV-62-70. b. **RESTORE** charging and letdown: • **REFER TO** Attachment 1. c. ** **GO TO** Step 18.
EXAMINER: The following actions are taken from AOI-20,"Malfunction of Pressurizer Level Control System," Attachment 1, "Alignment of Charging and Letdown."		
	RO	1. **IF** charging **NOT** established, **THEN PERFORM** the following: a. **CLOSE** 1-FCV-62-89, CHRG HDR-RCP SEALS FLOW CONTROL. b. **ENSURE** Charging Pump running. c. **OPEN** 1-FCV-62-90 and 1-FCV-62-91, CHARGING LINE ISOL. d. **ENSURE** 1-FCV-62-85, NORM CHARGING TO LOOP 1, or 1-FCV-62-86, ALT CHARGING TO LOOP 4, OPEN. e. **ADJUST** 1-FCV-62-93 to maintain seal injection flow between 8 and 13 gpm for each RCP.
	RO	2. **ENSURE** letdown isol valves OPEN: • 1-FCV-62-69, CVCS LETDOWN ISOLATION. • 1-FCV-62-70, CVCS LETDOWN ISOLATION. • 1-FCV-62-77, CVCS LP LETDOWN ISOLATION.
	RO	3. **PLACE** 1-HIC-62-78A, LETDOWN HX OUTLET TEMP TCV-70-192 CNTL, in MANUAL at 25% OPEN.
	RO	4. **PLACE** 1-HIC-62-81A, LETDOWN PRESS CONTROL, in MANUAL at 40-50% OPEN if using 75 gpm orifice (20-30% OPEN if using 45 gpm orifice).
	RO	5. **THROTTLE OPEN** 1-FCV-62-89 and **ESTABLISH** 75 gpm or greater charging flow while maintaining seal injection flow between 8 and 13 gpm for each RCP using 1-FCV-62-93.
	RO	6. **OPEN** letdown orifices as needed: • 1-FCV-62-72 (45 gpm). • 1-FCV-62-73 (75 gpm). • 1-FCV-62-74 (75 gpm). • 1-FCV-62-76 (5 gpm).

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Event Description: 1A-A Charging Pump trip.

Time	Position	Applicant's Actions or Behavior
	RO	7. **ADJUST** 1-HIC-62-81A, LETDOWN PRESS CONTROL, for desired press, (320 psig at normal letdown temp), and **PLACE** in AUTO.
	RO	8. **PLACE** 1-HIC-62-78A, LETDOWN HX OUTLET TEMP TCV-70-192 CNTL, in AUTO.
	RO	9. **RETURN** pzr level to program.
	RO	10. **RETURN** 1-HIC-62-93A, CHARGING FLOW PZR LEVEL CONTROL, in AUTO.
EXAMINER: The following actions return to AOI-20,"Malfunction of Pressurizer Level Control System," at Step 18.		
	SRO	18. **NOTIFY** Work Control to initiate corrective action, if necessary.
	SRO	19. **EVALUATE** system alignment/status: • **REVIEW** actions performed in this Instruction. • **REFER TO** SOI-62.01, CVCS - Charging and Letdown
	SRO	SRO evaluates Tech Specs, and determines that the following are applicable: ***LCO 3.5.2. ECCS - Operating, Condition A restore train(s) to operable status within 72 hours.*** ***Tech Requirement 3.1.4, Charging Pumps -Operating. A. One required charging pump inoperable. A.1 Restore required charging pump to OPERABLE status. In 72 hours.***
	SRO	20. **RETURN TO** instruction in effect.
	CREW	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	CREW	**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).
Console Operator: When directed, initiate Event 5.		

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Event Description: Pressurizer Spray Valve 1-PCV-68-340D controller fails, requiring entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," and manual closure of the spray valve.

Time	Position	Applicant's Actions or Behavior
Indications: 90-B PZR PRESS LO-DEVN BACKUP HTRS ON RCS/PZR pressure dropping slowly on all indicators. Loop 1 Spray valve RED light LIT, when both spray valves should be partially open.		
	RO	Diagnoses and announces failure of 1-PCV-68-340D, LOOP 1 SPRAY VALVE.
	RO	May manually close 1-PCV-68-340D, Loop 1 Spray valve using 1-PIC-68-340D, LOOP 1 SPRAY CONTROL.
	SRO	Enters and directs actions of AOI-18, "Malfunction of Pressurizer Pressure Control System."
EXAMINER: The following actions are taken from AOI-18, Malfunction of Pressurizer Pressure Control System."		
NOTE 120 AC VITAL PWR BD 1-IV [breaker 2] supplies the plugmold power strip associated with both PZR spray valves and several other instruments required to respond to this event.		
	RO	1. **CHECK** pressurizer pressure stable or trending to desired pressure: • 1-PI-68-340A, • 1-PI-68-334, • 1-PI-68-323, • 1-PI-68-322.
	RO	**1. <u>RESPONSE NOT OBTAINED:</u>** **PLACE** pzr master controller 1-PIC-68-340A in MANUAL and **RESTORE** press to normal.
	RO	2. **CHECK** 1-XS-68-340D selected to a failed controlling or backup channel.
	RO	**2. <u>RESPONSE NOT OBTAINED:</u>** **IF** pzr press is abnormally low **THEN **GO TO** Step 6
	RO	6. **CHECK** pzr spray valves CLOSED: • Green indicating lights LIT. • Pzr spray demand meters, 1-PIC-68-340B and 1-PIC-68-340D indicating ZERO [1-M-4].
	RO	**6. <u>RESPONSE NOT OBTAINED:</u>** **CLOSE** pzr spray valve(s) manually. ***RO is successful in closing the PZR spray valve in MANUAL so reactor trip and Safety injection are NOT required.***

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Event Description: Pressurizer Spray Valve 1-PCV-68-340D controller fails, requiring entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," and manual closure of the spray valve.

Time	Position	Applicant's Actions or Behavior
	RO	7. **CHECK** pzr PORVs CLOSED: • **EVALUATE** tailpipe temperatures and acoustic monitor.
	RO	8. **CHECK** pzr Safeties CLOSED: • **EVALUATE** tailpipe temperatures and acoustic monitor.
	RO	9. **ENSURE** pzr heaters on as required: • Control Group on at 2220 psig. • Backup Groups on at 2210 psig.
	RO	10. **CHECK** aux spray, 1-FCV-62-84, CLOSED.
	RO	11. **CHECK** pzr press STABLE or RISING
	SRO	12. **GO TO** Step 16.
	RO	16. **WHEN** pressurizer pressure stable and equipment status supports returned to normal, **THEN ENSURE** the following in AUTO: • Pzr Master controller, • Pzr spray controllers, • All heater groups.
	SRO	17. **REFER TO** the following Tech Specs: a. 3.3.1, RTS Instrumentation. **Not Applicable.** b. 3.3.2, Engineered Safety Feature Actuation System (ESFAS) Instrumentation. **Not Applicable.** c. 3.3.4, Remote Shutdown System. **Not Applicable.** d. 3.4.1, RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits. **See note below.** e. 3.4.3, RCS Pressure and Temperature (P/T) Limits. f. 3.4.9, Pressurizer. **Not Applicable.** g. 3.4.10, Pressurizer Safety Valves. **Not Applicable.** h. 3.4.11, Pressurizer Power - Operated Relief Valves. **Not Applicable.** ***SRO determines that LCO 3.4.1, RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits was entered during the initial pressure drop, and was exited when pressure rose above 2214 psig. No other Tech Spec entry is required for the failed spray valve.***
	SRO	18. **INITIATE** repairs to failed equipment.
	SRO	19. **RETURN TO** Instruction in effect.
	CREW	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.

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Event Description: Pressurizer Spray Valve 1-PCV-68-340D controller fails, requiring entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," and manual closure of the spray valve.

Time	Position	Applicant's Actions or Behavior
	CREW	**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).
Console Operator: When directed, initiate Event 5.		

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Event Description: Anticipated Transient Without Scram, requiring entry into FR-S.1.
1A and 1B Motor Driven Auxiliary Feedwater Pumps fail to automatically start, requiring manual start. 1-FCV-62-138 fails to open, requiring local operation to begin boration.

Time	Position	Applicant's Actions or Behavior
Indications: 78-D ONE LOOP FLOW LO (First Out Alarm) 123-B RCS LOOP 4 FLOW LO 1-FI-68-71A, -71B, -71D LOOP 4 FLOW all dropping.		
	RO	Announces the trip of RCP #4, and the Reactor Trip First Out alarm. 78-D.
	RO	Performs IMMEDIATE ACTION of FR-S.1, after attempting to initiate a manual reactor trip from panel 1-M-1 and 1-M-6.
	RO	Announces the ATWS condition.
	RO	Performs IMMEDIATE ACTION of FR-S.1. During rod insertion in MANUAL, the RO may contact multiple AUOs to trip the Rod Drive MG supply breakers; the Rod Drive MG set output breakers and/or the reactor trip breakers locally.
	BOP	Performs IMMEDIATE ACTION of FR-S.1.
	SRO	Enters and directs performance of FR-S.1, "Nuclear Power Generation/ATWS."
EXAMINER: The following steps are from FR-S.1 "Nuclear Power Generation/ATWS."		
	RO	1. **ENSURE** Reactor Trip: • Reactor trip and bypass breakers OPEN. • RPIs at bottom of scale. • Neutron flux DROPPING.
CRITICAL TASK 1 *WOG Critical Task List for FR-S.1. C* *Insert negative reactivity into the core by at least one of the following methods before completing the immediate-action steps of FR-S.1:* • *Insert RCCAs* *Reactor trip must be verified to ensure that the only heat being added to the RCS is from decay heat and reactor coolant pump heat. The safeguards systems that protect the plant during accidents are designed assuming that only decay heat and pump heat are being added to the RCS. If the reactor cannot be tripped, then the control rods should be manually inserted into the core in order to decrease reactor power.*		
CRITICAL TASK 1	RO	**1. RESPONSE NOT OBTAINED** Manually **TRIP** reactor. **IF** reactor will **NOT** trip, **THEN INSERT** control rods.

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Event Description: Anticipated Transient Without Scram, requiring entry into FR-S.1.
1A and 1B Motor Driven Auxiliary Feedwater Pumps fail to automatically start, requiring manual start. 1-FCV-62-138 fails to open, requiring local operation to begin boration.

Time	Position	Applicant's Actions or Behavior
CRITICAL TASK 2 *WOG Critical Task List for FR-S.1, A* *Manually trip the main turbine.* *The turbine is tripped to prevent an uncontrolled cooldown of the RCS due to steam flow that the turbine would require. For an ATWS event where a loss of normal feedwater has occurred, analyses have shown that a turbine trip is necessary (within 30 seconds) to maintain SG inventory.*		
CRITICAL TASK 2	BOP	2. **ENSURE** Turbine Trip: • • All turbine stop valves CLOSED.
	BOP	3. **CHECK** AFW pumps operation: a. Both MD AFW pumps RUNNING. b. TD AFW pump RUNNING. c. LCVs in AUTO or controlled in MANUAL.
CRITICAL TASK 3 *WOG Critical Task List for FR-S.1, B* *Manually start the AFW pumps.* *The MD AFW pumps start automatically on an SI signal and SG low level to provide feed to the SGs for decay heat removal. If SG levels drop below the appropriate setpoint, the turbine-driven AFW pump will also automatically start to supplement the MD pumps. The ATWS analyses have shown that actuation of AFW within 60 seconds after the failure to scram provides acceptable results.*		
CRITICAL TASK 3	BOP	**3. <u>RESPONSE NOT OBTAINED:</u>** Manually **START** pumps and open valves as necessary. ***The 1A and TD AFW Pumps did not automatically start. The BOP must manually start the pumps.***

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Event Description: Anticipated Transient Without Scram, requiring entry into FR-S.1. 1A and 1B Motor Driven Auxiliary Feedwater Pumps fail to automatically start, requiring manual start. 1-FCV-62-138 fails to open, requiring local operation to begin boration.

Time	Position	Applicant's Actions or Behavior
	BOP	**4. INITIATE** RCS Boration: a. **ENSURE** at least one centrifugal charging pump RUNNING. b. **OPEN** RWST outlet valves 1-LCV-62-135 and 1-LCV-62-136. c. **CLOSE** VCT outlet valves 1-LCV-62-132 and 1-LCV-62-133. d. **OPEN** BIT outlet valves 1-FCV-63-25 and 1-FCV-63-26 e. **CHECK** BIT flow. f. **PLACE** BA pumps in FAST speed. g. Throttle **OPEN** emergency borate valve 1-FCV-62-138 to maintain boric acid flow greater than 35 gpm. g. **RESPONSE NOT OBTAINED:** **IF** BA flow less than or equal to 35 gpm, **THEN:** • Locally **OPEN** emergency borate valve 1-FCV-62-138 [blender station el 713], **OR** • **ALIGN** manual boration: ***Console Operator will report that 1-FCV-62-138 will not open locally, using either the motor or manual handwheel.*** 1) **Locally OPEN** alternate boration valve 1-ISV-62-929 [blender station el 713]. ***Console Operator will enter Remote Function cvr10 to open 1-ISV-62-929*** 2) **OPEN** blender BA supply 1-FCV-62-140. 3) **MONITOR** BA flow.
	RO	5. **CHECK** pzr pressure less than 2335 psig.
	RO	6. **VERIFY** Cntmt Vent Isolation:*(on 1-XX-55-6E and 1-XX-55-6F)* * Train A GREEN * Train B GREEN
		6. RESPONSE NOT OBTAINED: **PERFORM** the following: a. **ENSURE** containment purge supply and exhaust fans STOPPED. [M-9] b. **CLOSE** dampers. [M-9]
	BOP	7. **IF** AFW flow established, **THEN** a. **PLACE** 1-HS-3-45 to LONG CYCLE RECIRC. b. **PLACE** MFW Bypass Reg Valves in AUTO.
	SRO	8. **IF** SI actuated OR required, **THEN PERFORM** Steps 1 through 6 of E-0, Reactor Trip or Safety Injection, as time allows.
	RO	9. **ENSURE** the following trips: a. Reactor Trip.

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Event Description: Anticipated Transient Without Scram, requiring entry into FR-S.1. 1A and 1B Motor Driven Auxiliary Feedwater Pumps fail to automatically start, requiring manual start. 1-FCV-62-138 fails to open, requiring local operation to begin boration.

Time	Position	Applicant's Actions or Behavior
EXAMINER: The RO may have already dispatched an AUO to open Rod Drive MG set input breakers at 480 V Unit Boards, and an AUO to open Reactor Trip breakers locally while initially inserting the control rods.		
	RO/BOP	9. **RESPONSE NOT OBTAINED:** a. **DISPATCH** operator to locally trip reactor: • **OPEN** reactor trip breakers and MG set output breakers [MG set room]. • **OPEN** breakers to MG sets [480V unit boards A and B]. b. Turbine Trip.
	RO	10. **MAINTAIN** rod insertion UNTIL rods fully inserted.
	SRO	11. **REFER TO** EPIP-1, Emergency Plan Classification Flowchart for ATWS event.
	SRO	12. **MONITOR** reactor subcriticality: a. **CHECK** Power range channels less than 5%. b. **CHECK** Intermediate range startup rate NEGATIVE. c. ** **GO TO** Step 21.
	RO	21. **TERMINATE** emergency boration: a. **PLACE** BA transfer pumps in SLOW speed. b. **CLOSE** emergency borate valve 1-FCV-62-138.
EXAMINER: Event 9, Steamline break inside containment, will be entered by the Console Operator when the RO requests the AUO to close 1-ISV-62-929.		
	RO	c. **IF** alternate boration opened, THEN Locally CLOSE 1-ISV-62-929.
NOTE If the reactor is verified to be subcritical, Status Trees may be implemented for other Red or Orange paths		
	SRO	22. **IMPLEMENT** other Red or Orange paths identified on Status Trees
	SRO	23. **IF SI** actuated, **THEN RETURN TO** Instruction in effect.

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Event Description: Steam line break inside containment.

Time	Position	Applicant's Actions or Behavior
EXAMINER: The SRO will enter E-0, "Reactor Trip or Safety Injection," at this point.		
NOTE 1 Steps 1 thru 4 are **IMMEDIATE ACTION STEPS.**		
NOTE 2 Status Trees / SPDS should be monitored when transitioned to another instruction.		
	RO	1. **ENSURE** reactor trip: • Reactor trip and bypass breakers OPEN. • RPIs at bottom of scale. • Neutron flux DROPPING.
	BOP	2. **ENSURE** Turbine Trip: • All turbine stop valves CLOSED.
	BOP	3. **CHECK** 6.9 kV shutdown boards: a. At least one board energized from: • CSST (offsite), OR • D/G (blackout).
	RO	4. **CHECK** SI actuated: a. Any SI annunciator LIT. b. Both trains SI **ACTUATED**. • 1-XX-55-6C • 1-XX-55-6D
EXAMINER: Appendices A and B (E-0) are provided on pages 26 through 40.		
	BOP	5. **EVALUATE** support systems: • **REFER TO** Appendixes A and B (E-0), Equipment Verification pages 15-28.
	SRO	6. **ANNOUNCE** reactor trip and safety injection over PA system.
	RO	7. **ENSURE** secondary heat sink available with either: • Total AFW flow greater than 410 gpm, OR • At least one S/G NR level greater than 29% [39% ADV].
	RO	8. **MONITOR** RCS temp stable at or trending to 557°F: • **IF** any RCP running, **THEN MONITOR** RCS Loop T-avg trending to 557°F. OR • **IF** NO RCP running, **THEN MONITOR** RCS Loop T-cold trending to 557°F.

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Event Description: Steam line break inside containment.

Time	Position	Applicant's Actions or Behavior
	RO	8. **RESPONSE NOT OBTAINED:** **IF** temp less than 557°F, **THEN ENSURE** steam dumps and S/G PORVs CLOSED. **IF** cooldown continues, **THEN:** • **PLACE** steam dump controls OFF. • **CONTROL** total AFW flow to maintain greater than 410 gpm UNTIL NR level in at least one S/G greater than 29% [39% ADV]. **IF** cooldown continues after AFW flow is controlled, **THEN** • **CLOSE** MSIVs. • **ENSURE** MSIV bypasses CLOSED. **IF** RCS temp greater than 564°F, **THEN ENSURE** either steam dumps or S/G PORVs OPEN.
	RO	9. **ENSURE** excess letdown valves CLOSED: • 1-FCV-62-54 • 1-FCV-62-55
	RO	10. **CHECK** pzr PORVs and block valves: a. Pzr PORVs CLOSED. b. At least one block valve OPEN.
	RO	11. **CHECK** pzr safety valves CLOSED: • **EVALUATE** tailpipe temperatures and acoustic monitors.
	RO	12. **CHECK** pzr sprays CLOSED.
	RO	13. **CHECK** if RCPs should remain in service: a. Phase B signals DARK [MISSP]. b. RCS pressure greater than 1500 psig.
	RO	14. **CHECK** S/G pressures: • All S/G pressures controlled or rising. • All S/G pressures greater than 120 psig.
	SRO	14. **RESPONSE NOT OBTAINED:** **IF** S/G pressure low OR dropping uncontrolled, **THEN GO TO** E-2, Faulted Steam Generator Isolation.
EXAMINER: The SRO will enter E-2, "Faulted Steam Generator Isolation," at this point.		
CAUTION If a faulted S/G is NOT needed for RCS cooldown, it should remain isolated during subsequent recovery actions.		
	BOP	1. **ENSURE** all MSIVs and MSIV bypasses CLOSED.

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Event Description: Steam line break inside containment.

Time	Position	Applicant's Actions or Behavior
NOTE If it is known that a steam leak exists in the Turbine building, the following step should not be performed until the affected steam header is depressurized.		
	BOP	2. **PLACE** steam dump controls OFF: • 1-HS-1-103A, STEAM DUMP FSV "A". • 1-HS-1-103B, STEAM DUMP FSV "B".
	BOP	3. **CHECK** for at least one Intact S/G: • Any S/G pressure controlled or rising, OR • Any S/G pressure greater than P-sat for RCS incore temperature.
	BOP	4. **IDENTIFY** Faulted S/G based on ANY of the following: • Any S/G pressure dropping in an uncontrolled manner, OR • Any S/G pressure less than 120 psig, OR • S/G enclosure temps high: 1) T1002A for 2 and 3, 2) T1003A for 1 and 4. OR • Local indication of break in any of the following: 1) Main steam lines, 2) Main feedwater lines, 3) Other secondary piping
CAUTION • If the turbine-driven AFW pump is the only available source of feed flow, steam supply to the turbine-driven AFW pump must be maintained from one SG. **• RCS cooldown requires the availability of at least one S/G.**		
CRITICAL TASK 4 *WOG Critical Task List for E-2, A* *Isolate the faulted SG before transition out of E-2.* *Isolation of the feedwater to the faulted SG maximizes the cooldown capability of the non-faulted loops following a feedline break and minimizes the RCS cooldown and mass and energy release following a steamline break. Isolation of steam paths from the faulted SG also minimizes the RCS cooldown and mass and energy release to containment. In addition, isolation of these steam paths could isolate the break.*		

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Event Description: Steam line break inside containment.

Time	Position	Applicant's Actions or Behavior
CRITICAL TASK 4	BOP	5. **ISOLATE** Faulted S/G: a. **ISOLATE** AFW flow to Faulted S/G. b. **ENSURE** MFW ISOLATED to Faulted S/G: • MFW isolation and bypass isolation valves CLOSED. • MFW reg and bypass reg valves CLOSED. • MFPs TRIPPED. c. **ENSURE** Faulted S/G PORV CLOSED. d. **ENSURE** Faulted S/G blowdown ISOLATED.
	BOP	6. **ENSURE** TD AFW pump being supplied from Intact S/G.
	BOP	7. **MONITOR** CST volume greater than 200,000 gal.
	RO	8. **WHEN** RCS temperature is stable or rising following Faulted S/G blowdown, **THEN ADJUST** Intact S/G PORV controllers in AUTO to: • P-sat for the highest RCS temp (one or more RCPs running) **OR** • P-sat for the highest T-cold temp (no RCPs running)
	SRO	9. **CHECK** secondary side radiation: • S/G discharge monitors NORMAL. • Condenser vacuum exhaust rad monitors NORMAL. • S/G blowdown rad monitor recorders NORMAL trend prior to isolation. • S/G sample results by Chemistry.
	SRO	10. **CHECK** SI termination criteria: a. **CHECK** RCS subcooling greater than 65°F [85°F ADV]. b. **CHECK** secondary heat sink available with either: • Total feed flow to Intact S/Gs greater than 410 gpm, OR • At least one Intact S/G NR level greater than 29% [39% ADV]. c. **CHECK** RCS pressure stable or rising. d. **CHECK** pzr level greater than 15% [33% ADV]. e. **GO TO** ES-1.1,SI Termination.

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Event Description: Steam line break inside containment.

Time	Position	Applicant's Actions or Behavior
EXAMINER: It is possible that the crew will get to step 10 of E-2, "Faulted Steam Generator Isolation," and determine that RCS pressure is not stable or rising. If this is the case then the crew will transition to E-1, "Loss of Reactor or Secondary Coolant. If the transiition to E-1 is made, then the following steps are applicable. If conditions do allow transition to ES-1.1 without a transition to E-1, then terminate the scenario when ES-1.1 is entered.		
	RO	c. **RESPONSE NOT OBTAINED:** ** **GO TO** Step 11.
	SRO	11. **GO TO** E-1, Loss of Reactor or Secondary Coolant.
EXAMINER: The following actions are taken from E-1, "Loss of Reactor or Secondary Coolant."		
NOTE **Seal injection flow should be maintained to all RCPs.**		
	SRO	1. **CHECK** if RCPs should remain in service: a. Phase B DARK [MISSP]. b. RCS pressure greater than 1500 psig.
	SRO	2. **REFER TO** EPIP-1, Emergency Plan Classification Flowchart.
NOTE Time since initiation of event is defined by performance of Step 3.		
	RO	3. **RECORD** current time to mark initiation of LOCA and determination of time for hot leg recirc.
		4. **CHECK** S/G pressures: • All S/G pressures controlled or rising. • All S/Gs pressures greater than 120 psig.
		5. **MAINTAIN** Intact S/G NR levels: a. **MONITOR** levels greater than 29% [39% ADV]. b. **CONTROL** intact S/G levels between 29% and 50% [39% and 50% ADV].
		6. **CHECK** secondary radiation: • S/G discharge monitors NORMAL. • Condenser vacuum exhaust rad monitors NORMAL. • S/G blowdown rad monitor recorders NORMAL trend prior to isolation.

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Event Description: Steam line break inside containment.

Time	Position	Applicant's Actions or Behavior
		7. **ENSURE** cntmt hydrogen analyzers in service: • **PLACE** 1-HS-43-200A in ANALYZE [M-10]. • **PLACE** 1-HS-43-210A in ANALYZE [M-10]. • **CHECK** low flow lights not lit [M-10]. • Locally **CHECK** low analyzer temp lights NOT lit [North wall of Train A 480V SD Bd rm].
		8. **MONITOR** pzr PORVs and block valves: a. Pzr PORVs CLOSED. b. At least one block valve OPEN.
		9. **DETERMINE** if cntmt spray should be stopped: a. **MONITOR** cntmt pressure less than 2.0 psig. b. **CHECK** at least one cntmt spray pump RUNNING. c. **RESET** cntmt spray signal. d. **STOP** cntmt spray pumps, and **PLACE** in A-AUTO. e. **CLOSE** cntmt spray discharge valves 1-FCV-72-2 and 1-FCV-72-39.
		10. **ENSURE** both pocket sump pumps STOPPED [M-15]: • 1-HS-77-410. • 1-HS-77-411.
		11. **CHECK** SI termination criteria: a. **CHECK** RCS subcooling greater than 65°F [85°F ADV]. b. **CHECK** secondary heat sink available with either: • Total feed flow to Intact S/Gs greater than 410 gpm, OR • At least one Intact S/G NR level greater than 29% [39% ADV]. c. **CHECK** RCS pressure stable or rising. d. **CHECK** pzr level greater than 15% [33% ADV]. e. ** **GO TO** ES-1.1, SI Termination.
EXAMINER: When the transition is made to ES-1.1, "SI Termination," inform the crew that a relief crew will continue from this point.		
END OF SCENARIO		

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

APPENDIX A
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EQUIPMENT VERIFICATION

1.	**ENSURE** PCBs OPEN: • PCB 5084. • PCB 5088.	**OPEN** manually.
2	**ENSURE** AFW pump operation: • Both MD AFW pumps RUNNING. • TD AFW pump RUNNING. • LCVs in AUTO, or controlled in MANUAL.	**ESTABLISH** at least one train AFW operation.
3.	**ENSURE** MFW isolation: • MFW isolation and bypass isolation valves CLOSED. • MFW reg and bypass reg valves CLOSED. • MFP A and B TRIPPED. • Standby MFP STOPPED. • Cond demin pumps TRIPPED. • Cond booster pumps TRIPPED.	Manually **CLOSE** valves and **STOP** pumps, as necessary. **IF** any valves can **NOT** be closed, **THEN** **CLOSE** #1 heater outlet valves.

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

4. **MONITOR** ECCS operation:

a. Charging pumps RUNNING.	a. Manually **START** charging pumps.
b. Charging pump alignment: • RWST outlets 1-LCV-62-135 and 1-LCV-62-136 OPEN. • VCT outlets 1-LCV-62-132 and 1-LCV-62-133 CLOSED. • Charging 1-FCV-62-90 and 1-FCV-62-91 CLOSED.	b. **ENSURE** at least one valve in each set aligned.
c. RHR pumps RUNNING.	c. Manually **START** RHR pumps.
d. SI pumps RUNNING.	d. Manually **START** SI pumps.
e. BIT alignment: • Outlets 1-FCV-63-25 and 1-FCV-63-26 OPEN. • Flow thru BIT.	e. **ENSURE** at least one valve aligned, and flow thru BIT.
f. RCS pressure greater than 1650 psig.	f. **ENSURE** SI pump flow. **IF** RCS press drops to less than 150 psig, **THEN** **ENSURE** RHR pump flow.

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

APPENDIX A
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EQUIPMENT VERIFICATION

5	**CHECK** cntmt isolation: a. Phase A isolation: • Train A GREEN. • Train B GREEN. b. Cntmt vent isolation: • Train A GREEN. • Train B GREEN.	**ACTUATE** Phase A and Cntmt Vent Isolation signal, **OR** Manually **CLOSE** valves and dampers as necessary.

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

6.	**CHECK** cntmt pressure: • Phase B DARK [MISSP]. • Cntmt Spray DARK [MISSP]. • Cntmt press less than 2.8 psig.	**PERFORM** the following: 1) **ENSURE** Phase B actuated. 2) **ENSURE** Cntmt Spray actuated. 3) **ENSURE** cntmt spray pumps running. 4) **ENSURE** cntmt spray flow. 5) **ENSURE** Phase B isolation: • Train A GREEN. • Train B GREEN • Manually **CLOSE** valves and dampers as necessary. 6) **STOP** all RCPs. 7) **ENSURE** MSIVs and bypasses CLOSED. 8) **PLACE** steam dump controls OFF. 9) **WHEN** 10 minutes has elapsed since Phase B actuated, **THEN** **ENSURE** air return fans start. 10) **USE** adverse cntmt [ADV] setpoints where provided.

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

7.	**CHECK** plant radiation NORMAL: • S/G blowdown rad recorder 1-RR-90-120 NORMAL prior to isolation [M-12]. • Condenser vacuum exhaust rad recorder 1-RR-90-119 NORMAL prior to trip [M-12]. • 1-RR-90-106 and 1-RR-90-112 radiation recorders NORMAL prior to isolation [M-12]. • S/G main steamline discharge monitors NORMAL [M-30]. • Upper and Lower containment high range monitors NORMAL [M-30]. • **NOTIFY** Unit Supervisor conditions NORMAL.	**NOTIFY** Unit Supervisor IMMEDIATELY.
8	**ENSURE** all D/Gs RUNNING.	**EMERGENCY START** D/Gs

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

9.	**ENSURE** ABGTS operation:	
	a. ABGTS fans RUNNING.	a. Manually **START** fans.
	b. ABGTS dampers OPEN: • FCO-30-146A. • FCO-30-146B. • FCO-30-157A. • FCO-30-157B.	b. Locally **OPEN** dampers.
10.	**ENSURE** at least four ERCW pumps RUNNING, one on each shutdown board preferred.	Manually **START** pumps as necessary.
11.	**ENSURE** ERCW supply valves OPEN to running D/Gs.	**IF** ERCW can **NOT** be aligned to running D/G, **THEN** **EMERGENCY STOP** affected D/G.
12.	**ENSURE** CCS HX C ALT DISCH TO HDR B, 0-FCV-67-152, is open to position A.	Manually **OPEN** 0-FCV-67-152 to position A.

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

13.	**CLOSE** CCS HX C DISCH TO HDR A, 0-FCV-67-144.	
14.	**MONITOR** EGTS operation: • EGTS fans RUNNING. • **ENSURE** dampers OPEN VERIFY filter bank dp between 5 and 9 inches of water.	Manually **START** fans **OPEN** dampers.
15.	**ENSURE** CCS pumps RUNNING: • 1A-A CCS pump. • 1B-B CCS pump. • C-S OR 2B-B CCS pump.	Manually **START** pumps as necessary.

NOTE
- The Upper and Lower Cntmt rad monitors sampling pumps should be shutdown if the sample flowpath is isolated.
- The following equipment is located on 1-M-9.

16.	**CHECK** CNTMT PURGE fans STOPPED:	**STOP** fans and **PLACE** handswitch in PULL-TO-LOCK.

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

17.	**CHECK** FUEL HANDLING EXH fans STOPPED, Fuel and Cask loading dampers CLOSED:	**STOP** fans and **PLACE** handswitch in PULL-TO-LOCK, manually **CLOSE** dampers.
18.	**ENSURE** AB GEN SUPPLY and EXH fans STOPPED.	**STOP** fans and **PLACE** handswitch in PULL-TO-LOCK.

NOTE • Dampers 1-HS-30-158 and 2-HS-30-270 remain open during ABI.

19.	**ENSURE** AB GEN SUP & EXH dampers CLOSED.	Manually **CLOSE** dampers.
20.	**ENSURE** MCR & SPREAD RM FRESH AIR dampers CLOSED: • FCV-31-3. • FCV-31-4.	Manually **CLOSE** dampers.

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

21.	**ENSURE** at least one CB EMER CLEANUP fan RUNNING and associated damper OPEN: • CB EMERG CLEANUP FAN A-A, OR Fan B-B RUNNING. • FCO-31-8, OPEN. OR FCO-31-7, OPEN.	Manually **START** fan. **NOTIFY** TSC if at least one damper NOT OPEN.
22.	**ENSURE** at least one CB EMER PRESS fan RUNNING and associated damper OPEN: • CB EMERG PRESS FAN A-A, OR FAN B-B RUNNING. • FCO-31-6, OPEN. OR FCO-31-5, OPEN.	Manually **START** fan. **NOTIFY** TSC if at least one damper NOT OPEN.

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

23.	**ENSURE** Control Building fans STOPPED and dampers CLOSED: • SPREADING ROOM SUPPLY and EXH FANS AND dampers. • TOILET & LKR RM EXHAUST FAN AND dampers.	Manually **STOP** fans. **NOTIFY** TSC if any damper NOT CLOSED.
24.	**INITIATE** Appendix B.	

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

APPENDIX B
(E-0)
Page 1 of 1

PHASE B PIPE BREAK CONTINGENCIES

1.	**CHECK** PHASE B actuated. (MISSP - 1-XX-55-6C, -6D)	**WHEN** PHASE B actuation occurs; **THEN** **GO TO** step 2.
2.	**ENSURE** 1-FCV-32-110 CLOSED. (CISP - 1-XX-55-6E) [A-train, window 13]	**DISPATCH** AUO to perform ATTACHMENT B1.
3.	**ENSURE** 1-FCV-67-107 CLOSED. (CISP - 1-XX-55-6E) [A -train, window 43]	**DISPATCH** AUO to perform ATTACHMENT B2.
4.	**ENSURE** 1-FCV-70-92 CLOSED. (CISP - 1-XX-55-6E) [A -train, window 73]	**DISPATCH** AUO to perform ATTACHMENT B3.
5.	**ENSURE** 1-FCV-70-140 CLOSED. (CISP - 1-XX-55-6F) [B -train, window 74]	**DISPATCH** AUO to perform ATTACHMENT B4.

ATTACHMENT B1
(E-0)
Page 1 of 1

CONTROL AIR ISOLATION

1. **CLOSE** 0-ISV-32-1013 - CONTROL AIR EL 713 AB HDR ISOL [A6/S EL. 713] (chain operated - behind Fuel and Waste Handling Bd. A).

2. **IF** 0-ISV-32-1013 CANNOT BE CLOSED,
   THEN:

   OPEN and **DISCONNECT** C&SS air compressor breakers:

   a) 0-BKR-32-25 - 480V SD BD 1A2-A, C/3D

   b) 0-BKR-32-26 - 480V SD BD 1B1-B, C/3D

   c) 0-BKR-32-27 - 480V AUX BLDG COM BD, C/6C

   d) 0-BKR-32-4900A - 480V TURB BLDG COM BD, C/6C

ATTACHMENT B2
(E-0)
Page 1 of 1

ERCW ISOLATION

1. **UNLOCK AND CLOSE** 1-ISV-67-523B - LOWER CNTMT VENT CLR 1B &1D ERCW SUP ISOL [A2U/692] (U-1 penetraton room - North of AB Pipe Chase Cooler 1B-B in overhead)

ATTACHMENT B3
(E-0)
Page 1 of 1

CCS RETURN ISOLATION

1. **CLOSE** 1-ISV-70-700 RCP OIL COOLER CCS RETURN ISOLATION [A4/V EL. 710 U-1 Penetration Room] (approximately 10 ft. North of Penetration Room Cooler 1B-B on mezzanine above RHR Sump Valve Room)

ATTACHMENT B4
(E-0)
Page 1 of 1

CCS SUPPLY ISOLATION

1. **CLOSE** 1-ISV-70-516 REACTOR BUILDING CCS SUPPLY ISOLATION [A671 EL. 737] (Behind Elevator approximately 2 ft. west on mezzanine above "A" CCS Heat Exchanger)

SHIFT TURNOVER CHECKLIST
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SHIFT TURNOVER CHECKLIST

Page _____ **of** _____

- ☐ SM
- ☒ US/MCR Unit _____
- ☐ UO Unit _____
- ☐ AUO Station _____
- ☐ STA (STA Function)

Off-going - Name _____

On-coming - Name _____

Part 1 - Completed by off-going shift/Reviewed by on-coming shift:

- Abnormal equipment lineup/conditions:
  1B MD AFW pump out-of-service for pump bearing replacement. Expected return to service in 18 hours. Tech Spec LCO 3.7.5 Action B was entered 6 hours ago.

- SI/Test in progress/planned: (including need for new brief)

- Major Activities/Procedures in progress/planned:
  100% power, MOL. RCS boron is 747 ppm. Control Bank D is at 220 steps. Train B/Channel II Work Week. 1B MFP turbine and pump vibration alarms 53-D and 54-D are currently lit and Operations Management has directed a load reduction to 75% using AOI-39 at 2%/minute to remove the MFP from service. Operations Management has established threshold values of 10 mils vibration on either the pump or turbine as 1B MFP trip criteria.

- Radiological changes in plant during shift:
  None planned

Part 2 - Performed by on-coming shift

- ☐ A review of the Operating Log since last held shift or 3 days, whichever is less.
- ☐ A review of the Rounds sheets/Abnormal readings (AUOs only)

Review the following for changes since last shift turnover:

- ☐ Standing Orders
- ☐ LCO(s) in actions (N/A for AUOs)
- ☐ PER review (N/A for AUOs)
- ☐ TACFs (N/A for AUOs)
- ☐ Operator workarounds, burdens and other challenges
- ☐ Immediate required reading.

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

- ☐ A walkdown of the MCR control boards (N/A for AUOs)

Relief Time: _____ Relief Date: _____

SHIFT TURNOVER CHECKLIST

SHIFT TURNOVER CHECKLIST

Page _____ of _____

- ☐ SM
- ☐ US/MCR Unit _____
- ☒ UO Unit _____
- ☐ AUO Station _____
- ☐ STA (STA Function)

Off-going - Name _____

On-coming - Name _____

Part 1 - Completed by off-going shift/Reviewed by on-coming shift:

- Abnormal equipment lineup/conditions:
  1B MD AFW pump out-of-service for pump bearing replacement. Expected return to service in 18 hours. Tech Spec LCO 3.7.5 Action B was entered 6 hours ago.

- SI/Test in progress/planned: (including need for new brief)

- Major Activities/Procedures in progress/planned:
  100% power, MOL. RCS boron is 747 ppm. Control Bank D is at 220 steps. Train B/Channel II Work Week. 1B MFP turbine and pump vibration alarms 53-D and 54-D are currently lit and Operations Management has directed a load reductionto 75% using AOI-39 at 2%/minute to remove the MFP from service. Operations Management has established threshold values of 10 mils vibration on either the pump or turbine as1B MFP trip criteria.

- Radiological changes in plant during shift:

Part 2 - Performed by on-coming shift

- ☐ A review of the Operating Log since last held shift or 3 days, whichever is less.
- ☐ A review of the Rounds sheets/Abnormal readings (AUOs only)

Review the following for changes since last shift turnover:

- ☐ Standing Orders
- ☐ LCO(s) in actions (N/A for AUOs)
- ☐ PER review (N/A for AUOs)
- ☐ TACFs (N/A for AUOs)
- ☐ Operator workarounds, burdens and other challenges
- ☐ Immediate required reading.

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

- ☐ A walkdown of the MCR control boards (N/A for AUOs)

Relief Time: _____ Relief Date: _____

Facility: **Watts Bar NRC Exam 1 August 2010** Scenario No.: **3** Op Test No.: **1**

Examiners: _____ Operators: _____ **SRO**

_____ _____ **RO**

_____ _____ **BOP**

Initial Conditions: 75% power, BOL. RCS boron concentration is 1128 ppm. Control Rod Bank D at 184 steps.

Turnover: Unit 1 is at 75% power. A power escalation to the preconditioned power level of 96% is to be conducted using GOI-4, "Normal Power Operations." 1D CCW pump was shutdown in order to perform maintenance on the motor. Repairs have been completed and the pump is now available. 0-SI-30-8-A, "Auxiliary Building Gas Treatment System Train A 10-hour Operation" has been in progress for 9 hours. TD AFWP is out of service to replace the trip-and-throttle valve and associated linkage. Tech Spec 3.7.5.B was entered for the TD AFWP 5 hours ago. Expected return to service is 9 hours. Train A/Channel I Work Week.

Event No.	Malf. No.	Event Type*	Event Description
1	n/a	R-RO N-BOP	Raise power after repairs to 1D CCW pump are complete.
2	mux_03c066	TS-SRO	ABGTS Fan belt fails during 0-SI-30-8-A, "Auxiliary Building Gas Treatment System Train A 10-hour Operation" surveillance performance. Requires a Tech Spec evaluation.
3	hic-62-78a cv58	C-RO	TIC-62-78 letdown temp controller fails high, and 1-FCV-62-79A LTDN HI TEMP DIVERT fails to divert automatically. ARI 110-D, LTDN TO DEMINS TEMP HI and ARI 247-A, LTDN HX RET FLOW LO, entry
4	rx07a	I-RO TS-SRO	1-PT-68-340, PZR PRESS fails high. Requires manual control of 1-PIC-68-340A, PZR PRESS MASTER CONTROL. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System. " Requires a Tech Spec evaluation.
5	tic-24-69	C-BOP	1-TIC-24-69, MTOT TEMP TEMP CONTROL fails high. Requires manual control of 1-TIC-24-69.
6	sic-46-20a	I-BOP	1A MFP speed controller fails low. Requires manual trip of the 1A MFP and entry into AOI-16," Loss of Normal Feedwater."
7	fw20	M-ALL	Main feedwater header breaks in the Turbine Building, on the common header downstream of the Number 1 (high pressure) feedwater heaters.
8	rp01b rprt1	C-RO	Automatic reactor trip fails to actuate. Requires the RO to manually trip the reactor. Trip switch RT-1 on 1-M-4 fails to actuate. RO trips the reactor using trip switch RT-2 on 1-M-6.
9	fw07a fw22c	M-ALL	1 A-A motor driven auxiliary feedwater pump trips on instantaneous overcurrent. 1B-B motor driven auxiliary feedwater pump develops a break on its discharge line. Requires entry into FR-H.1, "Loss of Secondary Heat Sink," and establishment of "bleed-and-feed."

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

Scenario 3 - Summary

Initial Condition	75% power, BOL. RCS boron concentration is 1128 ppm. Control Rod Bank D at 184 steps.

Turnover	Unit 1 is at 75% power. A power escalation to the preconditioned power level of 96% is to be conducted using GOI-4, "Normal Power Operations." 1D CCW pump was shutdown in order to perform maintenance on the motor. Repairs have been completed and the pump is now available. TD AFWP is out of service to replace the trip-and-throttle valve and associated linkage. Tech Spec 3.7.5.A was entered for the TD AFWP 5 hours ago. Expected return to service is 9 hours. Train A/Channel I Work Week.

Event 1	Power escalation is conducted using GO-4, "Normal Power Operations."
Event 2	ABGTS Fan belt fails during 0-SI-30-8-A surveillance performance. Operator responds to ARI 139-A, ABGTS FAN A-A/B-B FLOW LO alarm, and shuts down the A-A ABGTS fan. SRO evaluates Tech Specs and enters LCO 3.7.12, Auxiliary Building Gas Treatment System Condition A.
Event 3	TIC-62-78 letdown temp controller fails. RO responds to ARI 110-D LTDN TO DEMINS TEMP HI and takes manual control of temperature controller for the duration of the scenario. Upon reaching the
Event 4	1-PT-68-340, PZR PRESS fails high. Requires Tech Spec Evaluation.SRO enters AOI-18, "Malfunction of Pressurizer Pressure Control System" and directs compensatory actions. SRO evaluates Tech Specs and enters Tech Spec LCO 3.3.1, Reactor Trip System (RTS) Instrumentation, Conditions W and X; LCO 3.3.2, ESFAS Instrumentation, Conditions D and L.
Event 5	1-TIC-24-69, MTOT TEMP TEMP CONTROL fails high. Requires manual control of 1-TIC-24-69.
Event 6	1A MFP speed controller fails low. Requires manual trip of the 1A MFP and entry into AOI-16," Loss of Normal Feedwater."
Event 7	Main feedwater header breaks in the Turbine Building, on the common header downstream of the Number 1 (high pressure) feedwater heaters.
Event 8	Automatic reactor trip fails to actuate. Requires the RO to manually trip the reactor. Trip switch RT-1 on 1-M-4 fails to actuate. RO trips the reactor using trip switch RT-2 on 1-M-6.
Event 9	1 A-A motor driven auxiliary feedwater pump trips on instantaneous overcurrent. 1B-B motor driven auxiliary feedwater pump develops a break on its discharge line. Requires entry into FR-H.1, "Loss of Secondary Heat Sink," and "feed-and-bleed" actions to be taken.

Scenario 3 - Critical Task Summary

Critical Task 1 *from WOG Critical Task List, E-0, A*	*Manually trip the reactor from the control room before manually tripping the turbine.* *Manually tripping the turbine before the reactor is tripped will cause an unnecessary challenge to the steam generator PORV and Safety valves unless the reactor is tripped. Reactor trip must be verified to ensure that the only heat being added to the RCS is from decay heat and reactor coolant pump heat. The safeguards systems that protect the plant during accidents are designed assuming that only decay heat and pump heat are being added to the RCS.*
Critical Task 2 *from WOG Critical Task List, FR-H.1 F.*	*Initiate RCS bleed and feed so that the RCS depressurizes sufficiently for intermediate head injection to occur.* *Once the operator detects that secondary heat sink has degraded (SG wide range levels are less than or equal to 26%), RCS bleed and feed must be established to prevent or minimize core uncovery due to inadequate core cooling.*

Op Test No.: NRC Scenario # 3 Event # 1 Page 1 of 25

Event Description: Raise power after repairs to 1D CCW pump are complete.

Time	Position	Applicant's Actions or Behavior
EXAMINER: The following actions are taken from GO-4, "Normal Power Operation." Section 5.2, "Unit Startup from 30% to 100% Reactor Power," with Step 24 being repeated to raise power. The crew begins at Step 38.		
	BOP	[24] **CONTINUE** ascension to 90% power (70 to 74% if following refueling) by performing the following: [24.1] **IF** during any of the following steps the REFERENCE changes in an undesired manner, **THEN ADJUST** VPL to stop turbine load rise **OR PUSH** TURBINE MANUAL to place the turbine control mode in manual mode and **PROCEED** to section 5.6. [24.2] **ADJUST** VALVE POSITION LIMIT to 90% or ≤ to 5% above the Gov Control Indication. [24.3] **SET** LOAD RATE at predetermined value. [24.4] **PUSH** REFERENCE CONTROL Δ (raise) button to set desired load in SETTER display.
NOTE RCS should be diluted to raise TAVG, then Turbine load raised along with TAVG. Control rods will be used along with dilution to maintain ΔI and, if needed, for temperature.		
EXAMINER: The following actions are taken from SOI-62.02, "Boron Concentration Control," Section 6.6, "Minor Dilution."		
NOTES 1) Section 6.6, Minor Dilution, may be reproduced, laminated, displayed, reused, etc. as desired. 2) Minor Dilution is defined as the addition of Primary Water done several times each shift to compensate for fuel burn-up, and maintain Tavg on program.		
		[1] **ENSURE** 1-HS-68-341H, BACKUP HEATER C, is ON, to equalize Pzr-RCS CB.
		[2] **ADJUST** 1-FQ-62-142, PW BATCH COUNTER, for required quantity.
		[3] **PLACE** 1-HS-62-140B, VCT MAKEUP MODE in DIL.
		[4] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL, to START. [4.1] **CHECK** Red light is LIT.

Op Test No.: NRC Scenario # 3 Event # 1 Page 2 of 25

Event Description: Raise power after repairs to 1D CCW pump are complete.

Time	Position	Applicant's Actions or Behavior
		[5] **MONITOR** the following parameters:

Instrument	Location	Parameters
1-PI-62-122	1-M-6	VCT PRESS
1-LI-62-129A	1-M-6	VCT LEVEL
1-FI-62-142	1-M-6	PW TO BLENDER FLOW
1-FQ-62-142	1-M-6	PW BATCH COUNTER
1-FQ-62-139	1-M-6	BA BATCH COUNTER

		[6] **WHEN** dilution is COMPLETE, AND 1-FCV-62-128 is closed, **THEN PLACE** 1-HS-62-140B, VCT MAKEUP MODE, in AUTO.
		[7] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL, to START. [7.1] **CHECK** Red light is LIT.
		[8] **IF** desired to reduce VCT level, **THEN GO TO** Section 8.5, VCT Level Reduction.
EXAMINER: The following actions are taken from GO-4, "Normal Power Operation."		
	BOP	[24.5] **PUSH** GO button. [24.6] **MONITOR** Generator Megawatts RISING. [24.7] **CHECK** that load rise has **STOPPED** when reference display equals setter **OR IF** desired to stop the load change **THEN STOP** the load change by **DEPRESSING** the HOLD pushbutton. [24.8] **WHEN** desired to resume the load change, **THEN PRESS** the GO push button and continue to monitor load.
	BOP	[38] **ENSURE** both Stator Water Heat Exchangers are in service prior to exceeding 75% power.
NOTE The numbers below the pressure indication for 1-PIS-47-13 correspond to four relays (LEDs) that enable the runback logic. The numbers 1, 2, 3, 4 should be illuminated indicating all four relays are enabled.		
	BOP	[39] **CHECK** HP Turbine Impulse Pressure / Turbine Runback LEDs (1, 2, 3, 4) lit on panel L-262A, 1-PIS-47-13, TB 729 column T3/J.
	SRO	[40] **IF** startup is following refueling, **THEN CONTINUE** ascension to 90% RTP by performing the following: **Step is marked as N/A**

Op Test No.: NRC Scenario # 3 Event # 1 Page 3 of 25

Event Description: Raise power after repairs to 1D CCW pump are complete.

Time	Position	Applicant's Actions or Behavior
		[41] **BEFORE** raising above 80% power, **THEN ENSURE** the following: [41.1] 1-LCV-6-106A controlling properly. [41.2] 1-LCV-6-105A and 105B are **NOT** open.
NOTES 1) After operations less than 85% Reactor power for more than 2 weeks, Reactor Engineering evaluation of Hot Channel Factors per 1-SI-0-20 is required, before exceeding 90% power. 2) Performing NIS check and adjustment relatively close to 100% power may eliminate the need to RE-PERFORM these actions upon reaching 100% power.		
		[42] **WHEN** power is at or above 95%, **THEN PERFORM** the following [42.1] **ADJUST** PR NIS per 1-SI-92-1, NIS Daily Comparison. [42.2] **IF** evaluation of Hot Channel Factors is required, **THEN ENSURE** 1-SI-0-20, COMPLETE. [42.3] **ENSURE** MIG performs 1-SI-68-30 within 24 hours after power stabilizes at 90% or above (N/A if NOT applicable). [42.4] **ENSURE** the following level controllers maintaining levels within normal ranges: A. Feedwater heaters. B. MSR drain tanks
NOTE Turbine is normally operated in IMP OUT control below 30% turbine load. IMP IN operation above 30% turbine load is permissible as long as the unit remains stable (e.g. no instabilities due to IMP IN operation.)		
		[42.5] **IF** desired to limit instabilities due to IMP IN operation at loads greater than 95%, **THEN OBTAIN** Unit SRO concurrence to operate in IMP OUT **AND PLACE** Turbine in IMP OUT.
		[43] **IF** this a startup following a refueling, **THEN HOLD** power between 94 and 98% to complete post-refueling testing.
		[44] **IF** startup is following refueling, **THEN ENSURE** applicable portions of the PETs are COMPLETE for full power operation.
		[45] **CONTINUE** ascension to 100% power by performing the following:

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Event Description: Raise power after repairs to 1D CCW pump are complete.

Time	Position	Applicant's Actions or Behavior
		NOTES 1) TI-45, Determination of Preconditioned Reactor Power, identifies ramp rates, specific power levels where **HOLD** times are required, and control rod withdrawal limits. 2) Power escalation ramp rates and hold times should be per the most conservative of either the fuel pre-conditioning guidelines of TI-45 or the Turbine loading recommendations of SOI-47.02 3) Turbine load change may be stopped by depressing the HOLD push button, using VPL, or by depressing the MANUAL push button
		[45.1] **IF** during any of the following steps the REFERENCE changes in an undesired manner **THEN ADJUST** VPL. to stop turbine load rise **OR PUSH** TURBINE MANUAL to place the turbine control mode in manual mode and **PROCEED** to section5.6 [45.2] **CHECK** VALVE POS LIMIT light is **NOT** LIT. [45.3] **SET** VALVE POSITION LIMIT at 100% or ≤ to 5% above the Gov Control Indication. [45.4] **SET** LOAD RATE at predetermined value. [45.5] **PUSH** REFERENCE CONTROL Δ (raise) button to set desired load in SETTER display.
Cue Simulator Operator to insert Event 2.		

Op Test No.: NRC Scenario # 3 Event # 2 Page 5 of 25

Event Description: ABGTS Fan drive failure during 0-SI-30-8-A surveillance performance. Requires Tech Spec Evaluation.

Time	Position	Applicant's Actions or Behavior
Indications: 139-A ABGTS FAN A-A/B-B FLOW LO		
EXAMINER: As soon as the A-A ABGTS Fan is stopped, the Console Operator will clear the malfunction and allow Window 139-A ABGTS FAN A-A/B-B FLOW LO to clear.		
	RO	Announces Window 139-A, ABGTS FAN A-A/B-B FLOW LO alarm when received.
	BOP	Determines that A-A ABGTS fan motor is running based on RED indicating light LIT on panel 0-M-25. May place the A-A ABGTS Fan in STOP, PULL-TO-LOCK.
	SRO	Enters and directs actions of ARI 139-A ABGTS FAN A-A/B-B FLOW LO.
	SRO	May direct the BOP to shutdown the A-A ABGTS Fan using 0-SI-30-8-A, "Auxiliary Building Gas Treatment System Train A 10-hour Operation."
EXAMINER: The following actions are taken from ARI 139-A ABGTS FAN A-A/B-B FLOW LO.		
	BOP	**[1] IF** selected for P-AUTO, **THEN ENSURE** standby ABGTS starts. ***B-B ABGTS fan is in the A-AUTO position, so step is N/A.***
	SRO	**[2] DETERMINE** cause of failure, and **INITIATE** repairs if needed. ***Report from the Auxiliary Building AUO is that the drive belt for the A-A ABGTS fan is broken. SRO should direct the BOP to stop the A-A ABGTS fan, using 0-SI-30-8 steps.***
	SRO	**[3] REFER TO** SOI-30.06, *AUXILIARY BUILDING GAS TREATMENT SYSTEM (ABGTS).*
	SRO	**[4] REFER TO** Tech Specs. ***3.7.12 Auxiliary Building Gas Treatment System (ABGTS), Condition A: With one ABGTS train inoperable, restore the ABGTS train to OPERABLE status within 7 days.***
EXAMINER: The following actions are taken from 0-SI-30-8-A, "Auxiliary Building Gas Treatment System Train A 10-hour Operation," beginning at Step 15.		

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Event Description: ABGTS Fan drive failure during 0-SI-30-8-A surveillance performance. Requires Tech Spec Evaluation.

Time	Position	Applicant's Actions or Behavior
		[15] WHEN ABGTS Train A has operated continuously for at least 10 hours (600 min), THEN PERFORM the following: A. **IF** using Stop Watch, **THEN** PLACE 1-HS-30-146A, ABGTS FAN A-A [0-M-25], in STOP, simultaneous with stopping the Stop Watch. B. **IF** using meter, **THEN PLACE** 1-HS-30-146A, ABGTS FAN A-A [0-M-25], in **STOP.** C. **ENSURE** Suction and Discharge dampers, FCO-30-146A and FCO-30-146B, CLOSE.
		[16] ENSURE 1-HS-30-146A, ABGTS Fan A-A in A AUTO.
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	SRO	**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).
Cue Simulator Operator to insert Event 3.		

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Event Description: TIC-62-78 letdown temp controller fails high. Requires ARI entry.

Time	Position	Applicant's Actions or Behavior
Indications: 110-D LTDN TO DEMINS TEMP HI 247-B LTDN HX RET TEMP HI		
	RO	Diagnoses and announces failure of 1-HIC-62-78, Letdown temperature controller.
	RO	May place 1-TIC-62-78 in MANUAL and control temperature.
	RO	May place 1-HS-62-79A, LTDN HI TEMP DIVERT, to the VCT position.
	BOP	Responds to ARI 247-B LTDN HX RET TEMP HI alarm
	SRO	Enters and directs actions of ARI 110-D, LTDN TO DEMINS TEMP HI.
EXAMINER: The following actions are taken from ARI 110-D, LTDN TO DEMINS TEMP HI.		
	RO	**[1] IF** letdown temperature is greater than 137.5 °F on 1-TI-62-78 [1-M-6], **THEN ENSURE** CVCS demineralizers bypassed (lights above 1-HS-62-79 [1-M-6]). ***1-HS-62-79A fails to reposition automatically. The RO must manually rotate the handswitch from the DEMIN position to the VCT position to compensate for this failure.***
	RO	**[2] ENSURE** letdown flow is 45 gpm to 120 gpm on 1-FI-62-82 [1-M-6].
	RO	**[3] ENSURE** charging flow is 57 gpm to 132 gpm on 1-FI-62-93A [1-M-5].
	RO	**[4] ADJUST** 1-HIC-62-78A to maintain letdown temperature less than 127 °F on 1-TI-62-78.
	SRO	**[5] IF** problem is due to loss of CCS, **THEN REFER TO** AOI-15, *LOSS OF COMPONENT COOLING WATER (CCS).*
	SRO	**[6] NOTIFY** Work Control to initiate corrective action, if necessary.
	RO	**[7] WHEN** ready to return to normal, **THEN PLACE** 1-HS-62-79A, LTDN HI TEMP DIVERT, in DEMIN position, and **HOLD** until 1-TCV-62-79 is fully open.
EXAMINER: The following actions are taken from ARI 247-B LTDN HX RET TEMP HI.		
	BOP	**[1] CHECK** 1-TI-70-191, LTDN HX RET TEMP [0-M-27B]. ***BOP will request that the RO check 1-HIC-62-78A, LETDOWN HX OUTLET TEMP TCV-70-192 CNTL for proper operation.***
	RO	**[2] CHECK** letdown flow and pressure and **REDUCE** letdown flow as necessary.

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Event Description: TIC-62-78 letdown temp controller fails high. Requires ARI entry.

Time	Position	Applicant's Actions or Behavior
	BOP	**[3] CHECK** 1-TCV-70-192 maintaining letdown temp at setpoint. ***If not done previously, BOP will request that the RO check 1-HIC-62-78A, LETDOWN HX OUTLET TEMP TCV-70-192 CNTL for proper operation.***
	SRO	**[4] START** CCS Pump, or **REDUCE** CCS loads to maintain press between 40 and 108 psi on 1-PI-70-24A, CCS HX A SUP PRESS [0-M-27B].
	SRO	**[5] ENSURE** proper valve lineup through Ltdn Hx per SOI-70.01, Component Cooling Water (CCS).
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	SRO	**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).
Cue Simulator Operator to insert Event 4.		

Op Test No.: NRC Scenario # 3 Event # 4 Page 9 25

Event Description: PZR press 1-PT-68-340 fails high. Requires Tech Spec Evaluation.

Time	Position	Applicant's Actions or Behavior
Indications: 90-A PZR PRESS HI 124-B PZR PRESS HI Both PZR Spray valves indicate full open on controllers. Operable PZR pressure indicators display a rapid reduction in RCS pressure. All PZR heaters are OFF.		
	RO	Diagnose and announces failure of 1-PI-68-340, PZR PRESS downscale.
	RO	May refer to ARI 90-A PZR PRESS HI actions.
	RO	May refer to ARI 124-B PZR PRESS HI for actions.
	SRO	Enters and directs actions of AOI-18, "Malfunction of Pressurizer Pressure Control System."
EXAMINER: The following actions are taken from ARI 90-A PZR PRESS HI.		
	RO	**[1] CHECK** PZR pressure on 1-PI-68-334 and -340 [1-M-5].
	RO	**[2] IF** a PZR pressure channel has failed, **THEN** **[a] PLACE** PZR master controller 1-PIC-68-340A in manual control and stabilize pressure. **[b] GO TO** AOI-18, *MALFUNCTION OF PRESSURIZER PRESSURE CONTROL SYSTEM.*
EXAMINER: The following actions are taken from ARI 124-B PZR PRESS HI.		
	RO	**[1] CHECK** PZR pressure on 1-PI-68-334 and -340 [1-M-5].
	RO	**[2] GO TO** AOI-18, *MALFUNCTION OF PRESSURIZER PRESSURE CONTROL SYSTEM.*
EXAMINER: The following actions are taken from AOI-18, "Malfunction of Pressurizer Pressure Control System."		
NOTE 120 AC VITAL PWR BD 1-IV [breaker 2] supplies the plugmold power strip associated with both PZR spray valves and several other instruments required to respond to this event.		
	RO	1. **CHECK** pressurizer pressure stable or trending to desired pressure: • 1-PI-68-340A, • 1-PI-68-334, • 1-PI-68-323, • 1-PI-68-322.

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Event Description: PZR press 1-PT-68-340 fails high. Requires Tech Spec Evaluation.

Time	Position	Applicant's Actions or Behavior
		1. **RESPONSE NOT OBTAINED:** **PLACE** pzr master controller 1-PIC-68-340A in MANUAL and **RESTORE** press to normal.
	RO	2. **CHECK** 1-XS-68-340D selected to a failed controlling or backup channel.
	RO	3. **RESTORE** press control to normal: a. **SELECT** operable channels for control and backup with 1-XS-68-340D. b. **ENSURE** operable channel selected for recording with 1-XS-68-340B. c. **ENSURE** TR-68-2A placed to operable channel using 1-XS-68-2B, ΔT RCDR TR-68-2A LOOP SELECT [1-M-5]. d. **WHEN** Pressurizer pressure on program, **THEN RETURN** Pzr master controller 1-PIC-68-340A to AUTO.
	SRO	4. **NOTIFY** Work Control to remove failed channel from service.
	SRO	5. ****GO TO** Step 17.
	SRO	17. **REFER TO** the following Tech Specs: 3.3.1 ***Function 6. Overtemperature ΔT, Condition W, With one channel inoperable, place the channel in trip within 72 hours OR Be in Mode 3 within 78 hours.*** ***Function 8a. Pressurizer Pressure - Low, Condition X, With one channel inoperable, place the channel in trip within 72 hours, OR reduce THERMAL POWER to <P-7 within 78 hours.*** ***Function 8b. Pressurizer Pressure - High, Condition W, With one channel inoperable, place the channel in trip within 72 hours OR Be in Mode 3 within 78 hours.*** 3.3.2 ***Function 1.d, Pressurizer Pressure - Low, Condition D, With one channel inoperable, place the channel in trip within 72 hours OR be in Mode 3 within 78 hours AND be in Mode 4 within 84 hours.*** ***Function 8.b Pressurizer Pressure, P-11, Condition L, With one P-11 interlock channel inoperable, verify interlock is in required state for existing unit conditions within 1 hour OR be in Mode 3 within 7 hours AND be in Mode 4 within 13 hours.***
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.

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Event Description: PZR press 1-PT-68-340 fails high. Requires Tech Spec Evaluation.

Time	Position	Applicant's Actions or Behavior
	SRO	**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).
Cue Simulator Operator to insert Event 5.		

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Event Description: 1-TIC-24-69 controller fails high, causing MTOT temperature to rise.

Time	Position	Applicant's Actions or Behavior
Indications: 23-A TURB/GEN VIBRATION HI/HI-HI MTOT Oil Temperatures rising on ICS display.		
	BOP	May diagnose and announce rising trend on Main Turbine drain oil temperatures.
	BOP	May diagnose and announce rising trend on Main Turbine vibrations.
	BOP	Announces 23-A TURB/GEN VIBRATION HI/HI-HI alarm.
	SRO	Enters and directs actions of ARI 23-A TURB/GEN VIBRATION HI/HI-HI
EXAMINER: The following actions are taken from ARI 23-A TURB/GEN VIBRATION HI/HI-HI.		
	BOP	[1] **IF** the cause of this alarm is COUPLING vibration, **THEN** notify the Sys Eng. No Operator action is required.
	BOP	[2] **MONITOR** 1-CRT-47-121 [1-M-2] to determine which bearing has possible vibration problems.
	BOP	[3] **DISPATCH** Operator to perform the following: • **CHECK** local indications on 1-L-792 • **SOUND** Turbine bearings • **CHECK** Turbine lube oil temperature. • **CHECK** Seal Oil temperature.
	BOP	[4] **IF** a catastrophic Turbine/ Generator failure has occurred, **THEN EVALUATE** performing Generator Hydrogen Emergency Depressurization IAW SOI-35.01 Section 8.15.
	BOP	[5] **ATTEMPT** to stabilize or reduce bearing vibration by varying one or more of the following parameters within normal operation limits: • Turbine bearing lube oil supply temperature. ***BOP will determine that 1-TIC-24-69 is indicating full closed, and transfer the controller to MANUAL. After transferring the controller to MANUAL, the BOP will open the valve to reduce MTOT temperature.*** • Generator Megawatts and/or VARS • Seal Oil temperature.
	SRO	[6] **IF** bearing vibration is above 7 mils (10 mils for # 11 bearing), **THEN NOTIFY** Engineering **AND EVALUATE** if load reduction or unit shutdown warranted.

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Event Description: 1-TIC-24-69 controller fails high, causing MTOT temperature to rise.

Time	Position	Applicant's Actions or Behavior
	SRO	[7] **IF** bearing vibration continues to rise above evaluated limits, **THEN EVALUATE** rapid load reduction per AOI-39, or tripping the turbine prior to exceeding 14 mils vibration.
EXAMINER: SOI-47.02, "Turbo-Generator Startup Operation," Appendix F, "Turbine Instrument Limits," is provided on Pages 26 through 28.		
	BOP	[8] **ENSURE** Turbine is operated within startup and loading limitations of SOI-47.02, Turbo-generator Startup Operation.
	BOP	[9] **ENSURE** lube oil temperature, condenser vacuum, sealing steam pressure, and exhaust hood temperature are normal.
Cue Simulator Operator to insert Event 5. Additional events will occur after Event 5 is entered by the Console Operator.		

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Event Description: 1A MFP speed controller fails low. Requires trip of the 1A MFP and entry into AOI-16," Loss of Normal Feedwater."

Time	Position	Applicant's Actions or Behavior
Indications: 63-F SG LEVEL DEVIATION Speed (rpm) indication for the 1A MFP pump dropping as indicated on 1-SI-46-20A MFPT A SPEED. Pressure indication for 1A MFP dropping as indicated on 1-PI-3-66A MFWP A DISCH PRESS.		
	BOP	Diagnoses and announces the reduction in speed on the 1A MFP.
	BOP	May place 1-SC-46-20A, MFPT A - SPPED CONTROL in MANUAL and attempt to increase 1A MFPT speed.
	SRO	Enters and directs actions of AOI-16, "Loss of Normal Feedwater," Section 3.7, "MFW pump speed control circuit failure."
EXAMINER: The following actions are taken from ARI 63-F SG LEVEL DEVIATION.		
	BOP	**[1] DETERMINE** which S/G has abnormal level. **BOP determines ALL SG levels are abnormal.**
	BOP	**[2] CHECK** steam flow/feed flow instrumentation to **VERIFY** level controls are restoring S/G levels to **NORMAL.**
	BOP	**[3] IF** level controls have malfunctioned, **THEN** **[a] PLACE** FW controls in manual. **[b] RESTORE** S/G level to normal and **GO TO** AOI-16, *LOSS OF NORMAL FEEDWATER.* ***SRO determines step is N/A.***
	BOP	**[4] IF** MFPT speed controls have malfunctioned, **THEN** **[a] PLACE** MFPT speed controls in manual. **[b] RESTORE** MFW/MS ΔP to program AND **GO TO** AOI-16, *LOSS OF NORMAL FEEDWATER.* ***SRO directs the BOP to place the 1A MFPT speed control in MANUAL, and to raise pump speed.***
	SRO	**[5] INITIATE** WO for corrective action, if necessary.
EXAMINER: The following actions are taken from AOI-16, "Loss of Normal Feedwater," Section 3.7, "MFW pump speed control circuit failure."		
	BOP	1. **CHECK** MFWPT speed controller(s) NORMAL.

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Event Description: 1A MFP speed controller fails low. Requires trip of the 1A MFP and entry into AOI-16," Loss of Normal Feedwater."

Time	Position	Applicant's Actions or Behavior
	BOP	1. **RESPONSE NOT OBTAINED:** **CONTROL** MFP speed using MANUAL control of master controller or individual controller(s) as required. **(ρ) IF** MANUAL control of individual MFWPT controller is ineffective, **THEN TRIP** affected MFWPT, and ** **GO TO Section** 3.4 or 3.5 as applicable. ***SRO will direct the BOP to manually trip the 1A MFP since it is not responding to changes made via 1-SC-46-20A, MFPT A - SPEED CONTROL***
EXAMINER: The following actions are taken from AOI-16, "Loss of Normal Feedwater," Section 3.5, "Loss of MFWP Greater Than or Equal To 800 MWe (67% Turbine Load)."		
		1. (ρ) **IF** loss of S/G level is imminent, **THEN TRIP** reactor, and ** **GO TO** E-0, Reactor Trip or Safety Injection.
		2. **CHECK** turbine load less than or equal to 1000 MWe (85%).
		3. **PLACE** tripped MFP recirc valve controller in MANUAL, and **CLOSE** recirc valve.
		4. **CHECK** turbine load less than 800 MWe (67%).
		4. **RESPONSE NOT OBTAINED:** **ENSURE** Standby MFWP running. (ρ) **IF** Standby MFWP **NOT** available, **THEN REDUCE** turbine load to less than 800 MWe with valve position limiter.
		5. **ENSURE** MFWP speed rising to control S/G Δ-P and levels on program.
		5. **RESPONSE NOT OBTAINED:** Manually **CONTROL** MFWPT speed.
EXAMINER: During the performance of AOI-16, "Loss of Normal Feedwater," the feedwater line in the common header downstream of the high pressure heaters will develop. The crew will initiate a manual reactor trip and close the #1 (High Pressure) feedwater isolation valves.		

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Event Description: Feedwater line rupture downstream of the high pressure feedwater heaters. Automatic reactor trip does not occur. The RO attempts to initiate the reactor trip using handswitch RT-1 on 1-M-4. The RO must go to handswitch RT-2 on 1-M-6 to initiate the manual reactor trip.

Time	Position	Applicant's Actions or Behavior
Indications: Reactor power increasing on all Power Range indications. RCS temperature dropping. PZR level dropping. PZR pressure dropping. NO radiation changes on either the primary or secondary radiation monitors. 168-B TURB FDN SUMP LEVEL HI.		
	BOP	Diagnoses and announces the feedwater line break.
	SRO	May direct the RO to trip the reactor, based on imminent loss of SG level.
	RO	Recognizes that the reactor did not trip automatically and initiates a manual reactor trip. Trips the reactor from handswitch RT-2 on 1-M-6, after handswitch RT-1 fails to operate.
	RO	Performs Immediate Operator Actions following the reactor trip.
	BOP	Performs Immediate Operator Actions following the reactor trip.
	SRO	Enters and directs actions of E-0,"Reactor Trip or Safety Injection."
EXAMINER: The following actions are taken from E-0,"Reactor Trip or Safety Injection."		
NOTE 1 Steps 1 thru 4 are IMMEDIATE ACTION STEPS.		
NOTE 2 Status Trees / SPDS should be monitored when transitioned to another instruction.		
Critical Task 1 *from WOG Critical Task List, E-0, A* *Manually trip the reactor from the control room before manually tripping the turbine.* *Manually tripping the turbine before the reactor is tripped will cause an unnecessary challenge to the steam generator PORV and Safety valves unless the reactor is tripped.*		
Critical Task 1	RO	1. **ENSURE** reactor trip: • Reactor trip and bypass breakers OPEN. • RPIs at bottom of scale. • Neutron flux DROPPING.
	RO	2. **ENSURE** Turbine Trip: • All turbine stop valves CLOSED.
	RO	3. **CHECK** 6.9 kV shutdown boards: a. At least one board energized from: CSST (offsite), OR D/G (blackout).

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Event Description: Feedwater line rupture downstream of the high pressure feedwater heaters. Automatic reactor trip does not occur. The RO attempts to initiate the reactor trip using handswitch RT-1 on 1-M-4. The RO must go to handswitch RT-2 on 1-M-6 to initiate the manual reactor trip.

Time	Position	Applicant's Actions or Behavior
	RO	4. **CHECK** SI actuated: a. Any SI annunciator LIT. b. Both trains SI **ACTUATED.** • 1-XX-55-6C • 1-XX-55-6D
	SRO/RO	4. **RESPONSE NOT OBTAINED:** **DETERMINE** if SI required: a. **IF** ANY of the following exists: • S/G press less than 675 psig, OR • RCS press less than 1870 psig, OR • Cntmt press greater than 1.5 psig **THEN ACTUATE** SI manually. **IF** SI **NOT** required, **THEN ** GO TO** ES-0.1, b. **ACTUATE** SI manually.
EXAMINER: The following actions are taken from ES-0.1, "Reactor Trip Response."		
CAUTION **Plant conditions, AFW pump start signals and flow requirements should be evaluated as time allows.**		
	RO	1. **MONITOR** SI actuation criteria: • **IF** SI actuation occurs during the performance of this Instruction, **THEN ** GO TO** E-0, Reactor Trip or Safety Injection.
	BOP	2. **CHECK** Generator PCBs OPEN.
	RO	3. **MONITOR** RCS temperature stable at or trending to 557°F using: • RCS Loop T-avg with any RCP running. OR • RCS Loop T-cold with RCPs out-of-service.

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Event Description: Feedwater line rupture downstream of the high pressure feedwater heaters. Automatic reactor trip does not occur. The RO attempts to initiate the reactor trip using handswitch RT-1 on 1-M-4. The RO must go to handswitch RT-2 on 1-M-6 to initiate the manual reactor trip.

Time	Position	Applicant's Actions or Behavior
	RO	3. **RESPONSE NOT OBTAINED:** **IF** temperature is less than 557°F, **THEN ENSURE** steam dumps, S/G PORVs, and blowdown isolation valves CLOSED. **IF** cooldown continues, **THEN ENSURE** total feed flow is less than or equal to 500 gpm: • **REFER TO** SOI-3.02, Auxiliary Feedwater System, for manual control of TDAFWP. • **MAINTAIN** at least one S/G NR level greater than 29%, or total feed flow between 410 and 500 gpm for heat sink. **IF** cooldown continues after AFW flow is controlled, **THEN:** • **CLOSE** MSIVs. • **ENSURE** MSIV bypasses CLOSED. • **PLACE** steam dump controls OFF. **IF** temperature is less than 547°F after AFW is controlled, **THEN INITIATE** boration: • **REFER TO** AOI-34, Immediate Boration. **IF** temperature is greater than 564°F, **THEN ENSURE** either steam dumps, or S/G PORVs OPEN. **WHEN** cooldown is controlled, **THEN RETURN** AFW to AUTO as desired.
	BOP	4. **ENSURE** AFW operation: a. AFW established: • Both MD AFW pumps RUNNING. • TD AFW pump RUNNING. • LCVs in AUTO or controlled in MANUAL. b. Heat sink available: • Total feed flow greater than 410 gpm, OR • At least one S/G NR level greater than 29%.
	BOP	4. **RESPONSE NOT OBTAINED:** b. IF heat sink can NOT be established, THEN ** GO TO FR-H.1, Loss Of Secondary Heat Sink.
EXAMINER: The following actions are taken from FR-H.1, "Loss of Secondary Heat Sink."		
CAUTION • **If total feed flow CAPABILITY of 410 gpm is available, this Instruction should NOT be performed.** • **If an Intact S/G is available, feed flow should NOT be reestablished to any faulted S/G.**		
	RO	1. **CHECK** if secondary heat sink is required: a. RCS pressure greater than any Intact S/G pressure. b. RCS temperature greater than 375°F [360°F ADV].

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Event Description: Feedwater line rupture downstream of the high pressure feedwater heaters. Automatic reactor trip does not occur. The RO attempts to initiate the reactor trip using handswitch RT-1 on 1-M-4. The RO must go to handswitch RT-2 on 1-M-6 to initiate the manual reactor trip.

Time	Position	Applicant's Actions or Behavior
	RO	2. **ENSURE** at least one charging pump RUNNING.
CAUTION **RCS bleed and feed criteria must be monitored for immediate response if the criteria is exceeded.**		
	RO	3. **DETERMINE** if RCS bleed and feed required: a. **CHECK** RCS bleed and feed required: • Any THREE S/G WR levels less than or equal to 26% [36% ADV]. OR • RCS pressure greater than or equal to 2335 psig. b. **STOP** all RCPs, and ** **GO TO** Cautions prior to Step 18 to initiate RCS bleed and feed.
	RO	3. **RESPONSE NOT OBTAINED:** a. **MONITOR** RCS bleed and feed criteria: **WHEN** criteria are met, **THEN PERFORM** Substep 3b. ** **GO TO** step 4.
	BOP	4. **ENSURE** S/G blowdown ISOLATED.
	BOP	5. **MONITOR** CST volume greater than 200,000 gal.
NOTE **If the use of condensate flow is anticipated, then a higher pzr level will better accommodate the level shrink from S/G cooldown and depressurization.**		
	RO	6. **CONTROL** pzr level between 29% and 63% [47% and 58% ADV].
EXAMINER: Reports from the field are that the 1A-A MD AFWP tripped on instantaneous overcurrent and the motor has suffered damage. There is a break on the discharge piping of the 1B-B MD AFW pump, which prevents flow to #3 and #4 SGs. The TD AFW pump will require a minimum of 4 hours to reassemble the trip and throttle valve and linkage. The feedwater line break prevents use of secondary pumps as a supply to the SGs.		
	BOP	7. **ESTABLISH** MD AFW pump flow: a. **CHECK** MD AFW pump AVAILABLE. b. **ENSURE** both MD AFW pumps RUNNING. c. **ENSURE** MD AFW LCVs OPEN. d. **CHECK** MD AFW pump flow greater than 410 gpm. e. **CHECK** NR level in at least one S/G greater than 29% [39% ADV]. f. **RETURN TO** Instruction in effect.
	BOP	8. **ESTABLISH** TD AFW pump flow: a. **CHECK** TD AFW pump AVAILABLE.

Op Test No.: NRC Scenario # 3 Event # 7, 8 and 9 Page 20 of 25

Event Description: Feedwater line rupture downstream of the high pressure feedwater heaters. Automatic reactor trip does not occur. The RO attempts to initiate the reactor trip using handswitch RT-1 on 1-M-4. The RO must go to handswitch RT-2 on 1-M-6 to initiate the manual reactor trip.

Time	Position	Applicant's Actions or Behavior
	SRO	8. **RESPONSE NOT OBTAINED:** a. ** **GO TO** Step 9.
	RO	9. **STOP** all four RCPs.
	BOP	10. **IF** Secondary pumps will be used to feed S/Gs, **THEN REFER TO** Appendix A (FR-H.1), Establishing MFW following Reactor Trip, while continuing this Instruction. ***Based on the location of the feedwater break, secondary pumps will NOT be used to fill the SGs.***
CAUTION • **If offsite power is lost after SI reset, manual action will be required to restart the SI pumps and RHR pumps due to loss of SI start signal.** • **If plant conditions degrade after automatic SI is blocked, manual actuation may be required.**		
NOTE **After the low steamline pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.**		
	RO	11. **BLOCK** SI signals: a. **INITIATE** RCS depressurization to less than 1912 psig: **IF** letdown in service, **THEN ALIGN** aux spray USING Appendix B (FR-H.1), ALIGN AUX SPRAY.
EXAMINER: The following actions are taken from Appendix B (FR-H.1),"ALIGN AUX SPRAY.		
	RO	1. **ENSURE** at least one charging pump running.
	RO	2. **IF** charging is not aligned, **THEN ALIGN** charging: a) **CLOSE** RCP seal flow control 1-FCV-62-89. b) **OPEN** charging isolation 1-FCV-62-90 and 1-FCV-62-91. c) **ENSURE** charging 1-FCV-62-85 or 1-FCV-62-86 OPEN.
CAUTION **If RCS is on cold leg recirc, seal return isolation valves should not be opened (prevents sump inventory from diverting to VCT).**		
	RO	d) **OPEN** seal return 1-FCV-62-61 and 1-FCV-62-63.
	RO	3. **ENSURE** BIT outlet valves 1-FCV-63-25 AND 1-FCV-63-26 CLOSED.
NOTE Aux spray flow can be maximized by closing the normal pzr spray valve(s).		

Op Test No.: NRC Scenario # 3 Event # 7, 8 and 9 Page 21 of 25

Event Description: Feedwater line rupture downstream of the high pressure feedwater heaters. Automatic reactor trip does not occur. The RO attempts to initiate the reactor trip using handswitch RT-1 on 1-M-4. The RO must go to handswitch RT-2 on 1-M-6 to initiate the manual reactor trip.

Time	Position	Applicant's Actions or Behavior
	RO	4. **CONTROL** aux spray flow: a) **OPEN** aux spray 1-FCV-62-84. b) **CLOSE** charging 1-FCV-62-85 and 1-FCV-62-86. c) **MODULATE** Pzr Spray valves as needed to control Pzr pressure. d) **ADJUST** aux spray flow rate with 1-FCV-62-93 and 1-FCV-62-89 as needed.
EXAMINER: The following actions are the continuation of FR-H.1, Step 11		
	RO	b. **BLOCK** auto SI actuation signals [68-B], and [69-B]: 1) **NOTIFY** IMs to block auto SI USING IMI-99.040, AUTO SI Block. 2) **WHEN** RCS pressure is less than 1962 psig (P-11), **THEN** • **BLOCK** low pzr pressure SI. • **BLOCK** low steam pressure SI. c. **ENSURE** high cntmt pressure SI signal CLEARED [78-G]. d. **CHECK** SI actuated. d. **<u>RESPONSE NOT OBTAINED:</u>** ** **GO TO** Substep 11f. f. **MAINTAIN** RCS pressure less than 1912 psig.
NOTE • **Cycling reactor trip breakers to allow MFW Isolation reset is only required if SI or HI-HI S/G level has occurred.** • **If any valid SI signal has occurred since SI reset, cycling reactor trip breakers will initiate SI.**		
	BOP	12. **PREPARE** for MFW startup: a. **PLACE** MFW pump controllers in MANUAL, and **SET** to zero. b. **PLACE** MFW reg valve controllers in MANUAL, and **SET** to zero. c. **PLACE** MFW reg bypass valve controllers in MANUAL, and **SET** to zero. d. **CHECK** FW bypass isolation valves OPEN. ***Based on the location of the feedwater break, MFPs will NOT be used to fill the SGs.***
NOTE **If the standby feed pump will be used, only the hotwell pumps should be started to prevent an overpressure condition.**		

Op Test No.: NRC Scenario # 3 Event # 7, 8 and 9 Page 22 of 25

Event Description: Feedwater line rupture downstream of the high pressure feedwater heaters. Automatic reactor trip does not occur. The RO attempts to initiate the reactor trip using handswitch RT-1 on 1-M-4. The RO must go to handswitch RT-2 on 1-M-6 to initiate the manual reactor trip.

Time	Position	Applicant's Actions or Behavior
	BOP	13. **ESTABLISH** feedwater flow: a. **START** secondary plant pumps as necessary: 1) Hotwell pumps. 2) Condensate booster pumps. 3) Cond DI booster pumps. ***Based on the location of the feedwater break, secondary pumps will NOT be used to fill the SGs.***
	SRO	13. a. **RESPONSE NOT OBTAINED:** **IF** secondary plant pumps are **NOT** available, **THEN ** GO TO** Step 17.
	RO	17. **DETERMINE** if RCS bleed and feed required: a. **MONITOR** RCS bleed and feed criteria: • Any THREE S/G WR levels less than or equal to 26% [36% ADV]. OR • RCS pressure greater than or equal to 2335 psig.
	SRO	17. a. **RESPONSE NOT OBTAINED:** **RETURN TO** Cautions prior to Step 1. ***The crew may return to the Cautions prior to Step 1, if SG wide range level has not dropped to the point where "Bleed-and-feed" criteria have not been met.***
EXAMINER: When bleed and feed criteria are met, then the following steps will be performed.		
CAUTION • **Step 18 Through 20 must be performed quickly in order to establish RCS heat removal by RCS bleed and feed.** • **Termination of bleed and feed is required prior to transitioning out of FR-H.1 when heat sink is restored.**		
Critical Task 2 *from WOG Critical Task List, FR-H.1 F.* *Initiate RCS bleed and feed so that the RCS depressurizes sufficiently for intermediate head injection to occur.* *Once the operator detects that secondary heat sink has degraded (SG wide range levels are less than or equal to 26%), RCS bleed and feed must be established to prevent or minimize core uncovery due to inadequate core cooling.*		
Critical Task 2	RO	18. **ACTUATE** SI.
Critical Task 2	RO	19. **ENSURE** at least one of the following RCS feed paths: • At least one charging pump injecting thru BIT, OR • At least one SI Pump running with its injection valves open.

Op Test No.:	NRC	Scenario #	3	Event #	7, 8 and 9	Page	23	of	25

Event Description: Feedwater line rupture downstream of the high pressure feedwater heaters. Automatic reactor trip does not occur. The RO attempts to initiate the reactor trip using handswitch RT-1 on 1-M-4. The RO must go to handswitch RT-2 on 1-M-6 to initiate the manual reactor trip.

Time	Position	Applicant's Actions or Behavior
		CAUTION • **When the reactor vessel head vent block valve is opened, the throttle valve will cycle open and closed.** • **Slowly opening (5 seconds stroke time) the head vent valve will prevent water hammer and pipe damage.**
Critical Task 2	RO	20. **ENSURE** adequate RCS bleed path: a. **ENSURE** all pzr PORVs and pzr PORV block valves OPEN.
		CAUTION **WHEN feedwater source is AVAILABLE, THEN feed rate will be controlled by Steps 30 and 31.**
		NOTE **The details of Steps 4 through 15 may be referred to as necessary to establish feed flow in the following step but procedure performance must continue to terminate RCS bleed and feed.**
	RO	21. **RESET** SI, and CHECK the following: • SI ACTUATED permissive DARK. • AUTO SI BLOCKED permissive LIT.
	RO	22. **RESET** Containment Isolation Phase A and Phase B.
	BOP	23. **ENSURE** cntmt air in service: a. Aux air press greater than 75 psig [M-15]. b. Cntmt air supply valves OPEN [M-15]: • 1-FCV-32-80. • 1-FCV-32-102. • 1-FCV-32-110.
	SRO	24. **PERFORM** Steps 1 through 6 of E-0, REACTOR TRIP OR SAFETY INJECTION, while continuing with this Instruction.
	RO	25. **MAINTAIN** RCS bleed and feed paths: • MAINTAIN charging pump injection thru BIT. • MAINTAIN SI pump flow. • MAINTAIN both pzr PORVs and block valves OPEN.
		CAUTION **If containment pressure rises to greater than 2.8 psig, containment spray should be verified.**

Op Test No.: NRC Scenario # 3 Event # 7, 8 and 9 Page 24 of 25

Event Description: Feedwater line rupture downstream of the high pressure feedwater heaters. Automatic reactor trip does not occur. The RO attempts to initiate the reactor trip using handswitch RT-1 on 1-M-4. The RO must go to handswitch RT-2 on 1-M-6 to initiate the manual reactor trip.

Time	Position	Applicant's Actions or Behavior
	RO	26. **DETERMINE** if cntmt spray should be stopped: a. Spray pumps running. b. **MONITOR** cntmt pressure less than 2.0 psig. c. **RESET** containment spray signal. d. **STOP** cntmt spray pumps and PLACE in A-AUTO. e. **CLOSE** cntmt spray discharge valves 1-FCV-72-2 and 1-FCV-72- 39.
	RO	26.a. **RESPONSE NOT OBTAINED:** a. **IF** both spray pumps stopped, **THEN** ** **GO TO** Step 27.
	SRO	27. **WHEN** RWST level is less than 34% **THEN** ** **GO TO** ES-1.3, TRANSFER TO RHR CONTAINMENT SUMP.
	BOP	28. **ENSURE** CCS alignment for RHR operation: a. RHR heat exchanger B outlet 1-FCV-70-153 OPEN. b. RHR heat exchanger A outlet 1-FCV-70-156 OPEN. c. SFP heat exchanger A supply 0-FCV-70-197 CLOSED.
NOTE **The details of Steps 4 through 15 may be referred to as necessary to establish feed flow in the following step but procedure performance must continue to terminate RCS bleed and feed.**		
	SRO	29. **EVALUATE** the following to restore level in at least one S/G: a. AFW pumps. b. MFW pumps. c. Condensate pumps. d. ERCW valves to AFW suction. e. HPFP spool piece (AOI-7.06).
CAUTION **Feedwater flow rates should be controlled to prevent excessive RCS cooldown.**		
NOTE **If possible, a S/G should be selected to feed which has WR level greater than 15% [25% ADV] and RCS Loop WR hot leg temperature less than 550°F.**		
	BOP	30. **ESTABLISH** feedflow to one Selected S/G: a. Feed source – AVAILABLE
	SRO	30.a. **RESPONSE NOT OBTAINED:** **GO TO** Step 33.

Op Test No.: NRC Scenario # 3 Event # 7, 8 and 9 Page 25 of 25

Event Description: Feedwater line rupture downstream of the high pressure feedwater heaters. Automatic reactor trip does not occur. The RO attempts to initiate the reactor trip using handswitch RT-1 on 1-M-4. The RO must go to handswitch RT-2 on 1-M-6 to initiate the manual reactor trip.

Time	Position	Applicant's Actions or Behavior
	SRO	33. **CHECK** all RCS bleed and feed termination criteria met: • At least one S/G NR level greater than 29% [39% ADV]. • Incore T/C dropping. • T-hot dropping.
	SRO	33. **RESPONSE NOT OBTAINED:** **CONTINUE** RCS bleed and feed UNTIL all criteria met. **CONTINUE** actions to restore secondary heat sink. ** **GO TO** Note prior to Step 29.
EXAMINER: When the crew has addressed Step 33 RNO and determines that a return to Step 29 is required, inform them that another crew will continue from here.		
END OF SCENARIO		

Appendix F
(Page 1 of 3)
Turbine Instrument Limits

INSTRUMENT ID	NORMAL	ALARM	TURBINE TRIP/ MAXIMUM
ICS Computer Points			
ICS Points T2010A - T2019A: Bearing Metal Temp	<175°F	210°F	225°F
ICS point T2035A: Bearing Oil Drain	<160°F	170°F	180°F
ICS point T2021A - T2024A: Thrust Bearing Metal Temp	<175°F	210°F	225°F
1-CRT-47-121, Turbine Vibration			
Turb/Gen Bearing Vibration	<4 mils	7 mils (Hi)(1) 14 mils (Hi-Hi).	14 mils max.
Exciter Bearing Vibration	<4 mils	7 to10 mils (Hi) 14 mils (Hi-Hi).	14 mils max.
Eccentricity	~600 rpm		3 mils double-amplitude
Differential Expansion: Gov-End Gov-End	0.500 Short 0.500 Long	≥.615 ≤.219	≥.645 ≤.189
Differential Expansion: Gen-End Gen-End	1.000 Short 1.000 Long	≥1.259 ≤.216	≥1.289 ≤.186
Casing Expansion	1" Movement on Heating or Cooling		
Thrust Position	0 mils	+35 mils -35 mils	+35 mils -35 mils

1 Bearing #11 has a high alarm setpoint of 10 mils per TACF 1-08-0003-047.

Appendix F
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Turbine Instrument Limits

PARAMETER	ICS POINT(S)	NORMAL	ALARM	TURBINE TRIP/MAXIMUM
Steam Chest Metal Temps				
Left Hand Deep vs. Shallow	T2055A vs. T2607A			Maximum Gradient During Startup 125°F ΔT
Right Hand Deep vs. Shallow	T2056A vs. T2608A			Maximum Gradient During Startup 125°F ΔT
HP Turbine Cylinder Metal Temps (1)				
Midspan Cover vs. Base	T2609A vs. T2060A		75 °F ΔT *	Trip at 100°F ΔT
Governor End Extraction Zone Cover vs. Base	T2610A vs. T2061A		75 °F ΔT *	Trip at 100°F ΔT
Generator End Extraction Zone Cover vs. Base	T2611A vs. T2062A		75 °F ΔT *	Trip at 100°F ΔT
LP Turbine Inlet Steam Temps				
LP A Left vs. Right	T2000A vs. T2001A	25 °F ΔT		Maximum 75°F ΔT for 15 minutes (2)
LP B Left vs. Right	T2002A vs. T2003A	25 °F ΔT		Maximum 75°F ΔT for 15 minutes (2)
LP C Left vs. Right	T2004A vs. T2005A	25 °F ΔT		Maximum 75°F ΔT for 15 minutes (2)
LP A Rate of Change	T2000A T2001A			Maximum 50°F Instantaneous 100°F per hour
LP B Rate of Change	T2002A T2003A			Maximum 50°F Instantaneous 100°F per hour
LP B Rate of Change	T2004A T2005A			Maximum 50°F Instantaneous 100°F per hour

* Parameters are provided as information and do **NOT** represent actual alarm setpoints.

1 Used for water detection. Limits are when base is colder than cover.

2 During abnormal conditions, this difference may be as high as 75°F for periods of 15 minutes provided that such occurrences are at least four hours apart.

Appendix F
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Turbine Instrument Limits

PARAMETER	ICS POINT(S)	NORMAL	ALARM	TURBINE TRIP/MAXIMUM
LP Turbine Exhaust Steam Temps				
LP A	T2050A	100 to 110°F	Maximum continuous 175°F	Maximum short term 250°F
LP B	T2051A	100 to 110°F	Maximum continuous 175°F	Maximum short term 250°F
LP C	T2052A	100 to 110°F	Maximum continuous 175°F	Maximum short term 250°F

INSTRUMENT ID	NORMAL	ALARM	TURBINE TRIP/ MAXIMUM
1-EI-57-17,Generator Neutral Volts	3-5 Volts	7.5 Volts (1)	15 Volts (2)

(1) No Ronan or Computer alarm. 1-EI-57-17 will emit an audible "Click." TPS and System Engineering should be notified of this event.

(2) Automatic Neutral Overvoltage Trip is from 1-RLY-244-M3430 (NEUTRAL VOLTAGE) [Relay Room].

PARAMETER	NORMAL	ALARM	TURBINE TRIP/ MAXIMUM
Condenser Zone DP (A-B), (B-C)	1.5" Hg	2.0" Hg*	2.5" Hg
Condenser Zone DTs		49°F*	50°F
Thrust Bearing Wear Detector	20 psig	35 psig	60 psig (Auto Trip)
Bearing Oil Disch Temp	<160°F	170°F	180°F
Bearing Oil Supply Temp	110-130°F		
Bearings 1 thru 11 Disch Temp Ind	(Computer Pts T2025 -T2035A or local at Turbine)		

* NOTE: Parameters are provided as information and do NOT represent actual alarm setpoints.

Appendix A
(Page 1 of 1)
Reactivity Control Plan (Example Form)

Station: WBN Unit: 1 Cycle: 10 Burnup: 150 MWD/MTU Revision: 0

Preparer: _____/_____ Reviewer: _____/_____
/ Date RXE / Date

Approver: _____/_____ Authorizer: _____/_____
RXES or designee / Date Ops / Date

RXE support required Onsite? ☑Yes ☐No Describe: _____

Title of Reactivity Control Plan: **Ramp Up from 75% to 100% (BOL)**

Assumptions:
1. Calculated volumes below assume Tave maintained on Tref.
2. Reactor was previously conditioned to 100%, then dropped to 75% RTP 72 hours ago.
3. Conditioned power level drops at a rate of 2%/day 24 hours after the downpower begins. Therefore, reactor is assumed to have a CPL of 96% at the start of this plan. (See attached plots.)

Major Steps:
1. **Ramp** up from 75% to CPL (~95%) at 5%/hour.
2. **Ramp** up from CPL to **100%** at **3%** per hour.
3. **Maintain** power at **100%**.

Detailed Description:

NOTE: See attached plots.
NOTE: Allowing Tave drift will typically reduce the total amount of necessary boration and dilution.
NOTE: Use BEACONDH ICS Screen so long as DOGHOUSE ICS Screen shows AFD is within the +/- 3% band.
NOTE: Ramping linearly without holds will reduce the total amount of necessary boration and dilution.

RAMP UP TO CPL (~95%)
1. **DILUTE** ~**1500** gal of **PW**.
2. **WITHDRAW** CBD to ~**203** steps to control AFD on target.

RAMP UP TO 100%
1. **DILUTE** ~**160** gal of **PW**.
2. **WITHDRAW** CBD to ~**211** steps to control AFD on target.

MAINTAIN 100% POWER
1. **DILUTE** ~**3450** gal PW for account for Xenon build-in (60 hours). See attached plots.
2. **WITHDRAW** CBD at ~**220** steps to control AFD on target.

Ramp Up from 75% to 100% (BOL)

Critical Parameter	Limit	Required Action
Control Rod Height	> RIL Lo	**If** rods < RIL Lo, **then ENSURE** RCS borated amount specified in Step 1 **and WITHDRAW** rods.

Activated: _____/_____ Terminated: _____/_____
SM or US / Date SM or US / Date

SHIFT TURNOVER CHECKLIST

SHIFT TURNOVER CHECKLIST

Page _____ of _____

- ☐ SM
- ☒ US/MCR Unit _____
- ☐ UO Unit _____
- ☐ AUO Station _____
- ☐ STA (STA Function)

Off-going - Name _____

On-coming - Name _____

Part 1 - Completed by off-going shift/Reviewed by on-coming shift:

- Abnormal equipment lineup/conditions:
  TD AFWP is out of service to replace the trip-and –throttle valve and associated linkage. Tech Spec 3.7.5.B was entered for the TD AFWP 5 hours ago. Expected return to service is 9 hours. 1D CCW pump was shutdown in order to perform maintenance on the motor, and has been returned to service.

- SI/Test in progress/planned: (including need for new brief)
  0-SI-30-8-A, "Auxiliary Building Gas Treatment System Train A 10-hour Operation" has been in progress for 9 hours.

- Major Activities/Procedures in progress/planned:
  Unit 1 is at 75% power, BOL conditions, following the completion of repairs to the 1D CCW pump. A power escalation to the preconditioned power level of 96% is to be conducted using GOI-4, "Normal Power Operations." RCS boron concentration is 1128 ppm. Control Rod Bank D at 184 steps. Train A/Channel I Work Week. Reactor Engineering has provided a Reactivity Plan for the power change.

- Radiological changes in plant during shift:
  None planned

Part 2 - Performed by on-coming shift

- ☐ A review of the Operating Log since last held shift or 3 days, whichever is less.
- ☐ A review of the Rounds sheets/Abnormal readings (AUOs only)

Review the following for changes since last shift turnover:

- ☐ Standing Orders
- ☐ LCO(s) in actions (N/A for AUOs)
- ☐ PER review (N/A for AUOs)
- ☐ TACFs (N/A for AUOs)
- ☐ Operator workarounds, burdens and other challenges
- ☐ Immediate required reading.

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

- ☐ A walkdown of the MCR control boards (N/A for AUOs)

Relief Time: _____ Relief Date: _____

SHIFT TURNOVER CHECKLIST

SHIFT TURNOVER CHECKLIST

Page _____ of _____

- ☐ SM
- ☐ US/MCR Unit _____
- ☒ UO Unit _____
- ☐ AUO Station _____
- ☐ STA (STA Function)

Off-going - Name

On-coming - Name

Part 1 - Completed by off-going shift/Reviewed by on-coming shift:

- Abnormal equipment lineup/conditions:
  TD AFWP is out of service to replace the trip-and –throttle valve and associated linkage. Tech Spec 3.7.5.B was entered for the TD AFWP 5 hours ago. Expected return to service is 9 hours. 1D CCW pump was shutdown in order to perform maintenance on the motor, and has been returned to service.

- SI/Test in progress/planned: (including need for new brief)
  0-SI-30-8-A, "Auxiliary Building Gas Treatment System Train A 10-hour Operation" has been in progress for 9 hours.

- Major Activities/Procedures in progress/planned:
  Unit 1 is at 75% power, BOL conditions, following the completion of repairs to the 1D CCW pump. A power escalation to the preconditioned power level of 96% is to be conducted using GOI-4, "Normal Power Operations." RCS boron concentration is 1128 ppm. Control Rod Bank D at 184 steps.
  Train A/Channel I Work Week. Reactor Engineering has provided a Reactivity Plan for the power change.

- Radiological changes in plant during shift:

Part 2 - Performed by on-coming shift

- ☐ A review of the Operating Log since last held shift or 3 days, whichever is less.
- ☐ A review of the Rounds sheets/Abnormal readings (AUOs only)

Review the following for changes since last shift turnover:

- ☐ Standing Orders
- ☐ LCO(s) in actions (N/A for AUOs)
- ☐ PER review (N/A for AUOs)
- ☐ TACFs (N/A for AUOs)
- ☐ Operator workarounds, burdens and other challenges
- ☐ Immediate required reading.

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

- ☐ A walkdown of the MCR control boards (N/A for AUOs)

Relief Time: _____ Relief Date: _____

Facility: **Watts Bar NRC Exam 1 August 2010** Scenario No.: **4** Op Test No.: **1**

Examiners: _____ Operators: _____ **SRO**

_____ _____ **RO**

_____ _____ **BOP**

Initial Conditions: 100% power, MOL. RCS boron is 747 ppm. Control Bank D is at 220 steps.

Turnover: Train A/Channel I Work Week. Reduce power to 95%, to support removing the 1A CBP from service after assuming shift. 1A DG is out-of-service for planned maintenance on the air start system. Expected return to service in 8 hours. LCO 3.8.1.B was entered 2 hours ago. SR 3.8.1.1.was performed 45 minutes after LCO entry. The air start system problem has been isolated to the 1A DG. The National Weather Service has issued a Severe Thunderstorm Warning for Meigs, McMinn and Rhea Counties for the next 6 hours.

Event No.	Malf. No.	Event Type*	Event Description
1	n/a	N-BOP R-RO	Reduce power using GO-4,"Normal Power Operations," to support shutdown 1A Condensate Booster Pump.
2	rx05a 33	I-RO TS-SRO	PZR level transmitter, 1-LT-68-339 fails to approximately 33%, requiring entry into AOI-20, "Malfunction of Pressurizer Level Control System," and a Tech Spec evaluation.
3	rx11a 0	I-RO TS-SRO	Turbine impulse pressure, 1-PT-1-73, fails low, requiring entry into AOI-2,"Malfunction of Reactor Control System," and a Tech Spec evaluation.
4	rx09b	I-BOP	Steam flow transmitter, 1-FT-1-10a fails low, requiring entry into AOI-16,"Loss of Normal Feedwater."
5	cc07a cc03b	C-BOP	1A CCS pump shaft shears and 1B CCS pump fails to auto start. AOI-15, "Loss of Component Cooling Water (CCS)," entry is required.
6	th05c	M-All	SG 3 tube leak, requiring entry into AOI-33,"Steam Generator Tube Leak," and a rapid plant shutdown using AOI-39,"Rapid Load Reduction." SG 3 tube ruptures, requiring a reactor trip and safety injection initiation. Requires entry into E-0, "Reactor Trip or Safety Injection" and E-3, "Steam Generator Tube Rupture."
7	ed06a	C-BOP	1A-A 6.9 KV Shutdown Board trips due to differential lockout relay operation at the time of the reactor trip. Requires performance of AOI-43.01, "Loss of Unit 1 Train A Shutdown Boards," during performance of EOPs.
8	ms04c	C-BOP	#3 MSIV fails to close.

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

Scenario 4 - Summary

Initial Condition	100% power, MOL. RCS boron is 747 ppm. Control Bank D is at 220 steps.

Turnover	Train A/Channel I Work Week. Reduce power to 95%, to support removing the 1A CBP from service after assuming shift. 1A DG is out-of-service for planned maintenance on the air start system. Expected return to service in 8 hours. LCO 3.8.1.B was entered 2 hours ago. SR 3.8.1.1.was performed 45 minutes after LCO entry. The air start system problem has been isolated to the 1A DG. The National Weather Service has issued a Severe Thunderstorm Warning for Meigs, McMinn and Rhea Counties for the next 6 hours.

Event 1	Reduce power using GO-4,"Normal Power Operations," to support shutdown 1A Condensate Booster Pump.
Event 2	The pressurizer level transmitter selected for level control, 1-LT-68-339, slowly lowers to approximately 33%. The SRO enters and directs the actions of AOI-20, "Malfunction of Pressurizer Level Control System." (Letdown isolation will NOT occur, since level remains above the 17% setpoint.) The SRO evaluates conditions and enters Tech Spec LCO 3.3.1, Reactor Trip System (RTS) Instrumentation, Condition X, LCO 3.3.3, Post Accident Monitoring (PAM) Instrumentation Function 13, Condition A.
Event 3	Turbine impulse pressure, 1-PT-1-73, fails low, causing the T-reference input to the Rod Control System to indicate a power mismatch between reactor and turbine power. Rods will insert requiring the operator to place rod control in manual. AOI-2, "Malfunction of Reactor Control System," Section 3.2,"Continuous Rod Withdrawal/Insertion." The SRO evaluates conditions and enters Tech Spec LCO 3.3.1, Reactor Trip System (RTS) Instrumentation, Function 16.f, Condition S.
Event 4	Steam flow transmitter, 1-FT-1-10A fails low, resulting in a steam flow-feed flow mismatch signal which throttles closed SG 2 main feedwater regulating, resulting in a SG 2 level drop. The operator must place SG 2 main feedwater regulating valve 1-FIC-3-48 in manual to recover from the level drop. The SRO enters and directs the actions of AOI-16, "Loss of Normal Feedwater," Section 3.6, "Main FW Reg or Bypass Reg Valve Control Failure." SG 2 main feedwater regulating valve will be returned to automatic.
Event 5	1A CCS pump shaft shears and 1B CCS pump fails to auto start on low header pressure. The SRO enters and directs the actions of AOI-15, "Loss of Component Cooling Water (CCS)." The SRO evaluates conditions and enters Tech Spec LCO 3.7.7 Component Cooling System (CCS) Condition A.
Event 6	SG 3 tube leak develops, requiring entry into AOI-33, "Steam Generator Tube Leak," and AOI-39, "Rapid Load Reduction." SG 3 tube ruptures, requiring a reactor trip and safety injection initiation. Requires entry into E-0, "Reactor Trip or Safety Injection" and E-3, "Steam Generator Tube Rupture."
Event 6	1A-A 6.9 KV Shutdown Board trips due to differential relay operation at the time of the reactor trip. The board failure requires performance of AOI-43.01, "Loss of Unit 1 Train A Shutdown Boards," during the performance of the EOPs.
Event 7	#3 MSIV fails to close. All attempts to close the MSIV will be unsuccessful. This will require specific E-3, RESPONSE NOT OBTAINED actions to be performed to address steam generator isolation.

Scenario 4 - Critical Task Summary

Critical Task 1 from WOG Critical Task List for E-3 A.	*Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.* *Once an affected steam generator has been identified, it is isolated from the intact steam generators to limit radiological releases and as a necessary step toward stopping primary-to-secondary leakage. Feedwater flow is also terminated to the affected steam generator after level has returned into the narrow range. This minimizes the possibility of steam generator overfill.*
Critical Task 2	*Isolate secondary pathways to limit depressurization and contamination by initiating Attachment 2 (E-3), Steamline Isolation (MCR), and Attachment 3 (E-3), Steamline Isolation (Local) prior to initiating RCS cooldown.* *Isolation is performed to maintain ruptured SG pressurized during the cooldown in order to allow subsequent RCS depressurization to ruptured SG pressure while maintaining RCS subcooling.*
Critical Task 3 from WOG Critical Task List for E-3 B.	*Establish/maintain an RCS temperature so that transition from E-3 does not unnecessarily occur. Properly identifies, establishes cooldown, and maintains temperature at target temperature in accordance with E-3, Steps 17 and 18.*
Critical Task 4 from WOG Critical Task List for E-3 D.	*Depressurize RCS to meet SI termination criteria before E-3, "Steam Generator Tube Rupture," Step 31 criteria are exceeded.* *RCS pressure is decreased to stop primary-to-secondary leakage and establish indicated pressurizer level greater than 15%.*

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

Event Description: Reduce power using GO-4,"Normal Power Operations," to support shutdown 1A Condensate Booster Pump.

Time	Position	Applicant's Actions or Behavior
NOTE Controlling load reductions, Rod position and boron concentration will ensure Axial Flux remains within allowed limits. (For example, Boric acid addition can be set up to control rate of Rod insertion during a down power to control ΔI within the required limits)		
	BOP	[12] **IF** desired to operate in IMP IN, **THEN OBTAIN** Unit SRO concurrence to operate in IMP IN **AND PLACE** Turbine in IMP IN
Evaluator Note: The following actions are taken from SOI-62.02, "Boron Concentration Control," Section 6.7, "Minor Boration."		
NOTES **1) Section 6.7, may be reproduced, laminated, displayed, reused, etc. as desired.** **2) Minor Boration is defined as the addition of Boric Acid done several times each shift early in core life, to compensate for burnable poison burn-up, and maintain Tavg on program.**		
	RO	[1] **ENSURE** 1-HS-68-341H, BACKUP HEATER C [1-M-4], is ON, to equalize RCS-Pzr CB.
	RO	[2] **ADJUST** 1-FC-62-139, BA TO BLENDER [1-M-6], for desired flow rate.
	RO	[3] **ADJUST** 1-FQ-62-139, BA BATCH COUNTER [1-M-6], for required quantity.
	RO	[4] **PLACE** 1-HS-62-140B, VCT MAKEUP MODE [1-M-6], in BOR.
	RO	[5] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL [1-M-6], to START. [5.1] **CHECK** Red light is LIT.
	RO	[6] **MONITOR** the following parameters:

Instrument	Location	Parameters
1-PI-62-122	1-M-6	VCT PRESS
1-LI-62-129A	1-M-6	VCT LEVEL
1-FI-62-139	1-M-6	BA TO BLENDER FLOW
1-FQ-62-139	1-M-6	BA BATCH COUNTER
1-FI-62-142	1-M-6	PW TO BLENDER FLOW
1-FQ-62-142	1-M-6	PW BATCH COUNTER
1-LI-62-238	1-M-6	BAT A LEVEL
1-LI-62-242	1-M-6	BAT C LEVEL

	RO	[7] **WHEN** Boration is COMPLETE, **THEN PLACE** 1-HS-62-140B, VCT MAKEUP MODE, in AUTO.
	RO	[8] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL, to START. [8.1] **CHECK** Red light is LIT.
	RO	[9] **RETURN** 1-FC-62-139, BA TO BLENDER [1-M-6], to desired flow rate.

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

Event Description: Reduce power using GO-4,"Normal Power Operations," to support shutdown 1A Condensate Booster Pump.

Time	Position	Applicant's Actions or Behavior
		NOTES 1) Turbine maybe operated in IMP IN above 30% turbine load as long as IMP IN does NOT cause unit instability IMP IN will control turbine load as a percentage of impulse pressure that correlates to % load vs. % of valve opening in IMP OUT. This will allow for a more linear load ascension 2) Turbine load change may be stopped by depressing the HOLD push button, using VPL, or by depressing the MANUAL push button
	BOP	[13] **INITIATE** load reduction by PERFORMING the following on the Turbine EHC panel: [13.1] **IF** during any of the following steps the REFERENCE changes in an undesired manner **THEN ADJUST VPL** to stop turbine load rise. **OR** **PUSH** TURBINE MANUAL to place the turbine control mode in manual mode and proceed to section 5.6. [13.2] **PUSH** REFERENCE CONTROL ∇ (lower) button to set desired load in SETTER display. [13.3] **SET** LOAD RATE as required. [13.4] **PUSH** GO button. [13.5] **MONITOR** Generator Megawatts DROPPING. [13.6] **CHECK** that load change has **STOPPED** when reference display equals setter **OR** **IF** desired to stop the load change, **THEN** **STOP** the load change by **DEPRESSING** the HOLD pushbutton [13.7] **WHEN** desired to resume the load change, **THEN PRESS** the GO push button and continue to monitor load. [13.8] **ADJUST** VALVE POSITION LIMIT to ≤ 5% above the Gov Control Indication or as needed. [13.9] **REPEAT** Steps 5.3[13.2] to 5.3[13.5] to achieve desired load.
		CAUTION Do not exceed load rate of 5%/minute, or 10% step change
	RO	[14] **MONITOR** the following during the load reduction: [14.1] TAVG following TREF program. [14.2] All RPIs, Step Counters, Loop ΔT, and NIS for correct power distribution, quadrant power tilts, rod insertion, rod misalignment, inoperable RPIs, and inoperable rods.

Op Test No.: NRC Scenario # 4 Event # 1 Page 3 of 60

Event Description: Reduce power using GO-4,"Normal Power Operations," to support shutdown 1A Condensate Booster Pump.

Time	Position	Applicant's Actions or Behavior
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	SRO	**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).
Cue Simulator Operator to insert Event 2.		

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

Event Description: PZR level transmitter, 1-LT-68-339 fails to approximately 33%, requiring entry into AOI-20 and a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
Indications: 92-A "PZR LEVEL HI/LO Pressurizer level transmitter, 1-LT-68-339, indicates approximately 33% level. Letdown remains in service.		
	RO	Diagnoses and announces failure of 1-LT-68-339. Reports that letdown isolation is NOT required.
	RO	May enter and take actions of ARI- 92-A PZR LEVEL HI/LO.
	RO	May place 1-HIC-62-93, CHARGING FLOW PZR LEVEL CONTROL to MANUAL and increase charging flow/RCP seal flow.
	SRO	Enters and directs actions of AOI-20, "Malfunction of Pressurizer Level Control System."
Evaluator Note: The following actions are taken from ARI 92-A, "PZR LEVEL HI/LO."		
	RO	**[1] CHECK** PZR level indication on 1-M-4: • 1-LI-68-320 • 1-LI-68-335A • 1-LI-68-339
	RO	**[2] CHECK** PZR level and reference level on 1-LR-68-339 [1-M-5].
	SRO	**[3] IF** Malfunction Of Pressurizer Level Control System, **THEN GO TO** AOI-20, *MALFUNCTION OF PRESSURIZER LEVEL CONTROL SYSTEM.*
	RO	**[4] IF** level is high, **THEN ENSURE** letdown in service.
	RO	**[5] IF** level is low **AND** PZR level control system is attempting to increase level to program **THEN REFER TO** AOI-6, *SMALL REACTOR COOLANT SYSTEM LEAK.*
	SRO	**[6] REFER TO** Tech Specs.
Evaluator Note: The following actions are taken from AOI-20, "Malfunction of Pressurizer Level Control System."		
CAUTION Charging and letdown must be in service together. If letdown isolates or charging is lost, the other must be isolated.		
	RO	1. **CHECK** pzr level program signal NORMAL: • 1-LR-68-339 (green pen).

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Event Description: PZR level transmitter, 1-LT-68-339 fails to approximately 33%, requiring entry into AOI-20 and a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
	RO	2. **CHECK** if 1-XS-68-339E is selected to FAILED channel (control or backup): • LI-68-339, OR • LI-68-320, OR • LI-68-335.
	RO	3. **CHECK** failure HIGH.
	SRO	3. **RESPONSE NOT OBTAINED:** **IF** letdown in service, **THEN** ** **GO TO** Step 4.
	RO	4. **IF** controlling channel failed, **THEN PLACE** charging valve controller 1-HIC-62-93A in MAN, and **RESTORE** level to program.
	RO	5. **SELECT** operable pzr level channels for control and indication [1-M-5]: a. **SELECT** operable channels for control and backup with 1-XS-68-339E. ***Since 1-LI-68-339 has failed, the RO will select LI-68-335 B 320 position on 1-XS-68-339E.*** b. **ENSURE** operable channel selected for recording with 1-XS-68-339B. ***The RO confirms that LT-68-335 is selected on 1-XS-68-339B.*** c. **IF** backup channel failed high and Letdown still in service, **THEN** ****GO TO** Step 8.
	RO	6. **CHECK** letdown IN SERVICE: • 1-FCV-62-69 OPEN. • 1-FCV-62-70 OPEN. • 1-FCV-62-77 OPEN. • Letdown orifice OPEN.
	RO	7. **RESTORE** pzr level control to normal: a. **MAINTAIN** regen hx letdown temp < 380 °F. b. **CONTROL** charging and letdown to return pzr level to program. c. **ENSURE** pzr control heater bank D red light LIT. d. Momentarily **PLACE** 1-HS-68-341H, pzr backup heater bank C, to OFF. e. **CHECK** pzr program level NORMAL. • 1-LR-68-339 (green pen) f. **RETURN** charging valve controller 1-HIC-62-93A to AUTO.

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Event Description: PZR level transmitter, 1-LT-68-339 fails to approximately 33%, requiring entry into AOI-20 and a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
	SRO	8. **NOTIFY** Work Control to remove failed channel from service.
	SRO	9. **REFER TO** the following Tech Specs: • 3.3.1, Reactor Trip System (RTS) Instrumentation. ***Function 9. Pressurizer Water Level –High, Condition X: With one channel inoperable, place the channel in trip within 72 hours, OR reduce THERMAL POWER to <P-7 within 78 hours.*** • 3.3.3, Post Accident Monitoring (PAM) Instrumentation. ***Function 13. RCS Pressurizer Level, Condition A: With one or more functions with one required channel inoperable, restore the required channel to operable status within 30 days.*** • 3.4.9, Pressurizer. ***No action required.***
	SRO	10. **INITIATE** repairs to failed instrument/circuitry.
	SRO	11. **RETURN TO** instruction in effect.
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	SRO	**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).
Cue Simulator Operator to insert Event 3.		

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Event Description: Turbine impulse pressure, 1-PT-1-73, fails low, requiring entry into AOI-2, and a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
Indications: 94-A, "TAVG-TREF DEVIATION" 66-A, "C-5 LO TURB IMPULSE PRESS ROD BLOCK" 64-F, "C-11 BANK D AUTO WITHDRAWAL BLOCKED" cleared. Control Rods inserting at 72 steps per minute. Maximum demand on 1-XI-1-33 Steam Dump Demand.		
	RO	Diagnoses and announces the failure of 1-PT-1-73, Turbine Impulse Pressure transmitter low.
	RO	May place rod control in MANUAL to stop the unwarranted motion.
	SRO	Enters and directs actions of AOI-2, "Malfunction of Reactor Control System."
Evaluator Note: The following actions are taken from AOI-2, "Malfunction of Reactor Control System."		
	RO	1. **PLACE** control rods in MAN.
	RO	2. **CHECK** control rod movement STOPPED.
	RO	3. **MAINTAIN** T-avg on PROGRAM. (Reference Attachment 1) **USE** control rods. OR **ADJUST** turbine load.
	RO	4. **CHECK** loop T-avg channels NORMAL.
	RO	5. **CHECK** Auct Tavg NORMAL on 1-TR-68-2B.
	RO	6. **CHECK** NIS power range channels NORMAL.
	RO	7. **CHECK** the following: • Turbine impulse pressure channel 1-PI-1-73, NORMAL. • Tref and Auct Tavg NORMAL on 1-TR-68-2B (Reference Attachment 1)
	RO	7. **RESPONSE NOT OBTAINED:** **PLACE** steam dumps in pressure mode as follows: a. **PLACE** steam dumps to OFF. b. **PLACE** mode selector HS to STEAM PRESS. c. **ADJUST** steam dump demand to zero. d. **PLACE** steam dumps to ON. e. **ENSURE** controller set at 84% (1092 psig). f. **WHEN** conditions allow, **THEN REFER TO** SOI-1.02 and **PLACE** steam dumps in TAVG Mode.

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Event Description: Turbine impulse pressure, 1-PT-1-73, fails low, requiring entry into AOI-2, and a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
	RO	8. **MONITOR** core power distribution parameters: • Power range channels. • ΔFlux Indicators. • T-avg. • Loop ΔT. • Incore TCs. • Feed flow/Steam flow.
	SRO	9. **INITIATE** repairs to failed equipment.
	SRO	10. **REFER TO** Tech Specs: • 3.3.1, Reactor Trip System (RTS) Instrumentation. ***Function 16.f. Turbine Impulse Pressure, P-13, Condition S: With one channel inoperable, verify interlock in required state for existing unit conditions within one hour or be in Mode 2 within 7 hours.***
CAUTION	**Allowing at least 5 minutes between any rod control input (i.e., T-avg, T-ref, or NIS) change and placing rods in AUTO, will help prevent undesired control rod movement.**	
	SRO	11. **NOTIFY** Chemistry of any reactor power changes greater than 15% in one hour.
EXAMINER: With 1-PT-1-73 failed low, the rod control system must remain in MANUAL. The actions contained in steps 12-14 of AOI-22, "Malfunction of Reactor Control System," are not applicable.		
	SRO	12. **IF** loop ΔT and loop Tavg channels were defeated due to Tavg channel failure, and Tavg channel has been repaired, T**HEN PUSH IN** 1-XS-68-2D, ΔT CHANNEL DEFEAT, and 1-XS-68-2M, TAVG CHANNEL DEFEAT, and select away from all ΔT and Tavg channels.
	SRO	13. **WHEN** conditions allow auto rod control, **THEN**: a. **ENSURE** T-avg and T-ref within 1°F. b. **ENSURE** zero demand on control rod position indication [1-M-4]. c. **PLACE** rods in AUTO.
	SRO	14. **WHEN** conditions allow auto pzr level control, **THEN ENSURE** pzr level returned to normal program, AND **PLACE** 1-FCV-62-93 in AUTO
	SRO	15. **RETURN TO** Instruction in effect.
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.

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Event Description: Turbine impulse pressure, 1-PT-1-73, fails low, requiring entry into AOI-2, and a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
	SRO	**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).
Cue Simulator Operator to insert Event 4.		

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Event Description: Steam flow transmitter, 1-FT-1-10a fails low, requiring entry into AOI-16.

Time	Position	Applicant's Actions or Behavior
Indications: 58-B, "SG FEEDWATER FLOW HI" 63-F. "SG LEVEL DEVIATION" Feed flow decreasing on SG 2 to match failed steam flow. SG 2 level decreasing.		
	BOP	Diagnose and announce the failure of 1-FI-1-10A, SG 2 Steam Flow.
	BOP	May place SG 2 main feedwater regulating valve, 1-FIC-3-48, in MANUAL and raise feedwater flow.
	BOP	May place 1-PC-46-20, MFP Master Controller in MANUAL and raise MFP speed.
	SRO	Enters and directs actions of AOI-16, Loss of Normal Feedwater," Sub Section 3.6, "MFW reg or reg bypass valve control failure."
Evaluator Note: The following actions are taken from AOI-16, Loss of Normal Feedwater," Sub Section 3.6, "MFW reg or reg bypass valve control failure."		
	BOP	1. **CONTROL** failed MFW reg or bypass reg valve in MANUAL.
	RO	2. **EVALUATE** placing control rods in MANUAL. ***Since 1-PT-1-73 is failed, the rod control system is already in MANUAL.***
	BOP	3. **CHECK** MFW pumps recirc valves CLOSED.
NOTE 1.) If the main reg. valve is malfunctioning, the bypass reg. valve for the affected loop may be manually positioned as necessary up to 0.85 x 106 lb/hr flow to dampen oscillations in feedwater flow. 2.) A power tilt in the affected core quadrant may occur due to a rise in bypass flow. Flows above 84,500 lbm/hr in the bypass line will invalidate the value of computer point U1118.		
	SRO	4. **CHECK** SG levels on bypass reg valve control.
	BOP	4. **RESPONSE NOT OBTAINED:** ** **GO TO** Step 6.
	BOP	6. **CHECK** S/G levels returning to PROGRAM.
	BOP	7. **MONITOR** TDMFW Pump speed normal for current power level.
	BOP	7. **RESPONSE NOT OBTAINED:** **PLACE** TDMFW Pump Master Speed Control to MANUAL, **THEN ADJUST** speed as necessary.
NOTE A LO FW FLOW WTR HAMMER annunciation [59-C] will be received when any main feedwater flow drops to less than 0.75 x 106 lb/hr.		

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Event Description: Steam flow transmitter, 1-FT-1-10a fails low, requiring entry into AOI-16.

Time	Position	Applicant's Actions or Behavior
	BOP	8. **WHEN** any S/G MFW flow drops to less than 0.55 x 10^6 lb/hr, **THEN INITIATE** manual anti-water hammer actions:
		CAUTION **Power range N41 controls S/G 1 and S/G 4 MFW reg valves. N42 controls S/G 2 and S/G 3 MFW reg valves.**
		NOTE All power range monitors input to auctioneered high anticipatory circuit for bypass FW reg valves.
	RO	9. **CHECK** power range N41 through N44 NORMAL.
NOTE Steps 7 & 8 should end up having the same channel (A or B) selected for steam flow and feed flow on each S/G to ensure a loss of voltage to any one channel will have minimal effect on the affected S/G level.		
	BOP	10. **CHECK** controlling steam flow Channels NORMAL.
	BOP	10. **RESPONSE NOT OBTAINED:** a. **SELECT** operable channel. b. **EVALUATE** effect of the failed channel on the MFPs Speed Control and **ADJUST** in MANUAL as necessary while continuing this section.
	BOP	11. **CHECK** controlling FW flow channels NORMAL.
	BOP	12. **CHECK** press compensation channel(s) NORMAL.
	BOP	13. **ENSURE** same channel (A or B) selected for steam flow and feed flow on each S/G
	BOP	14. **IF** affected S/G controlling channel and level NORMAL, **THEN** a. **RETURN** MFW reg valve to AUTO. b. **RETURN** TDMFWP Speed Control to AUTO (if in MANUAL).
	BOP	15. **WHEN** conditions allow auto rod control, **THEN,** a. **ENSURE** T-avg and T-ref within 1°F. b. **ENSURE** zero demand on control rod position indication [1-M-4]. c. **PLACE** rods in AUTO. ***Since 1-PT-1-73 is failed, the rod control system must remain in MANUAL.***
	BOP	16. **INITIATE** repairs to failed equipment.
	BOP	17. **RETURN TO** Instruction in effect.
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.

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

Event Description: Steam flow transmitter, 1-FT-1-10a fails low, requiring entry into AOI-16.

Time	Position	Applicant's Actions or Behavior
	SRO	**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).
Cue Simulator Operator to insert Event 5.		

Op Test No.: NRC Scenario # 4 Event # 5 Page 13 of 60

Event Description: 1A CCS pump shaft shears and 1B CCS pump fails to auto start. AOI-15 entry is required.

Time	Position	Applicant's Actions or Behavior
Indications: Numerous low flow alarms associated with 1A CCS header. 1A CCS pump running with no discharge pressure and low amps. 1B CCS pump stopped, with CCS header pressure less than 40 psig.		
	BOP	Diagnose and announce failure of 1A CCS pump.
	BOP	May start 1B CCS pump, since the AUTO start feature failed to start the pump on low header pressure.
	SRO	Enter and direct actions of AOI-15, "Loss of Component Cooling Water (CCS)," Sub Section 3.2 "Loss of CCS Flow or Surge Tank Level less than 60% or dropping uncontrolled."
Evaluator Note: The following actions are taken from AOI-15, "Loss of Component Cooling Water (CCS)," Sub Section 3.2 "Loss of CCS Flow or Surge Tank Level less than 60% or dropping uncontrolled."		
	BOP	1. **CHECK** CCS pumps status:
	BOP	a. **CHECK** any CCS pump TRIPPED or running pump NOT pumping forward: • ERCW/CCS Motor tripout alarm, • Low header pressure (train A or B), • Multiple low flow alarms.
	BOP	b. **CHECK** at least one U-1 Train A header supply pump RUNNING AND pumping forward: • 1A-A • 1B-B
	BOP	b. **RESPONSE NOT OBTAINED:** **START** available U-1 Train A CCS Pump.
	BOP	c. **CHECK** any Train B header supply pump RUNNING AND pumping forward: • C-S • 2B-B
	BOP	d. **PLACE** any non-operable or tripped CCS pump in STOP/PULL-TO-LOCK.
	BOP	e. **CHECK** TWO U-1Train A header supply pumps RUNNING: • 1A-A • 1B-B

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Event Description: 1A CCS pump shaft shears and 1B CCS pump fails to auto start. AOI-15 entry is required.

Time	Position	Applicant's Actions or Behavior
		e. **RESPONSE NOT OBTAINED:** **ENSURE** at least one of the following CLOSED to avoid excessive flow: • RHR htx A, 1-FCV-70-156, OR • SFP htx A, 0-FCV-70-197.
	BOP	f. **CHECK** flows returned to NORMAL.
	BOP	g. **CHECK** A and B side surge tank levels between 57% and 85%.
	SRO	h. ** **GO TO** Step 15.
	SRO	15. **EVALUATE** affected equipment operation USING Appendix A.
	SRO	16. **WHEN** CCS returned normal, **THEN** • **CHECK** only one CCS pump per Train. • **CHECK** one TBBP running. ***Both TBBPs will be running at this point. The BOP will stop one of the pumps and place its handswitch in STOP, return the switch to the mid position and then pull the handswitch to the PULL A-P AUTO position.***
	SRO	17. **REFER TO** Tech Specs 3.7.7, Component Cooling Water System (CCS). ***LCO 3.7.7, Condition A. With one CCS train inoperable, restore the CCS train to OPERABLE status within 72 hours.***
	SRO	18. **INITIATE** repairs. ***SRO should report both the trip of the 1A CCS pump and the failure of the 1B CCS pump to start on low header pressure.***
	SRO	19. **WHEN** repairs are complete, **THEN**: **a. ENSURE** 1-HS-70-63A, U1 SURGE TANK MAKEUP LCV in P-AUTO. **b.** ENSURE CCS, CVCS, CS pumps, RHR pumps & SI pumps are in normal alignment: • REFER to SOI-70.01 Component Cooling Water (CCS). • REFER to SOI 62.01, CVCS-Charging and letdown. • REFER to SOI 72.01, Containment Spray System. • REFER to SOI 74.01, Residual Heat Removal System. • REFER to SOI 63.01, Safety Injection System.
	SRO	20. **RETURN TO** Instruction in effect.

EXAMINER: The following actions are taken from the Alarm Response Instruction for Window 242-A, "SAMPLE HXS RET HDR FLOW LO."

Op Test No.: NRC Scenario # 4 Event # 5 Page 15 of 60

Event Description: 1A CCS pump shaft shears and 1B CCS pump fails to auto start. AOI-15 entry is required.

Time	Position	Applicant's Actions or Behavior
	BOP	**[1] CHECK** 1-FI-70-181, SAMPLE HXS FLOW [0-M-27B].
	BOP	**[2] ENSURE** 1-FCV-70-183 and -215 OPEN. ***The Console Operator will enter Remote Function ccr58 to open 1-FCV-70-215 locally AFTER the BOP opens 1-FCV-70-183.***
	BOP	**[3] START** CCS Pump, or **REDUCE** CCS loads to maintain press between 40 and 108 psi on 1-PI-70-27, CCS HX A SUP PRESS [0-M-27B].
	BOP	**[4] IF** flow remains low, **THEN** **[a] REFER TO** AOI-15, Loss Of Component Cooling Water (CCS). **[b] NOTIFY** Chemistry of low flow condition. **[c] CHECK** proper position of 1-THV-70-731A, -731B, and -731C per TI-31.08, Flow Balancing Valves Setpoints.
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	SRO	**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).
Cue Simulator Operator to insert Event 6.		

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Event Description: SG 3 tube leak, requiring entry into AOI-33.

Time	Position	Applicant's Actions or Behavior
Indications: 175-B, "VAC PMP EXH 1-RM-119 RAD HI"		
	BOP	Diagnoses and announces steam generator tube leak.
	SRO	Enters and directs actions of AOI-33, "Steam Generator Tube Leak."
EXAMINER: The following actions are taken from ARI 175-B, "VAC PMP EXH 1-RM-119 RAD HI."		
NOTES 1) If switching in the switchyard causes this window to annunciate, the system engineer should be notified. 2) 1-RM-90-119 has associated ICS computer point R0001A. 3) ICS computer points in parentheses ().		
	BOP	[1] **REFER TO** AOI-33, Steam Generator Tube Leak.
	BOP	[2] **CHECK** 1-RM-90-120 (R1020A) and 1-RM-90-121 (R1021A).
	BOP	[3] **CHECK** Post Accident monitors 1-RM-90-421 (R9055A), 1-RM-90-422 (R9056A), 1-RM-90-423 (R9057A), and 1-RM-90-424 (R9058A).
	BOP	[4] **IF** Alarm is valid, **THEN REQUEST** Chemistry to evaluate appropriate SG Blowdown routing when monitor alarms (i.e., CTBD or hotwell), based on ODCM limitations.
NOTE 1-HS-15-44 is key operated. Obtain key from Unit SRO.		
	BOP	[5] **IF** Step [4] Chemistry evaluation determines that SG Blowdown routing should divert to the hotwell on alarm, **THEN DISPATCH** AUO to VERIFY 1-HS-15-44, SG BLOWDOWN DISCH TO CTBD [T5I/708] **NOT** in OPEN.
NOTE ICS screen CHEM7 provides calculated instantaneous primary to secondary leak rate value.		
	BOP	[6] **NOTIFY** Chemistry to perform CM-9.09 "Effluent Radiation Monitor Alarm Guidelines".
	BOP	[7] **NOTIFY** Radiological Protection to investigate alarm.
	SRO	[8] **IF** monitor declared inoperable, **THEN NOTIFY** Chemistry Count room to initiate compensatory sampling.
	SRO	[9] **REFER TO** AOI-31, Abnormal Release Of Radioactive Material.
EXAMINER: The flowing actions are taken from AOI-33, "Steam Generator Leak."		

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Event Description: SG 3 tube leak, requiring entry into AOI-33.

Time	Position	Applicant's Actions or Behavior
NOTE Sufficient time must be allowed for level to respond following changes in charging flow, in order to determine if Pzr level can be maintained.		
	RO	**1. CHECK** If PZR Level Can Be Maintained:
	RO	**a. CONTROL** charging flow as necessary. **1. OPEN** 1-FCV-62-93 as required. **2. OPEN** 1-FCV-62-89 as required. **3. IF** letdown at 120 gpm **THEN PLACE** 1-HIC-62-81A, in MANUAL, **AND CLOSE** 1-FCV-62-72, (45 gpm). **4. IF** required, **ADJUST** 1-HIC-62-81A, **AND ENSURE** in AUTO.
NOTE Sufficient time must be allowed for level to respond following changes in charging flow, in order to determine if Pzr level can be maintained.		
	RO	**b. MONITOR** pzr level STABLE or INCREASING.
NOTE Condenser Vacuum Exhaust and SG blowdown Radiation Monitors should be monitored at approximately 15 minute intervals for indications of rising leak rate.		
	RO	**2. IDENTIFY** Leaking SG(s); a. **EVALUATE** the following: • Unexpected rise in any SG narrow range level, • Feedwater flow mismatches, • High radiation from any Chemistry SG sample results, • High radiation on any SG main steamline radiation monitor, • RADCON survey of main steamlines and SG blowdown lines. b. **MONITOR** Condenser Vacuum Exhaust and SG Blowdown Radiation Monitors
	RO	**3. CHECK** If VCT Level Can Be Maintained: **a. MAINTAIN** VCT level greater than 13%, using automatic **OR** manual makeup.
NOTE: Sufficient time must be allowed for level to respond following changes in charging flow, in order to determine if Pzr level can be maintained.		
	SRO	**4. DETERMINE** If Plant Shutdown Is Required: • High Secondary Radiation, **AND** • PZR level continues to decrease, **OR** • Charging flow continues to rise.

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Event Description: SG 3 tube leak, requiring entry into AOI-33.

Time	Position	Applicant's Actions or Behavior
	SRO	4. **RESPONSE NOT OBTAINED:** **GO TO** APPENDIX A to monitor SG leakage.
		NOTE: **This appendix provides steps to monitor primary to secondary leakage and directs unit shutdown if leakage limits are exceeded.**
		EXAMINER: The following actions are taken from AOI-33, Appendix A.
	RO	1. **MONITOR** PZR level STABLE.
		NOTE **Lower containment rad monitor count rate rising concurrently with secondary rad monitors may indicate a developing fuel defect, which could give a false indication of SG tube leak. Threshold values for correlating RM-90-119 count rate to SG tube leakage must be recalculated if RCS activity has changed significantly.**
	SRO	**2. INITIATE** Sampling To Monitor SG Leak. **a. CHECK** lower containment rad monitor count rate - STABLE or DROPPING. **b. NOTIFY** Chem Lab to evaluate Leakage **USING** CM-5.01. **c. NOTIFY** RADCON To Monitor: • Main Steam Lines. • S/G blowdown lines.
	SRO	**3. NOTIFY** the following: a. Shift Manager. b. Plant personnel via PA: "Attention plant personnel. We have developed a SG tube leak. Treat all steam leaks as radioactive."
		NOTE **Based on monitor sensitivity, the Condenser Vacuum Exhaust rad monitor (1-RM-90-119) is the preferred indication for leak rate monitoring. Other secondary rad monitors and/or SG sampling should be used for confirmation. Confirmation time should be kept to a minimum.**

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Event Description: SG 3 tube leak, requiring entry into AOI-33.

Time	Position	Applicant's Actions or Behavior
	BOP	**4. MONITOR** Primary-To-Secondary Leak Rate Trend. **a. PERFORM** Data Sheet 1, Steam Generator Tube Leak Trending every 15 min. **b. ESTIMATE** leak rate using ICS Chem 7 screen. **c. CHECK** rise in count rate validated by at least one of the following: • Sample results confirming rise in SG activity. **OR** • Two independent secondary rad monitors showing rise in count rate.
NOTE **To prevent an unnecessary Unit shutdown, primary to secondary leakage and rate of change should be monitored over a 30 minute time period, to ensure the rise in leakage is not a temporary spike that returns to less than 75 gpd (0.052 gpm) limit.**		
	SRO	**5. CHECK** Plant Shutdown **NOT** Required, USING App C, SG Tube Leak Action Levels.
EXAMINER: The following actions are taken from AOI-33, Appendix C.		
NOTE 1 Action Level 3 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. **NOTE 2** Rate-of-change limit in Action Level 3, Condition 1, applies to progressively rising leak rates and not to leak rate spikes followed by leak rate drops. Rate of change should be determined over at least 30 minutes. **NOTE 3** Action Level 3 Condition 2 applies to leakage spikes exceeding 150 gpd that are confirmed as being real.		

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Event Description: SG 3 tube leak, requiring entry into AOI-33.

Time	Position	Applicant's Actions or Behavior

ACTION LEVEL 3

OPERATING CONDITION	ACTIONS
• Condition #1: Leak rate in any one SG is greater than or equal to 75 gpd (0.052 gpm), **AND** Leakage rate-of-change is rising by greater than or equal to 30 gpd/hr (equivalent to 15 gpd in 30 minutes). **OR** • Condition #2: Leak rate in any one SG is greater than or equal to 150 gpd.	1. If criteria for Condition #1 are met, continue the performance of section 3.0 to 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. If criteria for Condition #2 is met, continue the performance of section 3.0 to place the unit in Mode 3 within 6 hours. 3. Initiate DATA SHEET 1 and record radiation monitor readings every 15 min. 4. Coordinate with Chemistry to identify leaking SG, quantify leakage and determine leakage rate-of-change. 5. Initiate actions to minimize spread of contamination. 6. Evaluate need for additional resources in the following areas: Operations, Chemistry, Radcon, water processing, makeup water.

	SRO	***From the table for Action Level 3, the SRO determines that a plant shutdown is required per Condition 2, Leak Rate in any one SG is greater than or equal to 150 gpd.***
EXAMINER: After evaluating leak rate using Appendix C, the SRO returns to Appendix A, Step 5 RNO for actions.		
	SRO	**5. RESPONSE NOT OBTAINED:** **IF** Plant Shutdown is required, **THEN; RETURN TO** Section **3.0**, step **6.**
EXAMINER: The following actions are taken from AOI-33, Section 3.0, Step 6.0		

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Event Description: SG 3 tube leak, requiring entry into AOI-33.

Time	Position	Applicant's Actions or Behavior
	SRO	**6. PERFORM** The Following Evaluations: **a. EVALUATE** Tech Specs for applicability: • 3.4.13, RCS Operational Leakage, • 3.7.5, Auxiliary Feedwater (AFW) System, • 3.7.6, Condensate Storage Tank (CST), • 3.7.14, Secondary Specific Activity, **b. EVALUATE** EPIP-1, Emergency Plan Classification Matrix.
EXAMINER: After the crew performs Step 6, cue the Console Operator to modify Event 6 from a severity of 1.5 to a severity of 15.		
EXAMINER: The following actions are taken from AOI-33, Section 3.0, Step 1. This is the continuous action step that the crew may return to in order to determine if PZR level can be maintained.		
NOTE **Sufficient time must be allowed for level to respond following changes in charging flow, in order to determine if Pzr level can be maintained.**		
		1. CHECK If PZR Level Can Be Maintained: **a. CONTROL** charging flow as necessary. **1. OPEN** 1-FCV-62-93 as required. **2. OPEN** 1-FCV-62-89 as required. **3. IF** letdown at 120 gpm **THEN PLACE** 1-HIC-62-81A, in MANUAL, **AND CLOSE** 1-FCV-62-72, (45 gpm). **4. IF** required, **ADJUST** 1-HIC-62-81A, **AND ENSURE** in AUTO.
NOTE **Sufficient time must be allowed for level to respond following changes in charging flow, in order to determine if Pzr level can be maintained.**		
		b. MONITOR pzr level STABLE or INCREASING.
		b. **RESPONSE NOT OBTAINED:** **PERFORM** the following; **1. ISOLATE** letdown as necessary. **2. INCREASE** chg flow, and start additional chg pmp as needed. **3. IF** loss of PZR level is imminent, **THEN** **a) TRIP** the reactor. **b) WHEN** reactor trip is verified, **THEN INITIATE** Safety Injection. **c) GO TO** E-0, Reactor Trip or Safety Injection, Step 1.

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Event Description: SG 3 tube ruptures, requiring a reactor trip and safety injection initiation. Requires entry into E-0, "Reactor Trip or Safety Injection" and E-3, "Steam Generator Tube Rupture."
#3 MSIV fails to close.

Time	Position	Applicant's Actions or Behavior
EXAMINER: When the SG tube leakage rises to a point where the crew determines that pressurizer level loss is imminent, and the SRO will order a reactor trip and Safety injection actuation.		
EXAMINER: The 1A-A 6.9 kv Shutdown Board will trip 10 seconds after the reactor trip. AOI-43.01,"Loss of Unit 1 Train A Shutdown Boards will be performed in conjunction with the EOPs on a "not to interfere" basis. AOI-43.-1 actions are provided beginning on Page 30.		
EXAMINER: The following actions are taken from E-0, "Reactor Trip or Safety Injection."		
NOTE 1 Steps 1 thru 4 are **IMMEDIATE ACTION STEPS.**		
NOTE 2 Status Trees / SPDS should be monitored when transitioned to another instruction.		
	RO	1. **ENSURE** reactor trip: • Reactor trip and bypass breakers OPEN. • RPIs at bottom of scale. • Neutron flux DROPPING.
	RO	2. **ENSURE** Turbine Trip: • All turbine stop valves CLOSED.
	RO	3. **CHECK** 6.9 kV shutdown boards: a. At least one board energized from: CSST (offsite), OR D/G (blackout).
	RO	4. **CHECK** SI actuated: a. Any SI annunciator LIT. b. Both trains SI **ACTUATED**. • 1-XX-55-6C • 1-XX-55-6D
EXAMINER: The tube leak progresses from a leak to a rupture prior to the reactor trip, and a manual safety injection will be required based on imminent loss of PZR level.		

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Event Description: SG 3 tube ruptures, requiring a reactor trip and safety injection initiation. Requires entry into E-0, "Reactor Trip or Safety Injection" and E-3, "Steam Generator Tube Rupture."
#3 MSIV fails to close.

Time	Position	Applicant's Actions or Behavior
	SRO/RO	4. **RESPONSE NOT OBTAINED:** **DETERMINE** if SI required: a. **IF** ANY of the following exists: • S/G press less than 675 psig, OR • RCS press less than 1870 psig, OR • Cntmt press greater than 1.5 psig **THEN ACTUATE** SI manually. **IF** SI **NOT** required, **THEN** ** **GO TO** ES-0.1, b. **ACTUATE** SI manually.
EXAMINER: Appendices A and B (E-0) are provided on pages 38 through 52.		
	BOP	5. **EVALUATE** support systems: • **REFER TO** Appendixes A and B (E-0), Equipment Verification pages 15-28.
	SRO	6. **ANNOUNCE** reactor trip and safety injection over PA system.
	RO	7. **ENSURE** secondary heat sink available with either: • Total AFW flow greater than 410 gpm, OR • At least one S/G NR level greater than 29% [39% ADV].
	RO	8. **MONITOR** RCS temp stable at or trending to 557°F: • **IF** any RCP running, **THEN MONITOR** RCS Loop T-avg trending to 557°F. OR • **IF** NO RCP running, **THEN MONITOR** RCS Loop T-cold trending to 557°F.

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Event Description: SG 3 tube ruptures, requiring a reactor trip and safety injection initiation. Requires entry into E-0, "Reactor Trip or Safety Injection" and E-3, "Steam Generator Tube Rupture."
#3 MSIV fails to close.

Time	Position	Applicant's Actions or Behavior
	RO	8. **RESPONSE NOT OBTAINED:** **IF** temp less than 557°F, **THEN ENSURE** steam dumps and S/G PORVs CLOSED. **IF** cooldown continues, **THEN:** • **PLACE** steam dump controls OFF. • **CONTROL** total AFW flow to maintain greater than 410 gpm UNTIL NR level in at least one S/G greater than 29% [39% ADV]. **IF** cooldown continues after AFW flow is controlled, **THEN** • **CLOSE** MSIVs. • **ENSURE** MSIV bypasses CLOSED. **IF** RCS temp greater than 564°F, **THEN ENSURE** either steam dumps or S/G PORVs OPEN.
	RO	9. **ENSURE** excess letdown valves CLOSED: • 1-FCV-62-54 • 1-FCV-62-55
	RO	10. **CHECK** pzr PORVs and block valves: a. Pzr PORVs CLOSED. b. At least one block valve OPEN.
	RO	11. **CHECK** pzr safety valves CLOSED: • **EVALUATE** tailpipe temperatures and acoustic monitors.
	RO	12. **CHECK** pzr sprays CLOSED.
NOTE Seal injection flow should be maintained to all RCPs.		
	RO	13. **CHECK** if RCPs should remain in service: a. Phase B signals DARK [MISSP]. b. RCS pressure greater than 1500 psig.
	RO	14. **CHECK** S/G pressures: • All S/G pressures controlled or rising. • All S/G pressures greater than 120 psig.
	RO	15. **CHECK** for RUPTURED S/G • All S/Gs narrow range levels CONTROLLED or DROPPING. • Secondary side radiation NORMAL from Appendix A.
	SRO	15. **RESPONSE NOT OBTAINED:** **IF** any S/G has level rising in an uncontrolled manner or has high radiation, **THEN** ** **GO TO** E-3, Steam Generator Tube Rupture.

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Event Description: SG 3 tube ruptures, requiring a reactor trip and safety injection initiation. Requires entry into E-0, "Reactor Trip or Safety Injection" and E-3, "Steam Generator Tube Rupture."
#3 MSIV fails to close.

Time	Position	Applicant's Actions or Behavior
EXAMINER: The following actions are taken from E-3, "Steam Generator Tube Rupture."		
NOTE Early notification of RADPROT and Chemistry could expedite subsequent sampling efforts if needed.		
	SRO	1. **REFER TO** EPIP-1, Emergency Plan Classification Flowchart.
NOTE Seal injection flow should be maintained to all RCPs.		
	SRO	2. **CHECK** if RCPs should remain in service: a. Phase B DARK [MISSP]. b. RCS pressure greater than 1500 psig.
	RO	3. **IDENTIFY** Ruptured S/G based on ANY of the following: • Unexpected rise in S/G NR level OR • S/G discharge monitor high radiation OR • RADPROT Survey OR • Chemistry sample.
	RO	4. **ENSURE** Ruptured S/G PORV aligned: a. **ENSURE** controller in AUTO set at 90%. b. **ENSURE** HS in P-AUTO.
CAUTION If turbine-driven AFW pump is only available source of feed flow, then steam supply to the turbine-driven AFW pump must be maintained.		
	SRO	5. **ENSURE** TD AFW pump being supplied from Intact S/G.
	RO	6. **ENSURE** Ruptured S/G blowdown isolated.
Critical Task 1 *WOG Critical Task List for E-3 A.* *Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.* *Once an affected steam generator has been identified, it is isolated from the intact steam generators to limit radiological releases and as a necessary step toward stopping primary-to-secondary leakage. Feedwater flow is also terminated to the affected steam generator after level has returned into the narrow range. This minimizes the possibility of steam generator overfill.*		
Critical Task 1	SRO	7. **CLOSE** Ruptured S/G MSIV and bypass valve.

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Event Description: SG 3 tube ruptures, requiring a reactor trip and safety injection initiation. Requires entry into E-0, "Reactor Trip or Safety Injection" and E-3, "Steam Generator Tube Rupture."
#3 MSIV fails to close.

Time	Position	Applicant's Actions or Behavior
EXAMINER: E-3, "Steam Generator Tube Rupture," Attachment are provided on the indicated pages. Attachment 1 is provided on Pages 54 through 56. Attachment 2 is provided on Page 57. Attachment 3 is provided on Pages 58 through 59. Appendix D is provided on Page 60. ***After being assigned an attachment, the Console Operator will wait 5 minutes and then report that the Attachment has been completed.***		
Critical Task 1	BOP	7. **RESPONSE NOT OBTAINED:** Manually **CLOSE** valves. **IF** valves can **NOT** be closed, **THEN** Locally **REMOVE** power to valves: **DISPATCH** NAUO to perform Attachment 1 (E-3), **THEN:** 1) **CLOSE** Intact S/G MSIVs and bypass valves to isolate Ruptured S/G from intact S/Gs. 2) **ISOLATE** secondary pathways to limit depressurization and contamination by USING Attachment 2 (E-3), Steamline Isolation (MCR), AND Attachment 3 (E-3), Steamline Isolation (Local). 3) **USE** Intact S/G PORVs for dumping steam when required. **IF** at least one Intact S/G can **NOT** be isolated from Ruptured S/G, **THEN** ** **GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery.
CAUTION If any Ruptured S/G is also faulted, feed flow should remain isolated in subsequent steps UNLESS needed for RCS cooldown.		
Critical Task 1	RO	8. **CONTROL** Ruptured S/G level: a. **CHECK** Ruptured S/G NR level greater than 29% [39% ADV]. b. **ISOLATE** AFW flow to Ruptured S/G. c. **ENSURE** MFW ISOLATED to Ruptured S/G: • MFW isolation valves CLOSED. • MFW bypass isolations CLOSED. • MFW reg and bypass reg valves CLOSED. • MFW pumps TRIPPED. d. **CONTROL** Ruptured S/G NR level greater than 29% [39% ADV].
	RO	9. **PLACE** dump back valve to CST, 1-LIC-2-3, in MANUAL, and **CLOSE** valve.
	RO	10. **MAINTAIN** condenser level 1-LR-2-12 on-scale [M-3].
	SRO	11. **DISPATCH** operator to OPEN 1-FCV-14-3 to bypass condensate DI.

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Event Description: SG 3 tube ruptures, requiring a reactor trip and safety injection initiation. Requires entry into E-0, "Reactor Trip or Safety Injection" and E-3, "Steam Generator Tube Rupture."
#3 MSIV fails to close.

Time	Position	Applicant's Actions or Behavior
	RO	12. **ENSURE** RADPROT dispatched to survey secondary plant.
	SRO	13. **NOTIFY** Chemistry to obtain samples as necessary for confirming Ruptured S/G.
	SRO	14. **NOTIFY** plant personnel of potential contaminated release.
Critical Task 2 *Isolate secondary pathways to limit depressurization and contamination by initiating Attachment 2 (E-3), Steamline Isolation (MCR), and Attachment 3 (E-3), Steamline Isolation (Local) prior to initiating RCS cooldown.* *Isolation is performed to maintain ruptured SG pressurized during the cooldown in order to allow subsequent RCS depressurization to ruptured SG pressure while maintaining RCS subcooling.*		
Critical Task 2	RO	15. **ENSURE** major steam flowpaths from the ruptured S/G isolated: a. TD AFW pump steam supply from Ruptured S/G CLOSED (if applicable). b. Ruptured S/G MSIV and bypass valve CLOSED, OR Intact S/G MSIVs and bypass valves CLOSED.
Critical Task 2	RO	**15: <u>RESPONSE NOT OBTAINED:</u>** **ISOLATE** secondary pathways to limit depressurization and contamination by INITIATING Attachment 2 (E-3), Steamline Isolation (MCR), AND Attachment 3 (E-3), Steamline Isolation (Local).
	RO	16. **CHECK** Ruptured S/G pressure greater than 690 psig.
Critical Task 3 *WOG Critical Task List for E-3 B.* *Establish/maintain an RCS temperature so that transition from E-3 does not unnecessarily occur. Properly identifies, establishes cooldown, and maintains temperature at target temperature in accordance with E-3, Steps 17 and 18.*		
Critical Task 3	RO	17. **DETERMINE** target incore temp for RCS cooldown: • **IF** Ruptured S/G pressure is between listed values, **THEN USE** lower value:

RUPTURED S/G PRESSURE (PSIG)	TARGET INCORE TEMP (°F)
1100	491°F [471°F ADV]
1000	479°F [459°F ADV]
900	466°F [446°F ADV]
800	451°F [431°F ADV]
700	434°F [414°F ADV]
690	433°F [413°F ADV]

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Event Description: SG 3 tube ruptures, requiring a reactor trip and safety injection initiation. Requires entry into E-0, "Reactor Trip or Safety Injection" and E-3, "Steam Generator Tube Rupture."
#3 MSIV fails to close.

Time	Position	Applicant's Actions or Behavior
		CAUTION **• The 1500 psig RCP trip criteria is NOT applicable during or after a controlled RCS cooldown and depressurization.** **• If total feed flow CAPABILITY of 410 gpm is AVAILABLE, FR-H.1, Loss of Secondary Heat Sink, should NOT be implemented.** **• Excessive steam dump cooldown rate will cause MSIV isolation due to the rate sensitive signal.** **• If RCPs are not running, a false red or orange path may be indicated for FR-P.1 during the following steps. T-cold in the ruptured loop should be disregarded until Step 43.**
Critical Task 3	BOP	18. **INITIATE** RCS cooldown to target incore temp, determined from Step 17. a. **DUMP** steam to condenser from Intact S/G(s) at maximum achievable rate:
		IF dumps are in Tavg mode, **THEN** 1) **PLACE** steam dump controls OFF. 2) **PLACE** steam dump mode switch in STEAM PRESSURE. 3) **ENSURE** steam dump demand indicator 1-XI-1-33 reading zero. 4) **PLACE** steam dump controls ON. 5) **PLACE** steam dump controller in MAN, AND **FULLY OPEN** three cooldown valves (≤25% demand).
Critical Task 3	BOP	18. **a. <u>RESPONSE NOT OBTAINED</u>:** a. **IF** condenser steam dumps **NOT** available, **THEN USE** Intact S/G PORVs at maximum achievable cooldown rate **IF** an Intact S/G is **NOT** available, **THEN PERFORM** one BUT NOT BOTH of the following: • **USE** Faulted S/G, **OR** • ** **GO TO** ECA-3.1, SGTR LOCA - Subcooled Recovery. b. **WHEN** RCS pressure is less than 1962 psig (P-11), **THEN** • **BLOCK** low pzr pressure SI. • **BLOCK** low steam pressure SI. c. **WHEN** Tavg is less than 550°F (P-12), **THEN BYPASS** Lo-Lo Tavg interlock. d. **WHEN** incore temp is less than target temp, **THEN STOP** RCS cooldown, AND **MAINTAIN** incore temperature less than or equal to target. e. **CONTINUE** with Step 19 of this Instruction.

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Event Description: SG 3 tube ruptures, requiring a reactor trip and safety injection initiation. Requires entry into E-0, "Reactor Trip or Safety Injection" and E-3, "Steam Generator Tube Rupture."
#3 MSIV fails to close.

Time	Position	Applicant's Actions or Behavior
		19. **MONITOR** Intact S/G levels: a. At least one S/G NR level greater than 29% [39% ADV]. b. S/G NR levels less than 50% and controlled.
		20. **CONTROL** Intact S/G NR levels between 29% and 50% [39% and 50% ADV].
		21. **MONITOR** pzr PORVs and block valves: a. Pzr PORVs CLOSED. b. At least one block valve OPEN.
	RO	22. **CHECK** pzr safety valves CLOSED: • **EVALUATE** tailpipe temperatures and acoustic monitors.
CAUTION If offsite power is lost after SI reset, manual action will be required to restart the SI pumps and RHR pumps due to loss of SI start signal.		
	RO	23. **RESET** SI, and **CHECK** the following: • SI ACTUATED permissive DARK. • AUTO SI BLOCKED permissive LIT.
	RO	24. **RESET** Phase A and Phase B.
	BOP	25. **ENSURE** cntmt air in service: a. Aux air pressure greater than 75 psig [M-15]. b. Cntmt air supply valves OPEN [M-15]: • 1-FCV-32-80. • 1-FCV-32-102. • 1-FCV-32-110.
	RO	26. **DETERMINE** if RHR pumps should be stopped: a. **CHECK** RHR suction aligned from RWST. b. **CHECK** RCS pressure greater than 150 psig. c. **CHECK** RCS pressure stable or rising. d. **STOP** RHR pumps and **PLACE** in A-AUTO. e. **MONITOR** RCS pressure greater than 150 psig.
	SRO	27. **CHECK** target incore temperature: a. **VERIFY** incore temperature less than target temperature. b. **STOP** RCS cooldown. c. **MAINTAIN** incore temperature less than target temperature.
	RO	28. **MONITOR** Ruptured S/G pressure stable or rising.

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Event Description: SG 3 tube ruptures, requiring a reactor trip and safety injection initiation. Requires entry into E-0, "Reactor Trip or Safety Injection" and E-3, "Steam Generator Tube Rupture."
#3 MSIV fails to close.

Time	Position	Applicant's Actions or Behavior
		28. **RESPONSE NOT OBTAINED:** **MAINTAIN** Ruptured S/G at least 250 psig greater than the pressure of the S/G(s) used for cooldown: • Slowly **DUMP** steam from S/G(s) used for cooldown. • **MAINTAIN** RCS cooldown rate less than 100° F in one hour. **IF** the Ruptured S/G depressurizes to less than 250 psig above the pressure of the S/G(s) used for cooldown, **THEN ** GO TO** ECA-3.1, SGTR and LOCA – Subcooled Recovery.
	RO	29. **CHECK** RCS subcooling greater than 85°F [105°F ADV].
	RO	29. **RESPONSE NOT OBTAINED:** **IF** subcooling is less than 65°F [85°F ADV], **THEN ** GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery. **IF** subcooling is STABLE **OR** DROPPING, **THEN ** GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery. **DO NOT CONTINUE** this instruction UNTIL subcooling is greater than 85°F [105°F ADV].
CAUTION Cycling of the pzr PORV should be minimized to improve PORV reliability.		
NOTE • **If RCPs are not running, the upper head region may void during RCS depressurization. This will result in a rapidly rising pzr level.** • **Either Loop 1 or 2 pzr spray valve is effective for Loop 2 RCP in service or for Loops 1, 3, & 4 RCPs in service.**		
Critical Task 4 *WOG Critical Task List for E-3 D.* *Depressurize RCS to meet SI termination criteria before E-3, "Steam Generator Tube Rupture," Step 31 criteria are exceeded.* *RCS pressure is decreased to stop primary-to-secondary leakage and establish indicated pressurizer level greater than 15%.*		
Critical Task 4	RO	30. **INITIATE** RCS depressurization to minimize break flow, and **REFILL** pzr to greater than 15% [33% ADV]. a. **CHECK** pzr level less than 63% [58% ADV]. b. **MAINTAIN** subcooling greater than 65°F [85°F ADV]. c. **DEPRESSURIZE** RCS with normal sprays at maximum rate.

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Event Description: SG 3 tube ruptures, requiring a reactor trip and safety injection initiation. Requires entry into E-0, "Reactor Trip or Safety Injection" and E-3, "Steam Generator Tube Rupture."
#3 MSIV fails to close.

Time	Position	Applicant's Actions or Behavior
Critical Task 4	SRO	31. **DETERMINE** if RCS depressurization should be stopped: a. **CONTINUE** RCS depressurization UNTIL one of the following: • Pzr level rises to greater than 63% [58% ADV]. OR • RCS subcooling drops to less than 65°F [85°F ADV]. OR • BOTH of the following: 1) RCS pressure is less than Ruptured S/G pressure. AND 2) Pzr level is greater than 15% [33% ADV]. b. **WHEN** depressurization criteria satisfied, **THEN ENSURE** the following: 1) Normal pzr spray valves CLOSED. 2) Pzr PORVs CLOSED. 3) Aux spray valve CLOSED.
CAUTION • **SI should be terminated as quickly as possible after termination criteria are met to prevent Ruptured S/G overfill.** • **If total feed flow CAPABILITY of 410 gpm is AVAILABLE, FR-H.1, Loss of Secondary Heat Sink, should NOT be implemented.**		
	SRO	32. **CHECK** SI termination criteria: a. **CHECK** RCS subcooling greater than 65°F [85°F ADV]. b. **CHECK** secondary heat sink with either: • Total available feed flow greater than 410 gpm, OR • At least one S/G NR level greater than 29% [39% ADV]. c. **CHECK** RCS pressure stable or rising. d. **CHECK** pzr level greater than 15% [33% ADV].
	RO	33. **IF** RHR suction aligned from RWST, **THEN STOP** ECCS pumps, and **PLACE** in A-Auto: • RHR pumps. • SI pumps. • All BUT one charging pump.

Op Test No.:	NRC	Scenario #	4	Event #	7, 8	Page	32	of 60

Event Description: SG 3 tube ruptures, requiring a reactor trip and safety injection initiation. Requires entry into E-0, "Reactor Trip or Safety Injection" and E-3, "Steam Generator Tube Rupture."
#3 MSIV fails to close.

Time	Position	Applicant's Actions or Behavior
	RO	34. **ALIGN** charging: a. **CLOSE** RCP seal flow control 1-FCV-62-89. b. **OPEN** charging isolation valves 1-FCV-62-90 and 1-FCV-62-91. ***Due to the loss of Train A power, an AUO will have to be dispatched to perform manual actions required to open 1-FCV-62-90.*** c. **ENSURE** charging valve 1-FCV-62-85 OR 1-FCV-62-86 OPEN. d. **CHECK** RHR Suction aligned from RWST. e. **OPEN** seal return valves 1-FCV-62-61 and 1-FCV-62-63. ***Due to the loss of Train A power, an AUO will have to be dispatched to perform manual actions required to open 1-FCV-62-63.***
	RO	35. **CLOSE** BIT outlets 1-FCV-63-25 and 1-FCV-63-26. ***Due to the loss of Train A power, an AUO will have to be dispatched to perform manual actions required to open 1-FCV-63-26.***
	RO	36. **CONTROL** charging flow: a. **ADJUST** 1-FCV-62-89 and 1-FCV-62-93 to establish: • Seal injection flow between 8 and 13 gpm for each RCP. • Pzr level stable or rising.
	RO	37. **ENSURE** ECCS flow NOT required: a. **CHECK** RCS subcooling greater than 65°F [85°F ADV]. b. **CHECK** pzr level greater than 15% [33% ADV].
END OF SCENARIO		

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Event Description: 1A-A 6.9 KV Shutdown Board trips on differential lockout relay operation. AOI-43.01, "Loss of Unit 1 Train A Shutdown Boards," actions.

Time	Position	Applicant's Actions or Behavior
Indications: 12-C B 6.9 SD BD 1A-A VOLTAGE DEGRADED 101-C PRI WTR HDR PRESS LO 86-B CONTROL ROD NON-URGENT FAILURE 50-A MFPT 1A ABNORMAL 101-E RCP SEAL SUPPLY FLOW LO 108-A CHARGING FLOW HI/LO Multiple Radiation Monitor Instrument Failure alarms.		
	BOP	Diagnoses and announces the loss of the 1A 6.9 KV Shutdown Board.
	SRO	Assigns performance of AOI-43.01, "Loss of Unit 1 Train A Shutdown Boards," to the BOP, to be accomplished on a not to interfere basis while the EOPs are performed.
EXAMINER: The following actions are taken from AOI-43.01, "Loss of Unit 1 Train A Shutdown Boards."		
NOTE 1 CCP 1A-A, SIP 1A-A, RHR Pump 1A-A, CS Pump 1A-A, AFW Pump 1A-A, ERCW Pumps A-A and B-A, Pressurizer Heaters Backup Group 1A, and Pressurizer Heaters Control Group 1D will be unavailable on a loss of 6.9KV Shutdown Board 1A-A. **NOTE 2** Operability of remaining AC power sources must be determined within one hour per LCO 3.8.1. **NOTE 3** Steps to energize 6.9KV Shutdown Board 1A-A (or intermediate supply paths) may be repeated based on completed repair(s), protective relay reset, or direction from TSC. **NOTE 4** RCP's can be operated for up to 10 minutes after loss of CCS flow.		
	BOP	1. **MONITOR** 1B-B 6.9KV Shutdown Board ENERGIZED.
	BOP	2. **ENSURE** Diesel Generators running: • DG 1A-A • DG 1B-B • DG 2A-A • DG 2B-B
	RO	3. **MONITOR** RCP seal cooling available: • Seal injection flow OR • CCS flow through Thermal Barrier Heat Exchangers ***RO determines that the CCS system has returned to normal after the start of the 1B CCS pump due to low header pressure.***

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Event Description: 1A-A 6.9 KV Shutdown Board trips on differential lockout relay operation. AOI-43.01, "Loss of Unit 1 Train A Shutdown Boards," actions.

Time	Position	Applicant's Actions or Behavior
	BOP	4. **DISPATCH** personnel to Auxiliary Bldg to UNLOCK and **RACK UP** the following breakers: NOMENCLATURE / LOCATION / UNID MAINT SUPPLY FROM 6.9KV UNIT BD 1B / 6.9kV SDB 1A-A, C11 / 1-BKR-211-1718/11 MAINT SUPPLY FROM 6.9KV UNIT BD 2B / 6.9kV SDB 2A-A, C11 / 2-BKR-211-1818/11 ***These actions will not be taken due to the report of damage on the board.***
	BOP	5. **DISPATCH** personnel to Turbine Bldg to **CLOSE** the following breakers: NOMENCLATURE / LOCATION / UNID MAINT FEEDER TO 6.9 KV SHUTDOWN BD 1A-A / 6.9kV UNIT BD 1B / 1-BKR-201-B/8 MAINT FEEDER TO 6.9 KV SHUTDOWN BD 2A-A / 6.9kV UNIT BD 2B / 2-BKR-201-B/8 ***These actions will not be taken due to the report of damage on the board.***
	BOP	6. **CHECK** both 1A-A and 2A-A 6.9 KV Shutdown bds DEENERGIZED.
	SRO	6. **RESPONSE NOT OBTAINED:** ** **GO TO** Step **[9]**.
	BOP	9. **DISPATCH** personnel to the following locations to inspect for equipment damage: • 6.9KV Shutdown Board • 480V Shutdown Boards • Diesel Generator Building
	SRO	10. **NOTIFY** MAINTENANCE personnel of failure of Shutdown Board.
	BOP	11. **ENSURE** Unit 1 Instrument Power A Rack selected to ENERGIZED feeder (amber light ON) [1-M-7] (SOI-237.01). ***BOP operator transfers Unit 1 Instrument Power A Rack to its Alternate feed.***

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Event Description: 1A-A 6.9 KV Shutdown Board trips on differential lockout relay operation. AOI-43.01, "Loss of Unit 1 Train A Shutdown Boards," actions.

Time	Position	Applicant's Actions or Behavior
	RO	12. **ALIGN** BAT A for operation via BA Pump 1B USING SOI-62.05. ***BOP contacts the Auxiliary Building AUO to have alignment accomplished.***
	SRO	13. **MONITOR** Board Protective Relays NOT ACTUATED (local reports) ***Report received from the AUO that the 1A 6.9 KV Shutdown Board tripped due to differential relay operation. The bus work appears to be severely damaged.***
	SRO	13. **RESPONSE NOT OBTAINED:** **GO TO** Step **[38]**.
	RO/BOP	38. **ENSURE** affected equipment placed in **STOP PULL TO LOCK/OFF:** • 1A-A CCP. • Pressurizer Heaters Group 1A-A. • 1A-A Motor Driven AFW Pump. • 1A-A Component Cooling Water Pump. • 1A-A Thermal Barrier Booster Pump. • A-A ERCW Pump. • B-A ERCW Pump. • MCR Chiller A-A. • EBR Chiller A-A. • SD Bd Rm Chiller A-A. ***BOP informs the SRO prior to placing equipment in pull-to-lock.***
	BOP	39. **DISPATCH** AUO to D/G Bldg to monitor D/G conditions USING SOI-82 series, Appendix A, for operating parameters
	BOP	40. **ENSURE** Train A ERCW pumps in service as required to maintain pressure and flows (SOI-67.01): • C-A ERCW Pump. • D-A ERCW Pump.
	RO	41. **CHECK** any charging pump RUNNING

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Event Description: 1A-A 6.9 KV Shutdown Board trips on differential lockout relay operation. AOI-43.01, "Loss of Unit 1 Train A Shutdown Boards," actions.

Time	Position	Applicant's Actions or Behavior
	RO	41. **RESPONSE NOT OBTAINED:** **PERFORM** the following: a. **ISOLATE** letdown: • **CLOSE** letdown orifice(s). • **CLOSE** 1-FCV-62-69A. • **CLOSE** 1-FCV-62-70A. b. **RESTORE** charging and letdown: • **REFER TO** Attachment 1 ALIGNMENT OF CHARGING AND LETDOWN.
NOTE 1 CCS Pump 1A-A, Aux Bldg General Sup Fan 1A-A, CRDM Cooler 1A-A, Lower Cntmt Cooler 1A-A, EBR Air Handling Unit A-A, and Cntmt Air Return Fan 1A-A will be unavailable on a loss of 480V SD BD 1A1-A. **NOTE 2** Aux Bldg General Exh Fan 1A-A, CRDM Cooler 1C-A, Lower Cntmt Cooler 1C-A, MCR Chlr A-A Compressor, 480V SDBR AHU A-A, Station Air Compr A, and HP Fire Pump 1A-A will be unavailable on a loss of 480V SD BD 1A2-A.		
	BOP	42. **ENSURE** 1B-B CCS Pump Supplying A Train (SOI-70.01).
	BOP	43. **ENSURE** Thermal Barrier Booster Pump 1B-B in service(SOI-70.01).
	SRO	44. **EVALUATE** starting additional Control Rod Drive Mech Cooler Fans, Lower Compartment Cooler Fans, and Upper Compartment Cooler Fans (SOI-30.03).
	BOP	45. **ENSURE** Aux Bldg General Supply and Exhaust Fans in service as required to maintain ventilation and pressure (SOI-30.05).
	BOP	46. **ENSURE** EBR Air Conditioning Unit B-B and MCR Air Conditioning Unit B-B in service (SOI-31.01).
NOTE Radiation Monitors powered from 480V C & A Vent Board 1A1-A or Radiation Monitor & Sampling & Fire Protection 1-BD-242-1 will be inoperable on a loss of 480V C & A Vent Board 1A1-A.		
	BOP	47. **RESET** Radiation Monitor modules and alarms on 0-M-12.
NOTE 1 Unit 1 A Train ESF Room Coolers, Area Coolers, and Space Coolers will be unavailable on a loss of 480V C & A Vent Board 1A1-A. **NOTE 2** Emergency Gas Treatment System Fan A-A will be unavailable on a loss of 480V C & A Vent Board 1A1-A.		
	RO	48. **ENSURE** 1B Primary Water Pump in service as required (When in bypass mode, ensure Primary Water System aligned per SOI-81.01).
	BOP	49. **ENSURE** 1B Annulus Vacuum Fan in service (SOI-65.01).

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Event Description: 1A-A 6.9 KV Shutdown Board trips on differential lockout relay operation. AOI-43.01, "Loss of Unit 1 Train A Shutdown Boards," actions.

Time	Position	Applicant's Actions or Behavior
	BOP	50. **ENSURE** A Train or B Train 480V and Shutdown Board Room Ventilation in service (SOI-30.07).
CAUTION LCO 3.8.1 is expected to require performance of S/R 3.8.1.1 (0-SI-82-2). Performers are NOT to take ANY actions which would interrupt power supplies in service by this AOI.		
	SRO	51. **REFER TO** Tech Specs: • 3.5.2, ECCS-Operating. • 3.5.3, ECCS-Shutdown. • 3.8.1, AC Sources-Operating. • 3.8.2, AC Sources-Shutdown. • 3.8.4, DC Sources-Operating. • 3.8.5, DC Sources-Shutdown. • 3.8.9, Distribution Systems-Operating. • 3.8.10, Distribution Systems-Shutdown.
	SRO	52. **REFER TO** EPIP-1, Emergency Plan Classification Flowchart.
	SRO	53. **EVALUATE** transferring 125V Batt BD I to Battery Charger 6-S (SOI-236.01) or transferring 120V AC Vital Inverter 1-I from Normal To Alternate 480V power supply (SOI-235-series).
	SRO	54. **EVALUATE** transferring 24V CAP Battery Charger 1 from Normal to Alternate (SOI-252).
	BOP	55. **CHECK** Unit 1 A Train Shutdown Board(s) ready to be ENERGIZED.
	SRO	55. **RESPONSE NOT OBTAINED:** **GO TO** Step **[13]**.

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

1.	**ENSURE** PCBs OPEN: • PCB 5084. • PCB 5088.	**OPEN** manually.
2	**ENSURE** AFW pump operation: • Both MD AFW pumps RUNNING. • TD AFW pump RUNNING. • LCVs in AUTO, or controlled in MANUAL.	**ESTABLISH** at least one train AFW operation.
3.	**ENSURE** MFW isolation: • MFW isolation and bypass isolation valves CLOSED. • MFW reg and bypass reg valves CLOSED. • MFP A and B TRIPPED. • Standby MFP STOPPED. • Cond demin pumps TRIPPED. • Cond booster pumps TRIPPED.	Manually **CLOSE** valves and **STOP** pumps, as necessary. **IF** any valves can **NOT** be closed, **THEN** **CLOSE** #1 heater outlet valves.

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

4. **MONITOR** ECCS operation:

a. Charging pumps RUNNING.	a. Manually **START** charging pumps.
b. Charging pump alignment: • RWST outlets 1-LCV-62-135 and 1-LCV-62-136 OPEN. • VCT outlets 1-LCV-62-132 and 1-LCV-62-133 CLOSED. • Charging 1-FCV-62-90 and 1-FCV-62-91 CLOSED.	b. **ENSURE** at least one valve in each set aligned.
c. RHR pumps RUNNING.	c. Manually **START** RHR pumps.
d. SI pumps RUNNING.	d. Manually **START** SI pumps.
e. BIT alignment: • Outlets 1-FCV-63-25 and 1-FCV-63-26 OPEN. • Flow thru BIT.	e. **ENSURE** at least one valve aligned, and flow thru BIT.
f. RCS pressure greater than 1650 psig.	f. **ENSURE** SI pump flow. **IF** RCS press drops to less than 150 psig, **THEN** **ENSURE** RHR pump flow.

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

5	**CHECK** cntmt isolation: a. Phase A isolation: • Train A GREEN. • Train B GREEN. b. Cntmt vent isolation: • Train A GREEN. • Train B GREEN.	**ACTUATE** Phase A and Cntmt Vent Isolation signal, **OR** Manually **CLOSE** valves and dampers as necessary.

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

6.	**CHECK** cntmt pressure: • Phase B DARK [MISSP]. • Cntmt Spray DARK [MISSP]. • Cntmt press less than 2.8 psig.	**PERFORM** the following: 1) **ENSURE** Phase B actuated. 2) **ENSURE** Cntmt Spray actuated. 3) **ENSURE** cntmt spray pumps running. 4) **ENSURE** cntmt spray flow. 5) **ENSURE** Phase B isolation: • Train A GREEN. • Train B GREEN • Manually **CLOSE** valves and dampers as necessary. 6) **STOP** all RCPs. 7) **ENSURE** MSIVs and bypasses CLOSED. 8) **PLACE** steam dump controls OFF. 9) **WHEN** 10 minutes has elapsed since Phase B actuated, **THEN** **ENSURE** air return fans start. 10) **USE** adverse cntmt [ADV] setpoints where provided.

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Step	Action/Expected Response	Response Not Obtained

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7.	**CHECK** plant radiation NORMAL: • S/G blowdown rad recorder 1-RR-90-120 NORMAL prior to isolation [M-12]. • Condenser vacuum exhaust rad recorder 1-RR-90-119 NORMAL prior to trip [M-12]. • 1-RR-90-106 and 1-RR-90-112 radiation recorders NORMAL prior to isolation [M-12]. • S/G main steamline discharge monitors NORMAL [M-30]. • Upper and Lower containment high range monitors NORMAL [M-30]. • **NOTIFY** Unit Supervisor conditions NORMAL.	**NOTIFY** Unit Supervisor IMMEDIATELY.
8	**ENSURE** all D/Gs RUNNING.	**EMERGENCY START** D/Gs

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

9.	**ENSURE** ABGTS operation:	
	a. ABGTS fans RUNNING.	a. Manually **START** fans.
	b. ABGTS dampers OPEN: • FCO-30-146A. • FCO-30-146B. • FCO-30-157A. • FCO-30-157B.	b. Locally **OPEN** dampers.
10.	**ENSURE** at least four ERCW pumps RUNNING, one on each shutdown board preferred.	Manually **START** pumps as necessary.
11.	**ENSURE** ERCW supply valves OPEN to running D/Gs.	**IF** ERCW can **NOT** be aligned to running D/G, **THEN** **EMERGENCY STOP** affected D/G.
12.	**ENSURE** CCS HX C ALT DISCH TO HDR B, 0-FCV-67-152, is open to position A.	Manually **OPEN** 0-FCV-67-152 to position A.

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13.	**CLOSE** CCS HX C DISCH TO HDR A, 0-FCV-67-144.	
14.	**MONITOR** EGTS operation: • EGTS fans RUNNING. • **ENSURE** dampers OPEN VERIFY filter bank dp between 5 and 9 inches of water.	Manually **START** fans **OPEN** dampers.
15.	**ENSURE** CCS pumps RUNNING: • 1A-A CCS pump. • 1B-B CCS pump. • C-S OR 2B-B CCS pump.	Manually **START** pumps as necessary.

NOTE
- The Upper and Lower Cntmt rad monitors sampling pumps should be shutdown if the sample flowpath is isolated.
- The following equipment is located on 1-M-9.

16.	**CHECK** CNTMT PURGE fans STOPPED:	**STOP** fans and **PLACE** handswitch in PULL-TO-LOCK.

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

17.	**CHECK** FUEL HANDLING EXH fans STOPPED, Fuel and Cask loading dampers CLOSED:	**STOP** fans and **PLACE** handswitch in PULL-TO-LOCK, manually **CLOSE** dampers.
18.	**ENSURE** AB GEN SUPPLY and EXH fans STOPPED.	**STOP** fans and **PLACE** handswitch in PULL-TO-LOCK.

NOTE • Dampers 1-HS-30-158 and 2-HS-30-270 remain open during ABI.

19.	**ENSURE** AB GEN SUP & EXH dampers CLOSED.	Manually **CLOSE** dampers.
20.	**ENSURE** MCR & SPREAD RM FRESH AIR dampers CLOSED: • FCV-31-3. • FCV-31-4.	Manually **CLOSE** dampers.

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Step	Action/Expected Response	Response Not Obtained

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21.	**ENSURE** at least one CB EMER CLEANUP fan RUNNING and associated damper OPEN: • CB EMERG CLEANUP FAN A-A, OR Fan B-B RUNNING. • FCO-31-8, OPEN. OR FCO-31-7, OPEN.	Manually **START** fan. **NOTIFY** TSC if at least one damper NOT OPEN.
22.	**ENSURE** at least one CB EMER PRESS fan RUNNING and associated damper OPEN: • CB EMERG PRESS FAN A-A, OR FAN B-B RUNNING. • FCO-31-6, OPEN. OR FCO-31-5, OPEN.	Manually **START** fan. **NOTIFY** TSC if at least one damper NOT OPEN.

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Step	Action/Expected Response	Response Not Obtained

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23.	**ENSURE** Control Building fans STOPPED and dampers CLOSED: • SPREADING ROOM SUPPLY and EXH FANS AND dampers. • TOILET & LKR RM EXHAUST FAN AND dampers.	Manually **STOP** fans. **NOTIFY** TSC if any damper NOT CLOSED.
24.	**INITIATE** Appendix B.	

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Step	Action/Expected Response	Response Not Obtained

APPENDIX B
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PHASE B PIPE BREAK CONTINGENCIES

1.	**CHECK** PHASE B actuated. (MISSP - 1-XX-55-6C, -6D)	**WHEN** PHASE B actuation occurs; **THEN** **GO TO** step 2.
2.	**ENSURE** 1-FCV-32-110 CLOSED. (CISP - 1-XX-55-6E) [A-train, window 13]	**DISPATCH** AUO to perform ATTACHMENT B1.
3.	**ENSURE** 1-FCV-67-107 CLOSED. (CISP - 1-XX-55-6E) [A -train, window 43]	**DISPATCH** AUO to perform ATTACHMENT B2.
4.	**ENSURE** 1-FCV-70-92 CLOSED. (CISP - 1-XX-55-6E) [A -train, window 73]	**DISPATCH** AUO to perform ATTACHMENT B3.
5.	**ENSURE** 1-FCV-70-140 CLOSED. (CISP - 1-XX-55-6F) [B -train, window 74]	**DISPATCH** AUO to perform ATTACHMENT B4.

ATTACHMENT B1
(E-0)
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CONTROL AIR ISOLATION

1. **CLOSE** 0-ISV-32-1013 - CONTROL AIR EL 713 AB HDR ISOL [A6/S EL. 713] (chain operated - behind Fuel and Waste Handling Bd. A)

2. **IF** 0-ISV-32-1013 CANNOT BE CLOSED,
   THEN:

   OPEN and **DISCONNECT** C&SS air compressor breakers:

   a) 0-BKR-32-25 - 480V SD BD 1A2-A, C/3D

   b) 0-BKR-32-26 - 480V SD BD 1B1-B, C/3D

   c) 0-BKR-32-27 - 480V AUX BLDG COM BD, C/6C

   d) 0-BKR-32-4900A - 480V TURB BLDG COM BD, C/6C

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ATTACHMENT B2
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ERCW ISOLATION

1. **UNLOCK AND CLOSE** 1-ISV-67-523B - LOWER CNTMT VENT CLR 1B &1D ERCW SUP ISOL [A2U/692] (U-1 penetration room - North of AB Pipe Chase Cooler 1B-B in overhead)

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

ATTACHMENT B3
(E-0)
Page 1 of 1

CCS RETURN ISOLATION

1. **CLOSE** 1-ISV-70-700 RCP OIL COOLER CCS RETURN ISOLATION [A4/V EL. 710 U-1 Penetration Room] (approximately 10 ft. North of Penetration Room Cooler 1B-B on mezzanine above RHR Sump Valve Room)

ATTACHMENT B4
(E-0)
Page 1 of 1

CCS SUPPLY ISOLATION

1. **CLOSE** 1-ISV-70-516 REACTOR BUILDING CCS SUPPLY ISOLATION [A6/1 EL. 737] (Behind Elevator approximately 2 ft. west on mezzanine above "A" CCS Heat Exchanger)

WBN	STEAM GENERATOR TUBE RUPTURE	E-3 Rev 22

ATTACHMENT 1
(E-3)
Page 1 of 4

1.0 INSTRUCTIONS

[1] **IF** any MSIV will **NOT** close,
THEN
GO TO Section 1.1 (Attachment 1).

[2] **IF** any MSIV bypass valve will **NOT** close,
THEN
GO TO Section 1.2 (Attachment 1).

WBN	STEAM GENERATOR TUBE RUPTURE	E-3 Rev 22

ATTACHMENT 1
(E-3)
Page 2 of 4

1.1 MSIV Isolation

[1] **PLACE** affected MSIV transfer control switch in AUX position:
[Auxiliary Control Room, Panels 1-L-11A and 1-L-11B]

S/G (Circle affected S/G)	EQUIPMENT	AUX TRANSFER SWITCH	AUX POSITION √
1	MSIV Loop 1, Train A, 1-FCV-1-4	1-XS-1-4A	☐
	MSIV Loop 1, Train B, 1-FCV-1-4	1-XS-1-4B	☐
2	MSIV Loop 2, Train A, 1-FCV-1-11	1-XS-1-11A	☐
	MSIV Loop 2, Train B, 1-FCV-1-11	1-XS-1-11B	☐
3	MSIV Loop 3, Train A, 1-FCV-1-22	1-XS-1-22A	☐
	MSIV Loop 3, Train B, 1-FCV-1-22	1-XS-1-22B	☐
4	MSIV Loop 4, Train A, 1-FCV-1-29	1-XS-1-29A	☐
	MSIV Loop 4, Train B, 1-FCV-1-29	1-XS-1-29B	☐

[2] **CONSULT** UO to verify affected MSIV closed.

WBN	STEAM GENERATOR TUBE RUPTURE	E-3 Rev 22

ATTACHMENT 1
(E-3)
Page 3 of 4

1.1 MSIV Isolation (Continued)

[3] **IF** affected MSIV still open **OR** control power fuse removal desired, **THEN**
REMOVE MSIV fuses:

S/G (Circle affected S/G)	EQUIPMENT	FUSE LOCATION (Two per circuit)	FUSES REMOVED √
1	MSIV Loop 1, Train A, 1-FCV-1-4	125V Vital Battery Bd I Circuit A-46 Circuit B-46	 ☐ ☐
	MSIV Loop 1, Train B, 1-FCV-1-4	125V Vital Battery Bd II Circuit A-46 Circuit B-46	 ☐ ☐
2	MSIV Loop 2, Train A, 1-FCV-1-11	125V Vital Battery Bd I Circuit A-47 Circuit B-47	 ☐ ☐
	MSIV Loop 2, Train B, 1-FCV-1-11	125V Vital Battery Bd II Circuit A-47 Circuit B-47	 ☐ ☐
3	MSIV Loop 3, Train A, 1-FCV-1-22	125V Vital Battery Bd I Circuit A-48 Circuit B-48	 ☐ ☐
	MSIV Loop 3, Train B, 1-FCV-1-22	125V Vital Battery Bd II Circuit A-48 Circuit B-48	 ☐ ☐
4	MSIV Loop 4, Train A, 1-FCV-1-29	125V Vital Battery Bd I Circuit A-49 Circuit B-49	 ☐ ☐
	MSIV Loop 4, Train B, 1-FCV-1-29	125V Vital Battery Bd II Circuit A-49 Circuit B-49	 ☐ ☐

[4] **NOTIFY** UO upon completion.

WBN	STEAM GENERATOR TUBE RUPTURE	E-3 Rev 22

ATTACHMENT 1
(E-3)
Page 4 of 4

1.2 MSIV Bypass Isolation

[1] **PLACE** HS in OFF for MSIV bypass valves that will NOT close:

S/G (Circle affected S/G)	NOMENCLATURE	LOCATION	POSITION	UNID	HS OFF √
1	MAIN STEAM ISOL VLV LOOP 1 BYP WARMING VLV	A3U/737	OFF	1-HS-1-147B	□
2	MAIN STEAM ISOL VLV LOOP 2 BYP WARMING VLV	A4U/757	OFF	1-HS-1-148B	□
3	MAIN STEAM ISOL VLV LOOP 3 BYP WARMING VLV	A5U/757	OFF	1-HS-1-149B	□
4	MAIN STEAM ISOL VLV LOOP 4 BYP WARMING VLV	A3U/737	OFF	1-HS-1-150B	□

[2] **NOTIFY** UO upon completion.

WBN	STEAM GENERATOR TUBE RUPTURE	E-3 Rev 22

ATTACHMENT 2
(E-3)
Page 1 of 1
STEAMLINE ISOLATION (MCR)

1. **CLOSE** the following HP steam and bypass isolation valves:

MSR A2 HP STM ISOL	1-M-2	1-HS-1-135A	☐
MSR B2 HP STM ISOL	1-M-2	1-HS-1-137A	☐
MSR C2 HP STM ISOL	1-M-2	1-HS-1-139A	☐
MSR A1 HP STM ISOL	1-M-2	1-HS-1-141A	☐
MSR B1 HP STM ISOL	1-M-2	1-HS-1-143A	☐
MSR C1 HP STM ISOL	1-M-2	1-HS-1-145A	☐
MSR A2 HP STM BYPASS ISOL	1-M-2	1-HS-1-235A	☐
MSR B2 HP STM BYPASS ISOL	1-M-2	1-HS-1-237A	☐
MSR C2 HP STM BYPASS ISOL	1-M-2	1-HS-1-239A	☐
MSR A1 HP STM BYPASS ISOL	1-M-2	1-HS-1-241A	☐
MSR B1 HP STM BYPASS ISOL	1-M-2	1-HS-1-243A	☐
MSR C1 HP STM BYPASS ISOL	1-M-2	1-HS-1-245A	☐

2. **CLOSE** the following HP steam warming valves:

MSR A1 WARMING LINE	1-M-2	1-HS-1-142	☐
MSR A2 WARMING LINE	1-M-2	1-HS-1-136	☐
MSR B1 WARMING LINE	1-M-2	1-HS-1-144	☐
MSR B2 WARMING LINE	1-M-2	1-HS-1-138	☐
MSR C1 WARMING LINE	1-M-2	1-HS-1-146	☐
MSR C2 WARMING LINE	1-M-2	1-HS-1-140	☐

3. **ENSURE** BOTH Steam Seal Supply valves in CLOSED position:
   a. 1-HS-47-180A, HP SEAL STEAM SUPPLY ISOL [1-M-2] ☐
   b. 1-HS-47-181A, HP SEAL STEAM SUPPLY BYPASS [1-M-2] ☐
4. **ENSURE** BOTH Steam Dump Control hand switches is in OFF RESET position:
   a. 1-HS-1-103A, STEAM DUMP FSV "A" [1-M-4] ☐
   b. 1-HS-1-103B, STEAM DUMP FSV "B" [1-M-4] ☐

WBN	STEAM GENERATOR TUBE RUPTURE	E-3 Rev 22

ATTACHMENT 3
(E-3)
Page 1 of 2

STEAMLINE ISOLATION (LOCAL)

1. **COORDINATE** steam isolation with RADPROT.
2. **CLOSE** at least one valve listed for each steam moisture trap manifold:

MSTR TRAP LEVEL SWITCH	MSTR TRAP STR ISOL		MSTR TRAP DRAIN ISOL		LOCATION
MAIN STEAM LINES					
200	1-ISV-1-916	☐	OR	1-ISV-1-922 ☐	T1M/708
201	1-ISV-1-926	☐	OR	1-ISV-1-932 ☐	T1M/708
202	1-ISV-1-936	☐	OR	1-ISV-1-942 ☐	T1M/708
203	1-ISV-1-946	☐	OR	1-ISV-1-952 ☐	T1M/708
COMMON STEAM HEADER					
204	1-ISV-1-956	☐	OR	1-ISV-1-962 ☐	T4J/708
206	1-ISV-1-966	☐	OR	1-ISV-1-972 ☐	T6J/708
STEAM DUMP HEADER					
207	1-ISV-1-976	☐	OR	1-ISV-1-982 ☐	T7H/708
208	1-ISV-1-986	☐	OR	1-ISV-1-992 ☐	T7G/708
209	1-ISV-1-996	☐	OR	1-ISV-1-1002 ☐	T7F/708

3. **CLOSE** steam supply isolation and bypass for each MFPT:

MFPT	NOMENCLATURE	LOCATION	POSITION	UNID	√
1A	MFPT 1A HP STEAM SUPPLY ISOL	T2J/729	CLOSED	1-ISV-1-611	☐
1A	MFPT 1A HP STEAM SUPPLY ISOL BYPASS	T2J/729	CLOSED	1-IBV-1-613	☐
1B	MFPT 1B HP STEAM SUPPLY ISOL	T2H/729	CLOSED	1-ISV-1-612	☐
1B	MFPT 1B HP STEAM SUPPLY ISOL BYPASS	T2H/729	CLOSED	1-IBV-1-614	☐

WBN	STEAM GENERATOR TUBE RUPTURE	E-3 Rev 22

ATTACHMENT 3
(E-3)
Page 2 of 2

STEAMLINE ISOLATION (LOCAL)

4. **IF** steamline warming is in progress,
   THEN

   CLOSE the following valves:

UNID	NOMENCLATURE	LOCATION	√
1-DRV-1-532	MAIN STEAM LOOP 3 WARMING VALVE DRAIN	NVR/729	☐
1-ISV-1-540	MAIN STEAM LOOP 3 MSTR TRAP ISOL	NVR/729	☐
1-DRV-1-534	MAIN STEAM LOOP 2 WARMING VALVE DRAIN	NVR/729	☐
1-ISV-1-541	MAIN STEAM LOOP 2 MSTR TRAP ISOL	NVR/729	☐
1-DRV-1-536	MAIN STEAM LOOP 1 WARMING VALVE DRAIN	SVR/729	☐
1-ISV-1-542	MAIN STEAM LOOP 1 MSTR TRAP ISOL	SVR/729	☐
1-DRV-1-538	MAIN STEAM LOOP 4 WARMING VALVE DRAIN	SVR/729	☐
1-ISV-1-543	MAIN STEAM LOOP 4 MSTR TRAP ISOL	SVR/729	☐

WBN	STEAM GENERATOR TUBE RUPTURE	E-3 Rev 22

APPENDIX D
(E-3)
Page 1 of 1

MINIMIZE SECONDARY SYSTEM CONTAMINATION

1. **PLACE** station sump pump handswitches to STOP [T9H/685].

2. **CLOSE** 0-ISV-40-1283, UNLINED HOLDING POND DISCHARGE TO YARD HOLDING POND [on dam between ponds].

3. **ALIGN** station sump discharge to unlined holding pond:
   a) **CLOSE** 0-ISV-40-970, CHEM CLEANING HDR TO LVWHP [north of LVWH pond].
   b) **CLOSE** 0-ISV-40-1281, CHEM HEADER ISOL TO LINED POND [north of lined pond].
   c) **OPEN** 0-ISV-40-1282, CHEM HEADER ISOL TO UNLINED POND [north of unlined pond].

4. **PLACE** station sump pump handswitches to AUTO.

5. **MINIMIZE** leakage or drainage into station sump:

   • Condensate and feedwater.

   • Cond DI effluent.

   • RCW or HPFP flushes.

SHIFT TURNOVER CHECKLIST
Page 1 of 2

SHIFT TURNOVER CHECKLIST 4

Page _____ of _____

- ☐ SM
- ☒ US/MCR Unit _____
- ☐ UO Unit _____
- ☐ AUO Station _____
- ☐ STA (STA Function)

Off-going - Name

On-coming - Name

Part 1 - Completed by off-going shift/Reviewed by on-coming shift:

- Abnormal equipment lineup/conditions:
  1A DG is out-of-service for planned maintenance on the air start system. Expected return to service in 8 hours. LCO 3.8.1.B was entered 2 hours ago. SR 3.8.1.1.was performed 25 minutes after LCO entry. The air start system problem has been isolated to the 1A DG. The National Weather Service has issued a Severe Thunderstorm Warning for Meigs, McMinn and Rhea Counties for the next 6 hours.

- SI/Test in progress/planned: (including need for new brief)

- Major Activities/Procedures in progress/planned:
  100% power, MOL. RCS boron is 747 ppm. Control Bank D is at 220 steps. Train A/Channel I Work Week. Reduce power to 95%, to remove the 1A CBP from service for scheduled maintenance on the lube oil system. Maintenance is scheduled to begin in 1 hour. Perform shutdown using GO-4, Section 5.3, "Unit Shutdown from 100% to 30% Reactor Power." GO-4 complete through Step 11. Reactor Engineering has provided a Reactivity Plan for the power maneuver.

- Radiological changes in plant during shift:
  None planned

Part 2 - Performed by on-coming shift

- ☐ A review of the Operating Log since last held shift or 3 days, whichever is less (N/A for AUOs)
- ☐ A review of the Rounds sheets/Abnormal readings (AUOs only)

Review the following programs for changes since last shift turnover:

- ☐ Standing Orders
- ☐ LCO(s) in actions (N/A for AUOs)
- ☐ PER review (N/A for AUOs)
- ☐ Immediate required reading
- ☐ TACF (N/A for AUOs)

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

- ☐ A walkdown of the MCR control boards (N/A for AUOs)

Relief Time: _____ Relief Date: _____

SHIFT TURNOVER CHECKLIST

SHIFT TURNOVER CHECKLIST

Page _____ of _____

- ☐ SM
- ☐ US/MCR Unit _____
- ☒ UO Unit _____
- ☐ AUO Station _____
- ☐ STA (STA Function)

Off-going - Name _____

On-coming - Name _____

Part 1 - Completed by off-going shift/Reviewed by on-coming shift:

- Abnormal equipment lineup/conditions:
  1A DG is out-of-service for planned maintenance on the air start system. Expected return to service in 8 hours. LCO 3.8.1.B was entered 2 hours ago. SR 3.8.1.1.was performed 25 minutes after LCO entry. The air start system problem has been isolated to the 1A DG. The National Weather Service has issued a Severe Thunderstorm Warning for Meigs, McMinn and Rhea Counties for the next 6 hours.

- SI/Test in progress/planned: (including need for new brief)

- Major Activities/Procedures in progress/planned:
  100% power, MOL. RCS boron is 747 ppm. Control Bank D is at 220 steps. Train A/Channel I Work Week. Reduce power to 95%, to remove the 1A CBP from service for scheduled maintenance on the lube oil system. Maintenance is scheduled to begin in 1 hour. Perform shutdown using GO-4, Section 5.3, "Unit Shutdown from 100% to 30% Reactor Power." GO-4 complete through Step 11. Reactor Engineering has provided a Reactivity Plan for the power maneuver.

- Radiological changes in plant during shift:

Part 2 - Performed by on-coming shift

- ☐ A review of the Operating Log since last held shift or 3 days, whichever is less (N/A for AUOs)
- ☐ A review of the Rounds sheets/Abnormal readings (AUOs only)

Review the following programs for changes since last shift turnover:

- ☐ Standing Orders
- ☐ Immediate required reading
- ☐ LCO(s) in actions (N/A for AUOs)
- ☐ TACF (N/A for AUOs)
- ☐ PER review (N/A for AUOs)

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

- ☐ A walkdown of the MCR control boards (N/A for AUOs)

Relief Time: _____ Relief Date: _____

Appendix A
(Page 1 of 1)
Reactivity Control Plan (Example Form)

Station: WBN Unit: 1 Cycle: 10 Burnup: 10,000 MWD/MTU Revision: 0

Preparer: _____/_____ Reviewer: _____/_____
/ Date RXE / Date

Approver: _____/_____ Authorizer: _____/_____
RXES or designee / Date Ops / Date

RXE support required Onsite? ☑Yes ☐No Describe: _____

Title of Reactivity Control Plan: **Ramp to 95%, 8 hr Hold, Return to 100% (MOL)**

Assumptions:
1. Calculated volumes below assume Tave maintained on Tref.
2. Reactor is stable at 100% RTP.
3. Conditioned power level will not become less than 100%.

Major Steps:
1. **Ramp** down to 95% at 10%/hr.
2. **Hold reactor at 95% for 8 hours.**
3. **Ramp up to 100% at 5%/hr.**
3. **Maintain** power at **100%**.

Detailed Description:

NOTE: See attached plots.
NOTE: Allowing Tave drift will typically reduce the total amount of necessary boration and dilution.
NOTE: Use BEACONDH ICS Screen so long as DOGHOUSE ICS Screen shows AFD is within the +/- 3% band.

RAMP DOWN TO 95%

1. **BORATE** ~**100** gal of **BA**.
2. **INSERT** CBD to ~**207** steps to control AFD on target.

HOLD AT 95%

1. **DILUTE** ~**500** gal of **PW**.
2. **MAINTAIN** CBD at ~**207** steps to control AFD on target.

RAMP UP TO 100%

1. **DILUTE** ~**500** gal PW.
2. **WITHDRAW** CBD to ~**220** steps to control AFD on target.

Ramp to 95%, 8 hr Hold, Return to 100% (MOL)

MAINTAIN POWER AT 100%

1. **BORATE 60 gal BA** to account for Xenon burn-out.
2. **DILUTE 1000 gal PW** to account for Xenon build-in. See attached plots.
3. **WITHDRAW AND MAINTAIN** CBD at ~**220** steps to control AFD on target.

Critical Parameter	Limit	Required Action
Control Rod Height	> RIL Lo	**If** rods < RIL Lo, **then ENSURE** RCS borated amount specified in Step 1 **and WITHDRAW** rods.

Activated: _____/_____ Terminated: _____/_____
SM or US / Date SM or US / Date

Facility: **Watts Bar NRC Exam 1 August 2010** Scenario No.: **5** Op Test No.: **1**

Examiners: _____ Operators: _____ **SRO**

_____ _____ **RO**

_____ _____ **BOP**

Initial Conditions: 100% power, MOL. RCS boron concentration is 747 ppm. Control Bank D is at 220 steps.

Turnover: Window 23-A, TURB/GEN VIBRATION HI/HI-HI is lit. Bearing 9 indicates 10.1 mils, and Bearing 10 indicates 9.0 mils. Operations Management and System Engineering have met, and directed that a power reduction to 90% at 2% per minute using AOI-39, "Rapid Load Reduction" be conducted as soon as shift relief and turnover is complete. A-A ERCW pump is out of service for motor bearing replacement. Pump has been out of service for 4 hours. Expected to be returned to service in 16 hours.

Event No.	Malf. No.	Event Type*	Event Description
1	n/a	N-BOP R-RO	Power reduction to reduce main turbine vibration.
2	ni07b	I-RO TS-SRO	Power Range Monitor N42 fails high, requiring entry into AOI-4, Nuclear Instrumentation Malfunctions," and a Tech Spec evaluation.
3	fw03c rd09 rp03	C-RO C-BOP	#3 heater drain pump 1C trips on instantaneous overcurrent. Turbine runback fails and rods fail to move in auto, Requires the RO to take manual control of rod control, and the BOP to manually drop load, Requires entry into AOI-2, "Malfunction of Reactor Control System."
4	rw16b	C-BOP TS-SRO	B-A ERCW pump trips on instantaneous overcurrent. Requires entry into AOI-13,"Loss of Essential Raw Cooling Water. Requires a Tech Spec evaluation.
5	ch27c	C-BOP TS-SRO	C-A Lower Compartment Cooler trips. Requires entry into ARI 138-E, Panel M-9 Motor Tripout. Requires Tech Requirement evaluation.
6	ms02d	M-All	Main Steam Line Break outside containment.
7	ms04a, ms04b, ms04c, ms04d	C-BOP	#1, 2, and 3 Main Steam isolation valves fail to close in AUTO. After operator is dispatched to perform E-2, "Faulted Steam Generator Isolation," Attachment 1, MSIVs will close. ***Closure will not occur until ECA-2.1 is entered.*** #4 Main Steam isolation valve fails to close in AUTO. Manual isolation of #4 MSIV ***is not successful*** throughout the scenario.

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

Scenario 5 - Summary

Initial Condition	Train A/Channel III Work Week. 100% power, MOL. RCS boron concentration is 747 ppm. Control Bank D is at 220 steps.

Turnover	Window 23-A, TURB/GEN VIBRATION HI/HI-HI is lit. Bearing 9 indicates 10.1 mils, and Bearing 10 indicates 9.0 mils. Operations Management and System Engineering have met, and directed that a power reduction to 90% at 2% per minute using AOI-39, "Rapid Load Reduction" be conducted as soon as shift relief and turnover is complete. 1A Containment Spray Pump is out of service for motor bearing replacement. Pump has been out of service for 4 hours. Expected to be returned to service in 16 hours.

Event 1	Power reduction to reduce main turbine vibration. During power reduction, vibrations are reduced.
Event 2	Power Range Monitor N42 fails high. The RO responds by placing rod control in manual and stabilizing the plant. The SRO enters and directs actions using AOI-4, "Nuclear Instrumentation Malfunctions." The SRO evaluates Tech Specs and enters LCO 3.3.1, Reactor Trip System (RTS) Instrumentation, Conditions D, E, W, R, and S. Determines LCO 3.2.4 Quadrant Power Tilt Ratio (QPTR) Surveillance 3.2.4.2 is applicable.
Event 3	#3 heater drain pump 1C trips on instantaneous overcurrent. Turbine runback fails and rods fail to move in auto, Requires the RO to take manual control of rod control, and the BOP to manually drop load, Requires entry into AOI-2, "Malfunction of Reactor Control System."
Event 4	B-A ERCW pump trips on instantaneous overcurrent. Requires entry into AOI-13,"Loss of Essential Raw Cooling Water," Sub Section 3.2, "Loss of ERCW Pump." The SRO evaluates Tech Specs and enters 3.7.8, Essential Raw Cooling Water (ERCW) System.
Event 5	C-A Lower Compartment Cooler trips. The operator will enter into ARI 138-E, Panel M-9 Motor Tripout. The SRO will direct the BOP to start another lower compartment cooler to stop the rise in containment temperature. The SRO evaluates Tech Requirements and enters TR 3.6.3, Lower Compartment Cooling (LCC) System, Condition A.
Event 6	Main steam line break occurs on Loop 2 steam line outside containment. The SRO enters AOI-38,"Main Steam or Feedwater Line Leak." Reports from outside the control room state that there is a large steam leak outside the roll-up doors at the Service Bay. The SRO orders a reactor trip and MSIV closure. E-0, "Reactor Trip or Safety Injection is entered.
Event 7	#1, 2, and 3 Main Steam isolation valves fail to close in AUTO. After operator is dispatched to perform E-2, "Faulted Steam Generator Isolation," Attachment 1, MSIVs will close. ***Closure will not occur until ECA-2.1 Step 5 is performed.*** #4 Main Steam isolation valve fails to close in AUTO. Manual isolation of #4 MSIV ***is not successful*** throughout the scenario.

Scenario 5 - Critical Task Summary

Critical Task 1 *from WOG Critical Task List, ECA-2.1, A.*	*Control the AFW flow rate to minimum detectable flow to each SG in order to minimize the RCS cooldown rate before FR-P.1, "Pressurized Thermal Shock," Critical Safety Function Status Tree develops an ORANGE PATH condition.* *If feed flow to a SG is isolated and the SG is allowed to dry out, subsequent reinitiation of feed flow to the SG could create significant thermal stress conditions on SG components. Maintaining a minimum verifiable feed flow to the SG allows the components to remain in a "wet" condition, thereby minimizing any thermal shock effects if feed flow is later increased.*
Critical Task 2 *From WOG Critical Task List for E-2, A*	*Isolate the faulted SG before transition out of E-2.* *Isolation of the feedwater to the faulted SG maximizes the cooldown capability of the non-faulted loops following a feedline break and minimizes the RCS cooldown and mass and energy release following a steamline break. Isolation of steam paths from the faulted SG also minimizes the RCS cooldown and mass and energy release to containment. In addition, isolation of these steam paths could isolate the break.* *Transition is made from ECA-2.1 back to E-2 when MSIVs are closed for three of four SGs.*
Critical Task 3	*Establish secondary heat sink (return AFW flow to intact SGs greater than 410 gpm) to meet SI termination criteria prior to entering ES-1.1.* *During performance of ECA-2.1, flow had been reduced to "minimum detectable flow" to minimize the RCS cooldown. Flow must be manually reestablished in order meet secondary heat sink requirements and allow SI termination.*

Op Test No.: NRC Scenario # 5 Event # 1 Page 1 of 51

Event Description: Power reduction to reduce main turbine vibration. During power reduction, vibrations are reduced.

Time	Position	Applicant's Actions or Behavior
EXAMINER: The following actions are from AOI-39, "Rapid Load Reduction," Section 3.2, "Power Reduction From Greater than 50% Power."		
CAUTION Condenser Backpressure limits are on previous page.		
CAUTION TURBINE MANUAL Operation requires continuous operator monitoring and control.		
CAUTION LOSS OF CONDENSER VACUUM may be made worse if steam dumps are actuated. AOI-11 requires T-ave and T-ref be maintained within 3°F.		
NOTE If the initiating condition is corrected, the power reduction may be terminated.		
	SRO RO	1. **ESTABLISH** a turbine load reduction rate less than or equal to 5%/min: a. **PLACE** turbine in IMP IN b. **SET** a desired load in the SETTER with the REFERENCE CONTROL. c. **SET** the LOAD RATE at less than or equal to 5%/min. d. **DEPRESS** GO pushbutton.
EXAMINER: AS load is reduced, the turbine vibrations will improve (drop from their initial values.)		
CAUTION	Over boration may result in excessive rod withdrawal or Tavg lower than desired for at power conditions.	
NOTE	• Rod Control should remain in automatic for Tavg Control • Reactivity Briefing Sheet, "Thumb Rules" (page 3), lists boration flows and volumes for different reduction rates. • Effect of boration will lag behind turbine load reduction and can be compensated for by temporarily increasing boric acid flow rate above recommended rate.	
	RO	**2. INITIATE** a manual boration: a. DETERMINE recommended boration flow rate and volume from Reactivity Briefing Sheet: b. INITIATE normal boration: 1) ADJUST BA flow controller, 1-FC-62-139, to desired flow rate. 2) ADJUST BA batch counter 1-FQ-62-139 to required quantity. 3) PLACE mode selector 1-HS-62-140B to BOR. 4) PLACE VCT makeup control 1-HS-62-140A, to START. 5) VERIFY desired boric acid flow indicated on 1-FI-62-139.
EXAMINER: The following actions are taken from SOI-62.02,"Boron Concentration Control,"Section 6.7, "Minor Boration."		

Op Test No.: NRC Scenario # 5 Event # 1 Page 2 of 51

Event Description: Power reduction to reduce main turbine vibration. During power reduction, vibrations are reduced.

Time	Position	Applicant's Actions or Behavior
NOTES		
1) Section 6.7, may be reproduced, laminated, displayed, reused, etc. as desired.		
2) Minor Boration is defined as the addition of Boric Acid done several times each shift early in core life, to compensate for burnable poison burn-up, and maintain Tavg on program.		
	RO	[1] **ENSURE** 1-HS-68-341H, BACKUP HEATER C [1-M-4], is ON to equalize RCS-Pzr CB.
	RO	[2] **ADJUST** 1-FC-62-139, BA TO BLENDER [1-M-6], for desired flow rate.
	RO	[3] **ADJUST** 1-FQ-62-139, BA BATCH COUNTER [1-M-6], for required quantity.
	RO	[4] **PLACE** 1-HS-62-140B, VCT MAKEUP MODE [1-M-6], in BOR.
	RO	[5] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL [1-M-6], to START. [5.1] **CHECK** Red light is LIT.
	RO	[6] **MONITOR** the following parameters:

Instrument	Location	Parameters
1-PI-62-122	1-M-6	VCT PRESS
1-LI-62-129A	1-M-6	VCT LEVEL
1-FI-62-139	1-M-6	BA TO BLENDER FLOW
1-FQ-62-139	1-M-6	BA BATCH COUNTER
1-FI-62-142	1-M-6	PW TO BLENDER FLOW
1-FQ-62-142	1-M-6	PW BATCH COUNTER
1-LI-62-238	1-M-6	BAT A LEVEL
1-LI-62-242	1-M-6	BAT C LEVEL

	RO	[7] **WHEN** Boration is COMPLETE, **THEN** **PLACE** 1-HS-62-140B, VCT MAKEUP MODE, in AUTO.
	RO	[8] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL, to START. [8.1] **CHECK** Red light is LIT.
	RO	[9] **RETURN** 1-FC-62-139, BA TO BLENDER [1-M-6], to desired flow rate.
EXAMINER: The following actions are from AOI-39, "Rapid Load Reduction," Section 3.2, "Power Reduction From Greater than 50% Power."		
NOTE AFD green target band can be monitored using ICS Turn On code DOGHOUSE.		
	RO	**3. MONITOR** rod position: • Rods above Lo-Lo insertion limit • AFD within Target Band

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Event Description: Power reduction to reduce main turbine vibration. During power reduction, vibrations are reduced.

Time	Position	Applicant's Actions or Behavior
	SRO	**4. REFER** to EPIP-1, Emergency Plan Classification Flowchart. ***EXAMINER: Step is N/A for given conditions.***
	SRO	**5. NOTIFY** the Load Coordinator of the required load reduction and expected ramp rate.
NOTE If reactor power is stabilized at a lower level a drop in Tavg will occur due to Xenon build up. Dilution may be required to maintain power level.		
	SRO RO	**6. MONITOR** Tavg and Tref: ▪ Tavg trending to Tref. ▪ Mismatch less than 5°F.
	SRO	**7. CHECK** rate of power reduction is rapid enough for existing plant conditions.
	SRO	**8. NOTIFY** Cnds Demin AUO of impending pmp shutdowns.
	SRO	**9. WHEN** rated thermal power change exceeds 15% in one hour, **NOTIFY** Chemistry to initiate 1-SI-68-128.
EXAMINER: Further steps of AOI-39, "Rapid Power Reduction" are not included, since the crew will only reduce power to 90%, and the remainder of AOI-39 steps are power level dependent. Simulator Operator enters Event 2.		
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	SRO	**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).
Cue Simulator Operator to insert Event 2 after load reduction is complete.		

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Event Description: Power Range Monitor N42 fails high

Time	Position	Applicant's Actions or Behavior
Indications: 83-A POWER RANGE OPERPOWER ROD WD STOP 83-D PLANT COMPUTER GENERATED ALARM (SEE ICS) 83-E POWER RANGE CHANNEL DEVIATION 90-B PZR PRESS LO-DEVN BACKUP HTRS ON 115-C POWER RANGE FLUX HI 115-E POWER RANGE FLUX RATE HI Control rods inserting at 72 steps per minute.		
	RO	Diagnoses and announces Power Range N42 Failure.
	RO	May place rods in MANUAL after determining that there is no secondary runback in progress.
	BOP	May place SG 2 and 3 feedwater regulating valves in MANUAL.
	SRO	Enter and direct actions of AOI-4, "Nuclear Instrumentation Malfunctions," Section 3.4, "Power Range Monitor Malfunction."
EXAMINER: The following actions are taken from AOI-4, "Nuclear Instrumentation Malfunctions," Section 3.4, "Power Range Monitor Malfunction."		
	RO	1. **PLACE** control rods in MANUAL.
	RO	2. **CHECK** rod motion STOPPED.
	RO	3. **CHECK** N41 Normal
	RO	4. **CHECK** N42 Normal
	BOP	4. **<u>RESPONSE NOT OBTAINED:</u>** **PLACE** S/G 2 and S/G 3 Main FW reg valves in MANUAL. **PLACE** all Bypass FW reg valves in MANUAL. **ADJUST** FW as required to maintain S/G levels on program. **PLACE** S/G 1 and S/G 4 LEVEL – NIS BIAS controllers in MANUAL. **MATCH** bias controllers to demand output on S/Gs 1 and 4.
	RO	5. **CHECK** N43 and N44 NORMAL
	BOP	6. **IF** Main FW reg valves controlling S/G level, **THEN:** a. **ENSURE** S/G Main FW reg valve level demand and level are matched. b. **PLACE** affected S/G Main FW reg valves in AUTO.
NOTE Control rod withdrawal may not be possible if a PRM has failed high due to the 103% Rod Withdrawl Stop (C-2) (Annunciator window 83-A).		
	RO	7. **MAINTAIN** T-avg and T-ref within 3°.

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Event Description: Power Range Monitor N42 fails high

Time	Position	Applicant's Actions or Behavior
	RO	8. **ENSURE** 1-NR-92-145 recording an operable power range channel.
NOTE Inputs to 1-TR-68-2A include power range monitor, pressurizer pressure, ΔT and Tavg. Selection of an operable channel should consider other failures in addition to the failed power range monitor channel.		
	RO	9. **ENSURE** 1-TR-68-2A placed to operable ΔT/OTΔT/OPΔT channel using 1-XS-68-2B, ΔT RCDR TR-68-2A LOOP SELECT [1-M-5].
	SRO	10. **DEFEAT** affected PRM functions: • **REFER TO** Attachment 1, PRM Function At NIS Rack.
EXAMINER: The following actions are taken from AOI-4, Nuclear Instrumentation Malfunctions," Attachment 1, "PRM Function At NIS Rack."		
NOTE The following annunciators may be affected by defeating a PRM channel: • [66-C, 67-C, 68-C, 69-C] N-(#) OVERPOWER ROD STOP BYPASSED. • [82-E] NIS CHANNEL IN TEST. • [83-A] POWER RANGE OVERPOWER ROD WD STOP. • [83-E] POWER RANGE CHANNEL DEVIATION. • [115-C] POWER RANGE FLUX HI. • [115-E] POWER RANGE FLUX RATE HI.		
	RO	A. **PERFORM** the following steps for the affected PRM: 1. **PLACE** DETECTOR CURRENT COMPARATOR switch for UPPER SECTION to failed channel. (N42) 2. **PLACE** DETECTOR CURRENT COMPARATOR switch for LOWER SECTION to failed channel. (N42)
NOTE On the following step, annunciator window 83-A, POWER RANGE OVERPOWER ROD WD STOP will clear (if channel failure was high) and window 66-C, 67-C, 68-C OR 69-C, N-(#) OVERPOWER ROD STOP BYPASSED, will come into alarm depending on which channel is bypassed.		
	RO	3. **PLACE** ROD STOP BYPASS switch to failed channel. (N42)
	RO	4. **PLACE** POWER MISMATCH BYPASS switch to failed channel. (N42)
NOTE On the following step, annunciator window 83-E, POWER RANGE CHANNEL DEVIATION, will clear and annunciator window 82-E, NIS CHANNEL IN TEST, will come into alarm.		
	RO	5. **PLACE** COMPARATOR CHANNEL DEFEAT switch to failed channel. (N42)

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Event Description: Power Range Monitor N42 fails high

Time	Position	Applicant's Actions or Behavior
NOTE On the following step, annunciator window 115-E, POWER RANGE FLUX RATE HI, will clear if the positive rate trip light is LIT.		
	RO	6. **IF** POSITIVE RATE TRIP is LIT, **THEN RESET** RATE MODE switch.
EXAMINER: The following actions are taken from AOI-4, "Nuclear Instrumentation Malfunctions," Section 3.4, "Power Range Monitor malfunction," at Step 11.		
	SRO	11. **IF** Bypass FW reg. valves are in MANUAL **AND** controlling S/G level, **THEN:** ***Determines that the step is not applicable, and continues to the next step.***
	SRO	12. **WHEN** failed PRM defeated **AND** AUTO rod control desired, **THEN:** a. **ENSURE** T-avg and T-ref within 1°. b. **ENSURE** zero demand on control rod position indication [1-M-4]. c. **PLACE** control rods in AUTO.
	SRO	13. **INITIATE** repairs on failed channel.
	SRO	14. **NOTIFY** Work Control to have IM trip failed channel bistables.
CAUTION Power fuses should not be removed during the performance of IMI-160 until affected S/G level controls are in manual at either the SG LEVEL - NIS BIAS controller(s) or the Main FW reg valve controllers.		
	SRO	15. **WHEN** notified bistables are tripped, **THEN CHECK** lights and alarms referenced in Appendix A are LIT. ***Determines that conditions of the step are not met and continues to the next step.***

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Event Description: Power Range Monitor N42 fails high

Time	Position	Applicant's Actions or Behavior
	SRO	16. **REFER TO** Tech Specs: 3.3.1-1, "Rx Trip System (RTS)" 2.a. Power Range Neutron Flux - High ***Condition D. One Power Range Neutron Flux-High channel inoperable. Place channel in trip within 72 hours AND Reduce THERMAL POWER to ≤ 75% RTP within 78 hours; OR Place channel in trip within 72 hours AND Perform SR 3.2.4.2 every 12 hours OR be in Mode 3 within 78 hours.*** 3.a. Power Range Neutron Flux Rate - High Positive Rate ***Condition E. With one channel inoperable, place the channel in trip within 72 hours OR be in Mode 3 in 78 hours.*** 6. Overtemperature ΔT ***Condition W. Place channel in trip within 72 hours OR be in Mode 3 within 78 hours.*** ***EXAMINER: P-7 remains operable.*** 16.c. Power Range Neutron Flux, P-8 ***Condition S. With ONE channel inoperable, verify the interlock is in required state for existing unit conditions within 1 hour OR be in Mode 2 within 7 hours.*** 16.d. Power Range Neutron Flux, P-9 ***Condition S. With ONE channel inoperable, verify the interlock is in required state for existing unit conditions within 1 hour OR be in Mode 2 within 7 hours.*** 16.e. Power Range Neutron Flux, P-10 ***Condition R. With ONE channel inoperable, verify the interlock is in required state for existing unit conditions within 1 hour OR be in Mode 3 within 7 hours.*** ***3.2.4 Quadrant Power Tilt Ratio (QPTR).*** ***SR 3.2.4.2 Verify QPTR is within limit using the movable incore detectors, once within 12 hours AND 12 hours thereafter.***
	SRO	17. **NOTIFY** Operations Duty Manager and Rx Engineering of failed channel.
	SRO	18. **DO NOT CONTINUE** with this Instruction UNTIL failed PRM repair is completed.
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.

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Event Description: Power Range Monitor N42 fails high

Time	Position	Applicant's Actions or Behavior
	SRO	**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).
Cue Simulator Operator to insert Event 3 AFTER rod control has been returned to AUTOMATIC.		

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Event Description: #3 heater drain pump 1C trips on instantaneous overcurrent. During load reduction/turbine runback, turbine runback fails to occur and rods fail to move in auto,

Time	Position	Applicant's Actions or Behavior
Indications: 14-E 1-M-1 THRU 1-M-6 MOTOR TRIPOUT 29-E #3 HD TANK LEVEL HI/LO 30-E #3 HD TANK BYP TO CONDENSER OPEN		
	BOP	Diagnoses and announces 1C #3 heater drain tank pump trip.
	SRO	May enter and direct actions of AOI-39, "Rapid Load Reduction," to reduce load to within secondary pump capabilities.
	SRO	May enter and direct actions of AOI-37, "Turbine Runback Response," if actions taken to reduce load are delayed.
EXAMINER: The following actions are taken from ARI 14-E, "		
	BOP	**[1] DETERMINE** what equipment tripped.
	BOP	**[2] PLACE** control switch for tripped equipment in OFF.
	BOP	**[3] START** spare equipment as needed.
	SRO	**[4] ADJUST** plant conditions as necessary to compensate for equipment affected.
	SRO	**[5] REFER TO** Tech Specs for operability requirements of affected equipment.
EXAMINER: The following actions are taken from 29-E,"#3 HD TANK LEVEL HI/LO."		
	BOP	**[1] DISPATCH** Operator to determine tank level by sightglass/indicator.
	BOP	**[2] IF** greater than 85% turbine load and all of the following exist, **THEN GO TO** AOI-37, Turbine Runback Response. • 1-LIS-6-26 indicates > 79% level • Low #3HDT pump flow (10,000 gpm)
	BOP	**[3] If** HI/LO tank level alarm due to level control failure, **THEN PLACE** 1-LIC-6-105 and/or 1-LIC-6-106 in MANUAL AND **RESTORE** level to normal using sightglass/level indicator.
NOTE Any #3 HDT pump NOT running with turbine load 85% will place 1-HIC-6-106 in service to position 1-LCV-6-106A at approximately 56% open, indicated by a blue light which will illuminate on the local panel above the 1-LCV-6-106A RESET button. The RESET button must be pushed to allow normal valve control prior to raising load when all pumps are available. The blue light should go out when the circuit is reset. SOI-5&6.01 may be referenced for instructions on resetting LCV 6-106A, and transferring control from 1-HIC-6-1-106A back to 1-LIC-6-106.		

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Event Description: #3 heater drain pump 1C trips on instantaneous overcurrent. During load reduction/turbine runback, turbine runback fails to occur and rods fail to move in auto,

Time	Position	Applicant's Actions or Behavior
	BOP	**[4] IF** level is high, **THEN** **[a] VERIFY** 1-LCV-6-106A **OPEN.** **[b] IF** 1-LCV-6-106A is throttled, **THEN RESET** 1-LCV-6-106A per SOI-5 & 6.01, Extraction Steam, Heater Drains And Vent System. **[c] VERIFY** 1-LCV-6-105A and -105B **OPEN.** **[d] CHECK** #3 Heater Drain Pumps operation. **[e] IF** #3 Heater Drain Pump (s) tripped, **THEN REFER TO** SOI-5 & 6.01, Extraction Steam, Heater Drains And Vent System for pump restart and system restoration.
	BOP	**[5] IF level is low, THEN** **[a] VERIFY 1-LCV-6-106A CLOSED.** **[b] VERIFY 1-LCV-6-105A and -105B CLOSED.**
	SRO	**[6] NOTIFY Work Control to initiate corrective action, if necessary.**
EXAMINER: The following action are taken from ARI 30-E, "#3 HD TANK BYP TO CONDENSER OPEN."		
	BOP	**[1] VERIFY** either 1-LCV-6-105A or -105B open by indicating lights on 1-XX-6-1 [1-M-2].
	BOP	**[2] IF** Turbine load greater than 85% and 1-LCV-6-105B full open, **THEN GO TO** AOI-37, Turbine Runback Response.
	SRO	**[3] IF** Turbine load less than 85%, **THEN PERFORM** the following, **[a] IF** system alignment normal (i.e. pumping forward) **THEN DISPATCH** Operator to determine cause of problem, and **PERFORM** the following: **[1] VERIFY** 1-LCV -6-106A **OPEN.** **[2] IF** 1-LCV-6-106A is throttled, **THEN RESET** 1-LCV-6-106A per SOI-5 & 6.01, Extraction Steam, Heater Drains And Vent System. **[b] CHECK** #3 Heater Drain Pumps operation. **[c] IF** #3 Heater Drain Pump(s) tripped, **THEN REFER TO** SOI-5 & 6.01, Extraction Steam, Heater Drains And Vent System, for pump restart and system restoration.
	SRO	**[4] NOTIFY** Work Control to initiate corrective action, if necessary.
EXAMINER: Since a load reduction was in progress using AOI-39, "Rapid Load Reduction," the SRO may direct the BOP to continue to drop load by repeating AOI-39, Step 1.		
CAUTION Condenser Backpressure limits are on previous page.		

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Event Description: #3 heater drain pump 1C trips on instantaneous overcurrent. During load reduction/turbine runback, turbine runback fails to occur and rods fail to move in auto,

Time	Position	Applicant's Actions or Behavior
CAUTION TURBINE MANUAL Operation requires continuous operator monitoring and control.		
CAUTION LOSS OF CONDENSER VACUUM may be made worse if steam dumps are actuated. AOI-11 requires T-ave and T-ref be maintained within 3°F.		
NOTE If the initiating condition is corrected, the power reduction may be terminated.		
	SRO RO	1. **ESTABLISH** a turbine load reduction rate less than or equal to 5%/min: a. **PLACE** turbine in IMP IN b. **SET** a desired load in the SETTER with the REFERENCE CONTROL. c. **SET** the LOAD RATE at less than or equal to 5%/min. d. **DEPRESS** GO pushbutton.
CAUTION	Over boration may result in excessive rod withdrawal or Tavg lower than desired for at power conditions.	
NOTE	• Rod Control should remain in automatic for Tavg Control • Reactivity Briefing Sheet, "Thumb Rules" (page 3), lists boration flows and volumes for different reduction rates. • Effect of boration will lag behind turbine load reduction and can be compensated for by temporarily increasing boric acid flow rate above recommended rate.	
	RO	**2. INITIATE** a manual boration: a. DETERMINE recommended boration flow rate and volume from Reactivity Briefing Sheet: b. INITIATE normal boration: 1) ADJUST BA flow controller, 1-FC-62-139, to desired flow rate. 2) ADJUST BA batch counter 1-FQ-62-139 to required quantity. 3) PLACE mode selector 1-HS-62-140B to BOR. 4) PLACE VCT makeup control 1-HS-62-140A, to START. 5) VERIFY desired boric acid flow indicated on 1-FI-62-139.
NOTE AFD green target band can be monitored using ICS Turn On code DOGHOUSE.		
	RO	**3. MONITOR** rod position: • Rods above Lo-Lo insertion limit • AFD within Target Band
	SRO	**4. REFER** to EPIP-1, Emergency Plan Classification Flowchart. ***Step is N/A for given conditions.***
	SRO	**5. NOTIFY** the Load Coordinator of the required load reduction and expected ramp rate.

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Event Description: #3 heater drain pump 1C trips on instantaneous overcurrent. During load reduction/turbine runback, turbine runback fails to occur and rods fail to move in auto,

Time	Position	Applicant's Actions or Behavior
NOTE If reactor power is stabilized at a lower level a drop in Tavg will occur due to Xenon build up. Dilution may be required to maintain power level.		
	SRO RO	**6. MONITOR** Tavg and Tref: ▪ Tavg trending to Tref. ▪ Mismatch less than 5°F.
	SRO	**7. CHECK** rate of power reduction is rapid enough for existing plant conditions.
	SRO	**8. NOTIFY** Cnds Demin AUO of impending pmp shutdowns.
	SRO	**9. WHEN** rated thermal power change exceeds 15% in one hour, **NOTIFY** Chemistry to initiate 1-SI-68-128.
EXAMINER: The following actions are taken from AOI-37,"Turbine Runback Response," which will be implemented if the load reduction is not successful in stabilizing the secondary plant prior to the runback logic being satisfied.		
	BOP	1. **ENSURE** BOP runback to less than or equal to 1000 MW (85%) turbine load. ***Automatic runback fails to occur, requiring the BOP to use the Valve Position Limit pushbutton to drop turbine load.***
	RO	2. **ENSURE** T-avg and T-ref within 3°F. ***Since the rod control system is not responding in automatic, the RO must manually insert control rods during the load reduction.***
	BOP	3. **ENSURE** at least two #3 HDT pumps RUNNING **WITH ADEQUATE** flow to maintain S/G levels.
	BOP	4. **MONITOR** the following to determine if main turbine free of water induction: • HTR level alarms. • Turbine vibration. • Turbine Metal Temperature ICS points T2609A-T2611A and T2060A-T2062A.
	RO	5. **MONITOR** AFD within the limits of LCO 3.2.3.
	BOP	6. **ENSURE** S/G levels return to program.

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Event Description: #3 heater drain pump 1C trips on instantaneous overcurrent. During load reduction/turbine runback, turbine runback fails to occur and rods fail to move in auto,

Time	Position	Applicant's Actions or Behavior
	BOP	7. **DISPATCH** personnel to check the following to determine cause of #3 HDT high level: • #3 HDT level, flow & controls. • #2 FW heater level. • 1-LCV-6-106A, #3 HDT level control [T2D/708 in valve pit]. • #3 HDT pump cavitation control 1-HS-6-106A, NOT reset [T1D/708 on west wall].
	SRO	8. **ENSURE** condensate system pumps in service as unit load requires: • **REFER TO** GO-4, Normal Power Operation.
	SRO	9. **IF** reactor power dropped by greater than or equal to 15% in one hour, **THEN NOTIFY** Chemistry to initiate power change sampling requirements.
	SRO	10. **REFER TO** SOI-5 & 6.01, Extraction Steam, Heater Drains, and Vent System to adjust #3 HDT LEVEL and reset pump cavitation control 1-HS-6-106A as necessary.
	BOP	11. **CHECK** VALVE POS LIMIT light LIT
	BOP	12. **RETURN** valve position limiter to normal a. **ENSURE** turbine in IMP OUT b. **REDUCE** turbine load using REFERENCE CONTROL ∇ (lower) AND GO button until VALVE POS LIMIT light not LIT, c. **RETURN** valve position limiter to normal.
	BOP	13. **IF** C-7 LOSS OF LOAD STM DUMP INTERLOCK annunciator LIT [66E], **THEN** a. **VERIFY** steam dump valves have zero demand. b. **RESET** loss-of-load interlock with steam dump mode switch (1-HS-1-103D)
	SRO	14. **INITIATE** repairs to failed equipment.
	SRO	15. **RETURN TO** Instruction in effect.

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Event Description: #3 heater drain pump 1C trips on instantaneous overcurrent. During load reduction/turbine runback, turbine runback fails to occur and rods fail to move in auto,

Time	Position	Applicant's Actions or Behavior
Indications: Control rods fail to insert in AUTO during the load reduction.		
	RO	Diagnoses and announces failure of control rods to insert in AUTO. May take manual control of rods and insert rods in response to the load reduction for the loss of the 1C #3 heater drain tank pump.
	SRO	May enter and direct actions of AOI-2, "Malfunction of Reactor Control System."
EXAMINER: The following actions are taken from AOI-2,"Malfunction of Reactor Control System," Section 3.6, "Failure of Control Rods to Move on Demand."		
	RO	1. **CHECK** CONTROL ROD URGENT alarm LIT [86-A].
	SRO	1. **RESPONSE NOT OBTAINED:** **IF** CONTROL ROD URGENT FAILURE alarm DARK, **THEN PLACE** control rods in MAN, AND ** **GO TO** NOTE prior to Step 16. ***The control rods may have been placed in MANUAL upon recognition of the failure of the AUTO function.***
NOTE Steps 16, 17 and 18 are to be performed for control rod problems other than Urgent Failures.		
	RO	16. **CHECK** for the C-5 LOW TURB IMPULSE PRESS ROD BLOCK [66-A] Alarm window DARK.
	RO	17. **CHECK** for the following rod stop alarm windows DARK: • INTERMED RANGE HI FLUX ROD WD STOP [82-B]. • POWER RANGE OVERPOWER ROD WD STOP [83-A]. • C-11 BANK D AUTO WITHDRAWAL BLOCKED [64-F]. • OVERPOWER ΔT TURB RUNBACK & C-4 ROD BLOCK [122-D]. • OVERTEMP ΔT TURB RUNBACK & C-3 ROD BLOCK [123-D].
	SRO	18. **IF** rod stop alarms are clear **AND** control rods will move in manual, **THEN**: a. **ENSURE** T-avg and T-ref within 3°F. b. **INITIATE** repairs to auto rod control system.
CAUTION Allowing at least 5 minutes between any rod control input (i.e., T-avg, T-ref, or NIS) change and placing rods in AUTO, will help prevent undesired control rod movement.		

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Event Description: #3 heater drain pump 1C trips on instantaneous overcurrent. During load reduction/turbine runback, turbine runback fails to occur and rods fail to move in auto,

Time	Position	Applicant's Actions or Behavior
	SRO	19. **WHEN** conditions allow auto rod control, **THEN**: a. **ENSURE** T-avg and T-ref within 1°F. b. **ENSURE** zero demand on control rod position indication [1-M-4]. c. **PLACE** rods in AUTO.
	SRO	20. **NOTIFY** Chemistry of any reactor power changes greater than 15% in one hour.
	SRO	21. **RETURN TO** Instruction in effect.
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	SRO	**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).
Cue Simulator Operator to insert Event 4.		

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Event Description: B-A ERCW Pump Trip

Time	Position	Applicant's Actions or Behavior
Expected Alarms: 223-A ERCW HDR A SUP PRESS LO. 224-B ERCW PMP B-A DISCH PRESS LO. 144-A ICE COND INLET DOOR OPEN.		
	BOP	Diagnoses and announces failure
	BOP	May enter Alarm Response Instructions 223-A and 224-B.
	SRO	Enter and direct actions of AOI-13, "Loss of Essential Raw Cooling Water", and directs crew actions, using Section 3.2, Loss of ERCW Pump."
EXAMINER: The following actions are taken from ARI 223-A ERCW HDR A SUP PRESS LO.		
	BOP	[1] **CHECK** 0-PI-67-18A, A ERCW SUP HDR PRESS [0-M-27A].
	BOP	[2] **DISPATCH** Operator to check ERCW Train A pumps.
	BOP	[3] **CHECK** valve alignment to ERCW Hdr A per SOI-67.01, *ESSENTIAL RAW COOLING WATER SYSTEM.*
	SRO	[4] **REFER TO** AOI-13, LOSS OF ESSENTIAL RAW COOLING WATER.
EXAMINER: The following actions are taken from ARI 224-B ERCW PMP B-A DISCH PRESS LO.		
	BOP	[1] **CHECK** the following [0-M-27A]: • 0-PI-67-33A, ERCW PMP B-A DISCH PRESS • 0-EI-67-31A, ERCW PMP B-A AMPS
	BOP	[2] **START** additional pumps, if needed.
	BOP	[3] **DISPATCH** Operator to check ERCW Pump B-A at IPS.
	SRO	[4] **REFER TO** AOI-13, *LOSS OF ESSENTIAL RAW COOLING WATER.*
EXAMINER: The following actions are taken from AOI-13"Loss of Essential Raw Cooling Water", Sub Section 3.2, "Loss of ERCW Pump."		
	BOP	1. **START** redundant trained ERCW Pump.
	SRO	2. **ENSURE** header pressures and flows return to expected values for existing plant conditions.
	BOP	3. **ENSURE** pump amps NORMAL.
	BOP	4. **PLACE** failed pump HS in PULL TO LOCK.
	BOP	5. **DISPATCH** personnel to determine reason for pump failure.

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Event Description: B-A ERCW Pump Trip

Time	Position	Applicant's Actions or Behavior
	BOP	6. Locally **CLOSE** discharge valve on failed pump.
	BOP	7. **ENSURE** applicable emergency power selector switch selected away from failed pump.
	SRO	8. **INITIATE** repair.
	SRO	9. **REFER TO** Tech Spec 3.7.8, Essential Raw Cooling Water System (ERCW). 3.7.8 Essential Raw Cooling Water (ERCW) System. ***Condition A. One ERCW train inoperable, other than for Condition C, Restore ERCW train to OPERABLE status within 72 hours.***
	SRO	10. **RETURN TO** Instruction in effect.
	SRO	Crew Brief would typically be conducted for this event as time allows prior to the next event.
	SRO	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).
Cue Simulator Operator to insert Event 5.		

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Event Description: C-A Lower Compartment Cooler trips.

Time	Position	Applicant's Actions or Behavior
Indications: 138-E PANEL M-9 MOTOR TRIPOUT 104-B LWR CNTMT TEMP HI		
	RO	Announces alarm 138-E, "M-9 MOTOR TRIPOUT."
	BOP	Goes to Panel 1-M-9 to determine which component(s) have tripped. Announces that C-A Lower Compartment Fan has tripped.
	SRO	Enters and directs actions of ARI 138-E, "M-9 MOTOR TRIPOUT."
EXAMINER: The following actions are taken from ARI 138-E, "PANEL M-9 MOTOR TRIPOUT."		
	BOP	**[1] DETERMINE** from panel 1-M-9 which motor has tripped.
	BOP	**[2] DISPATCH** Operator to determine cause of alarm and initiate corrective action.
EXAMINER: With containment temperatures rising, the SRO may direct the BOP to start the 1B-B Lower CNTMT Cooler. The following steps are taken from SOI-30.03, Containment HVAC and Pressure Control," Section 5.4, "Startup/Reserve Alignment of Lower CNTMT Coolers."		
	BOP	[1] **ENSURE** ERCW aligned to Lower CNTMT Coolers per Section 5.3.
EXAMINER: The following steps are taken from SOI-30.03, Containment HVAC and Pressure Control," 5.3, "Lower CNTMT Cooler ERCW Alignment."		
		[1] **IF** Lower CNTMT Cooler 1A-A is to be started or placed in reserve, **THEN ENSURE** the following [0-M-27A]: A. 1-FCV-67-83, LWR CNTMT A CLRS SUP CIV, OPEN. B. 1-FCV-67-89, LWR CNTMT A CLRS SUP CIV, OPEN. C. 1-FCV-67-87, LWR CNTMT A CLRS RET CIV, OPEN. D. 1-FCV-67-88, LWR CNTMT A CLRS RET CIV, OPEN. E. 1-HS-67-84A, LWR CNTMT CLR A OUTLET TCV, in P-AUTO. ***If not selected for start, the step is marked N/A.***
		[2] **IF** Lower CNTMT Cooler 1B-B is to be started or placed in reserve, **THEN ENSURE** the following [0-M-27A]: A. 1-FCV-67-99, LWR CNTMT B CLRS SUP CIV, OPEN. B. 1-FCV-67-105, LWR CNTMT B CLRS SUP CIV, OPEN. C. 1-FCV-67-103, LWR CNTMT B CLRS RET CIV, OPEN. D. 1-FCV-67-104, LWR CNTMT B CLRS RET CIV, OPEN. E. 1-HS-67-100A, LWR CNTMT CLR B OUTLET TCV, in P-AUTO. ***If not selected for start, the step is marked N/A.***

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Event Description: C-A Lower Compartment Cooler trips.

Time	Position	Applicant's Actions or Behavior
		[3] IF Lower CNTMT Cooler 1C-A is to be started or placed in reserve, **THEN ENSURE** the following [0-M-27A]: A. 1-FCV-67-91, LWR CNTMT C CLRS SUP CIV, OPEN. B. 1-FCV-67-97, LWR CNTMT C CLRS SUP CIV, OPEN. C. 1-FCV-67-95, LWR CNTMT C CLRS RET CIV, OPEN. D. 1-FCV-67-96, LWR CNTMT C CLRS RET CIV, OPEN. E. 1-HS-67-92A, LWR CNTMT CLR C OUTLET TCV, in P-AUTO. ***If not selected for start, the step is marked N/A.***
		[4] **IF** Lower CNTMT Cooler 1D-B is to be started or placed in reserve, **THEN ENSURE** the following [0-M-27A]: A. 1-FCV-67-107, LWR CNTMT C CLRS SUP CIV, OPEN. B. 1-FCV-67-113, LWR CNTMT C CLRS SUP CIV, OPEN. C. 1-FCV-67-111, LWR CNTMT C CLRS RET CIV, OPEN. D. 1-FCV-67-112, LWR CNTMT C CLRS RET CIV, OPEN. E. 1-HS-67-108A, LWR CNTMT CLR D OUTLET TCV, in P-AUTO. ***If not selected for start, the step is marked N/A.***
EXAMINER: The following steps are taken from SOI-30.03, Containment HVAC and Pressure Control," Section 5.4, "Startup/Reserve Alignment of Lower CNTMT Coolers."		
NOTE **Lower CNTMT Cooler 1A-A drains to the Pocket Sump. Condensate from the drain may cause a plant computer alarm on Pocket Sump rate of rise. If a valid alarm occurs, the Pocket Sump level monitor should be declared inoperable and the actions of LCO 3.4.15 performed.**		
		[2] REFER TO Section 3.0, Precaution 3.0H before starting or placing Lower CNTMT Coolers in reserve alignment.
		[3] IF Lower CNTMT Cooler 1A-A is to be started, **THEN** A. **ENSURE** 1-HS-30-74A, LWR CNTMT CLR A-A, in A-AUTO, **AND START** Cooler with 1-HS-30-74A. B. **ENSURE** LWR CNTMT CLR A-A, RUNNING. ***If not selected for start, the step is marked N/A.***
		[4] IF Lower CNTMT Cooler 1B-B is to be started, **THEN** **A. ENSURE** 1-HS-30-75A, LWR CNTMT CLR B-B, in A-AUTO, AND START Cooler with 1-HS-30-75A. **B. ENSURE** LWR CNTMT CLR B-B, RUNNING. ***If not selected for start, the step is marked N/A.***

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Event Description: C-A Lower Compartment Cooler trips.

Time	Position	Applicant's Actions or Behavior
		[5] IF Lower CNTMT Cooler 1C-A is to be started, **THEN** A. **ENSURE** 1-HS-30-77A, LWR CNTMT CLR C-A, in A-AUTO, **AND START** Cooler with 1-HS-30-77A. B. **ENSURE** LWR CNTMT CLR C-A, RUNNING. ***If not selected for start, the step is marked N/A.***
		[6] IF Lower CNTMT Cooler 1D-B is to be started, **THEN** A. **ENSURE** 1-HS-30-78A, LWR CNTMT CLR D-B, in A-AUTO, **AND START** Cooler with 1-HS-30-78A. B. **ENSURE** LWR CNTMT CLR D-B, RUNNING. ***If not selected for start, the step is marked N/A.***
	SRO	**[8] REFER TO** Tech Specs. ***There are no Technical Specifications to be entered for the loss of the C-A Lower Compartment Fan. The SRO must evaluate Technical Requirements, and enter TR 3.6.3 Lower Compartment Cooling (LCC) System, Condition A. One LCC fan inoperable, restore LCC fan to OPERABLE status within 7 days.***
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	SRO	**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).
Cue Simulator Operator to insert Event 6.		

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Event Description: Main Steam Line Break outside containment. No MSIVs close initially. After entry into ECA-2.1, "Uncontrolled Depressurization of All Steam Generators," #1, 2 and 3 MSIVs are closed manually. #4 MSIV remains open for the duration of the scenario.

Time	Position	Applicant's Actions or Behavior
Indications: Reactor power rising as indicated on 1-NR-92-145. Main generator megawatts dropping. Reactor coolant system pressure dropping. Tavg dropping.		
	RO	Diagnoses and announces rising reactor power and decreasing RCS Tavg.
	BOP	Diagnoses and announces generator megawatts decreasing, steam flows rising. Determines that containment pressure is not rising. May dispatch personnel to assist in locating the source of the steam leak.
	SRO	May enter and direct actions of AOI-38, "Main Steam or Feedwater Line Leak."
EXAMINER: The following steps are taken from AOI-38, "Main Steam or Feedwater Line Leak."		
	SRO	1. **IF** leak threatens personnel safety, **THEN:** a. **TRIP** Rx. b. **CLOSE** the following: • MSIVs. • MSIV bypass valves. c. ** **GO TO** E-0, Reactor Trip or Safety Injection. Until reports are received from personnel outside the control room, the SRO may continue with AOI-38 performance.
	BOP	2. **CHECK** S/G PORVs CLOSED.
	BOP	3. **CHECK** steam dump valves CLOSED.
	RO	4. **CHECK** reactor power less than or equal to 100%: • Loop ΔT. • NIS power range monitors.
	BOP/RO	4. **<u>RESPONSE NOT OBTAINED:</u>** **REDUCE** turbine load to 90% with valve position limiter. **IF** Rx power returns to 100%, **THEN** a. **TRIP** Rx. b. **CLOSE** all MSIVs and bypass valves. c. ** **GO TO** E-0, Reactor Trip or Safety Injection.
	RO	5. **ENSURE** T–avg and T–ref. within 3°F.

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Event Description: Main Steam Line Break outside containment. No MSIVs close initially. After entry into ECA-2.1, "Uncontrolled Depressurization of All Steam Generators," #1, 2 and 3 MSIVs are closed manually. #4 MSIV remains open for the duration of the scenario.

Time	Position	Applicant's Actions or Behavior
NOTE • It is a normal condition for Turbine load and Rx power to exhibit a nominal mismatch for loads less than 50%. • Hotwell makeup will rise following a rapid runback. The makeup flow should be allowed to stabilize before making any determination of leak size.		
	BOP	6. **MONITOR** leak less than 3% of required steam or FW flow: • **IF** power greater than 50%, **THEN COMPARE** turbine load to reactor power and ΔT. • **OBSERVE** steam and FW flow recorders. • **OBSERVE** hotwell level makeup less than 950 gpm.
EXAMINER: It is expected that the steam leak will be large enough for the SRO to determine that a reactor trip and MSIV closure is required.		
	BOP/RO	6. **RESPONSE NOT OBTAINED:** **PERFORM** the following: a. **TRIP** Rx. b. **CLOSE** all MSIVs and bypass valves. c. ** **GO TO** E-0, Reactor Trip or Safety Injection.
EXAMINER: Since the MSIVs failed to close when the handswitches were placed in CLOSE, the BOP may dispatch an AUO to the Auxiliary Control Room to place the MSIV transfer switches in the AUS position to attempt to close the valves.		
EXAMINER: The following steps are taken from E-0, "Reactor Trip or Safety Injection."		
NOTE 1 Steps 1 thru 4 are **IMMEDIATE ACTION STEPS.**		
NOTE 2 Status Trees / SPDS should be monitored when transitioned to another instruction.		
	RO	1. **ENSURE** reactor trip: • Reactor trip and bypass breakers OPEN. • RPIs at bottom of scale. • Neutron flux DROPPING.
	RO	2. **ENSURE** Turbine Trip: • All turbine stop valves CLOSED.
	RO	3. **CHECK** 6.9 kV shutdown boards: a. At least one board energized from: • CSST (offsite), OR • D/G (blackout).

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Event Description: Main Steam Line Break outside containment. No MSIVs close initially. After entry into ECA-2.1, "Uncontrolled Depressurization of All Steam Generators," #1, 2 and 3 MSIVs are closed manually. #4 MSIV remains open for the duration of the scenario.

Time	Position	Applicant's Actions or Behavior
	RO	4. **CHECK** SI actuated: a. Any SI annunciator LIT. b. Both trains SI **ACTUATED.** • 1-XX-55-6C • 1-XX-55-6D
	BOP	5. **EVALUATE** support systems: • **REFER TO** Appendixes A and B (E-0), Equipment Verification pages 15-28.
	SRO	6. **ANNOUNCE** reactor trip and safety injection over PA system.
	RO	7. **ENSURE** secondary heat sink available with either: • Total AFW flow greater than 410 gpm, OR • At least one S/G NR level greater than 29% [39% ADV].
	RO	8. **MONITOR** RCS temp stable at or trending to 557°F: • **IF** any RCP running, **THEN MONITOR** RCS Loop T-avg trending to 557°F. OR • **IF** NO RCP running, **THEN MONITOR** RCS Loop T-cold trending to 557°F.
	RO	8. **RESPONSE NOT OBTAINED:** **IF** temp less than 557°F, **THEN ENSURE** steam dumps and S/G PORVs CLOSED. **IF** cooldown continues, **THEN:** • **PLACE** steam dump controls OFF. • **CONTROL** total AFW flow to maintain greater than 410 gpm UNTIL NR level in at least one S/G greater than 29% [39% ADV]. **IF** cooldown continues after AFW flow is controlled, **THEN** • **CLOSE** MSIVs. • **ENSURE** MSIV bypasses CLOSED. **IF** RCS temp greater than 564°F, **THEN ENSURE** either steam dumps or S/G PORVs OPEN.
	RO	9. **ENSURE** excess letdown valves CLOSED: • 1-FCV-62-54 • 1-FCV-62-55

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Event Description: Main Steam Line Break outside containment. No MSIVs close initially. After entry into ECA-2.1, "Uncontrolled Depressurization of All Steam Generators," #1, 2 and 3 MSIVs are closed manually. #4 MSIV remains open for the duration of the scenario.

Time	Position	Applicant's Actions or Behavior
	RO	10. **CHECK** pzr PORVs and block valves: a. Pzr PORVs CLOSED. b. At least one block valve OPEN.
	RO	11. **CHECK** pzr safety valves CLOSED: • **EVALUATE** tailpipe temperatures and acoustic monitors.
	RO	12. **CHECK** pzr sprays CLOSED.
NOTE Seal injection flow should be maintained to all RCPs.		
	RO	13. **CHECK** if RCPs should remain in service: a. Phase B signals DARK [MISSP]. b. RCS pressure greater than 1500 psig.
	RO	14. **CHECK** S/G pressures: • All S/G pressures controlled or rising. • All S/G pressures greater than 120 psig.
	SRO	14. **RESPONSE NOT OBTAINED:** **IF** S/G pressure low OR dropping uncontrolled, **THEN GO TO** E-2, Faulted Steam Generator Isolation.
EXAMINER: The following actions are taken from E-2, "Faulted Steam Generator Isolation."		
CAUTION If a faulted S/G is NOT needed for RCS cooldown, it should remain isolated during subsequent recovery actions.		
	BOP	1. **ENSURE** all MSIVs and MSIV bypasses CLOSED.
	BOP	1. **RESPONSE NOT OBTAINED:** Manually **CLOSE** valves. **IF** valves can **NOT** be closed, **THEN** Locally **REMOVE** power to valves: • **DISPATCH** NAUO to perform Attachment 1 (E-2).
NOTE If it is known that a steam leak exists in the Turbine building, the following step should not be performed until the affected steam header is depressurized.		
	BOP	2. **PLACE** steam dump controls OFF: • 1-HS-1-103A, STEAM DUMP FSV "A". • 1-HS-1-103B, STEAM DUMP FSV "B".
	SRO	3. **CHECK** for at least one Intact S/G: • Any S/G pressure controlled or rising, OR • Any S/G pressure greater than P-sat for RCS incore temperature.

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Event Description: Main Steam Line Break outside containment. No MSIVs close initially. After entry into ECA-2.1, "Uncontrolled Depressurization of All Steam Generators," #1, 2 and 3 MSIVs are closed manually. #4 MSIV remains open for the duration of the scenario.

Time	Position	Applicant's Actions or Behavior
	SRO	3. **RESPONSE NOT OBTAINED: IF** pressure in all four S/Gs dropping uncontrolled, **THEN GO TO** ECA-2.1, Uncontrolled Depressurization of All Steam Generators.
EXAMINER: The following actions are taken from ECA-2.1,"Uncontrolled Depressurization of All Steam Generators."		
CAUTION If, at any time, except during SI termination steps 14 through 24, any Intact S/G can be isolated from the break and re-pressurized, then recovery actions should continue with E-2, Faulted Steam Generator Isolation.		
	SRO	1. **REFER TO** EPIP-1, Emergency Plan Classification Flowchart.
CAUTION If the TD AFW pump is the only available source of feed flow to ANY S/G, the steam supply must be maintained available.		
	BOP	2. **ENSURE** secondary pressure boundary isolated: • **ENSURE** all MSIVs and MSIV bypasses CLOSED. • **PLACE** steam dump controls OFF. • **ENSURE** MFW reg and bypass reg valves CLOSED. • **ENSURE** MFW isolation and bypass isolation valves CLOSED. • **IF** both MD AFW pumps available, **THEN ENSURE** steam supply valves to TD AFW pump CLOSED.
	BOP	2. **RESPONSE NOT OBTAINED:** Manually **CLOSE** valves to restore pressure boundary on at least one S/G. **IF** valves CANNOT be closed, **THEN DISPATCH** personnel to close valves locally, one loop at a time: • **CLOSE** MSIV and bypass valve as necessary USING Attachment 1 (ECA-2.1). • **ISOLATE** S/G atmospheric relief valve as necessary. • **CLOSE** additional feedwater or condensate MOVs as necessary. • **ISOLATE** blowdown locally as necessary.
CAUTION If total feed flow CAPABILITY of 410 gpm is available, FR-H.1, Loss of Secondary Heat Sink, should NOT be implemented.		
NOTE Minimum detectable flow is assured by observing flow indicator response to valve movement.		

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Event Description: Main Steam Line Break outside containment. No MSIVs close initially. After entry into ECA-2.1, "Uncontrolled Depressurization of All Steam Generators," #1, 2 and 3 MSIVs are closed manually. #4 MSIV remains open for the duration of the scenario.

Time	Position	Applicant's Actions or Behavior
Critical Task 1 *WOG Critical Task List, ECA-2.1, A.* *Control the AFW flow rate to minimum detectable flow to each SG in order to minimize the RCS cooldown rate before FR-P.1, "Pressurized Thermal Shock," Critical Safety Function Status Tree develops an ORANGE PATH condition.* *If feed flow to a SG is isolated and the SG is allowed to dry out, subsequent reinitiation of feed flow to the SG could create significant thermal stress conditions on SG components. Maintaining a minimum verifiable feed flow to the SG allows the components to remain in a "wet" condition, thereby minimizing any thermal shock effects if feed flow is later increased.*		
Critical Task 1	BOP	3. **CONTROL** feed flow to minimize RCS cooldown and prevent S/G dryout: a. **CHECK** T-cold cooldown rate less than 100°F in the last one hour. a. **RESPONSE NOT OBTAINED:** **REDUCE** feed flow to each S/G to minimum detectable to minimize cooldown. ** **GO TO** Substep 3c. c. **IF** any S/G NR level drops to 29% [39% ADV], **THEN MAINTAIN** at least minimum detectable flow to each S/G with low level.
	SRO	4. **MONITOR** shutdown margin during RCS cooldown: • **REFER TO** 1-SI-0-10, Shutdown Margin OR REACTINW Computer Program.
	RO	5. **MONITOR** T-hot stable or dropping.
EXAMINER: At this point in the scenario, the #1, #2 and #3 MSIVs will close. The crew will transition back to E-2, "Faulted Steam Generator Isolation" for additional actions.		
	BOP	1. **ENSURE** all MSIVs and MSIV bypasses CLOSED.
NOTE If it is known that a steam leak exists in the Turbine building, the following step should not be performed until the affected steam header is depressurized.		
	BOP	2. **PLACE** steam dump controls OFF: • 1-HS-1-103A, STEAM DUMP FSV "A". • 1-HS-1-103B, STEAM DUMP FSV "B".
	SRO	3. **CHECK** for at least one Intact S/G: • Any S/G pressure controlled or rising, OR • Any S/G pressure greater than P-sat for RCS incore temperature.

Op Test No.: NRC	Scenario # 5	Event # 6 and 7	Page 27 of 51
Event Description:	Main Steam Line Break outside containment. No MSIVs close initially. After entry into ECA-2.1, "Uncontrolled Depressurization of All Steam Generators," #1, 2 and 3 MSIVs are closed manually. #4 MSIV remains open for the duration of the scenario.		

Time	Position	Applicant's Actions or Behavior
	BOP	4. **IDENTIFY** Faulted S/G based on ANY of the following: • Any S/G pressure dropping in an uncontrolled manner, OR • Any S/G pressure less than 120 psig, OR • S/G enclosure temps high: 1) T1002A for 2 and 3, 2) T1003A for 1 and 4. OR • Local indication of break in any of the following: 1) Main steam lines, 2) Main feedwater lines,
CAUTION **• If the turbine-driven AFW pump is the only available source of feed flow, steam supply to the turbine-driven AFW pump must be maintained from one SG.** **• RCS cooldown requires the availability of at least one S/G.**		
Critical Task 2 *WOG Critical Task List for E-2, A* *Isolate the faulted SG before transition out of E-2.* *Isolation of the feedwater to the faulted SG maximizes the cooldown capability of the non-faulted loops following a feedline break and minimizes the RCS cooldown and mass and energy release following a steamline break. Isolation of steam paths from the faulted SG also minimizes the RCS cooldown and mass and energy release to containment. In addition, isolation of these steam paths could isolate the break.* *Transition is made from ECA-2.1 back to E-2 when MSIVs are closed for three of four SGs*		
Critical Task 2	BOP	5. **ISOLATE** Faulted S/G: a. **ISOLATE** AFW flow to Faulted S/G. b. **ENSURE** MFW ISOLATED to Faulted S/G: • MFW isolation and bypass isolation valves CLOSED. • MFW reg and bypass reg valves CLOSED. • MFPs TRIPPED. c. **ENSURE** Faulted S/G PORV CLOSED. d. **ENSURE** Faulted S/G blowdown ISOLATED.
NOTE TD AFW pump steam supply should NOT be aligned from an S/G with a known primary to secondary leak if other AFW sources are available.		
	BOP	6. **ENSURE** TD AFW pump being supplied from Intact S/G.
	BOP	7. **MONITOR** CST volume greater than 200,000 gal.

Op Test No.: NRC Scenario # 5 Event # 6 and 7 Page 28 of 51

Event Description: Main Steam Line Break outside containment. No MSIVs close initially. After entry into ECA-2.1, "Uncontrolled Depressurization of All Steam Generators," #1, 2 and 3 MSIVs are closed manually. #4 MSIV remains open for the duration of the scenario.

Time	Position	Applicant's Actions or Behavior
	BOP	8. **WHEN** RCS temperature is stable or rising following Faulted S/G blowdown, **THEN ADJUST** Intact S/G PORV controllers in AUTO to: P-sat for the highest RCS temp (one or more RCPs running) **OR** P-sat for the highest T-cold temp (no RCPs running)
	BOP	9. **CHECK** secondary side radiation: • S/G discharge monitors NORMAL. • Condenser vacuum exhaust rad monitors NORMAL. • S/G blowdown rad monitor recorders NORMAL trend prior to isolation. • S/G sample results by Chemistry.
Critical Task 3 *Establish secondary heat sink (return AFW flow to intact SGs greater than 410 gpm) to meet SI termination criteria prior to entering ES-1.1.* *During performance of ECA-2.1, flow had been reduced to "minimum detectable flow" to minimize the RCS cooldown. Flow must be manually reestablished in order meet secondary heat sink requirements and allow SI termination.*		
Critical Task 3		10. **CHECK** SI termination criteria: a. **CHECK** RCS subcooling greater than 65°F [85°F ADV]. b. **CHECK** secondary heat sink available with either: • Total feed flow to Intact S/Gs greater than 410 gpm, OR • At least one Intact S/G NR level greater than 29% [39% ADV]. c. **CHECK** RCS pressure stable or rising. d. **CHECK** pzr level greater than 15% [33% ADV]. e. ** **GO TO** ES-1.1, SI Termination.
EXAMINER: Terminate the scenario when the decision is made to transition to ES-1.1, SI Termination," and inform crew that another crew will continue from this point, and terminate the scenario.		
END OF SCENARIO		

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

APPENDIX A
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EQUIPMENT VERIFICATION

1.	**ENSURE** PCBs OPEN: • PCB 5084. • PCB 5088.	**OPEN** manually.
2	**ENSURE** AFW pump operation: • Both MD AFW pumps RUNNING. • TD AFW pump RUNNING. • LCVs in AUTO, or controlled in MANUAL.	**ESTABLISH** at least one train AFW operation.
3.	**ENSURE** MFW isolation: • MFW isolation and bypass isolation valves CLOSED. • MFW reg and bypass reg valves CLOSED. • MFP A and B TRIPPED. • Standby MFP STOPPED. • Cond demin pumps TRIPPED. • Cond booster pumps TRIPPED.	Manually **CLOSE** valves and **STOP** pumps, as necessary. **IF** any valves can **NOT** be closed, **THEN** **CLOSE** #1 heater outlet valves.

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

APPENDIX A
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EQUIPMENT VERIFICATION

4.	**MONITOR** ECCS operation:	
	a. Charging pumps RUNNING.	a. Manually **START** charging pumps.
	b. Charging pump alignment: • RWST outlets 1-LCV-62-135 and 1-LCV-62-136 OPEN. • VCT outlets 1-LCV-62-132 and 1-LCV-62-133 CLOSED. • Charging 1-FCV-62-90 and 1-FCV-62-91 CLOSED.	b. **ENSURE** at least one valve in each set aligned.
	c. RHR pumps RUNNING.	c. Manually **START** RHR pumps.
	d. SI pumps RUNNING.	d. Manually **START** SI pumps.
	e. BIT alignment: • Outlets 1-FCV-63-25 and 1-FCV-63-26 OPEN. • Flow thru BIT.	e. **ENSURE** at least one valve aligned, and flow thru BIT.
	f. RCS pressure greater than 1650 psig.	f. **ENSURE** SI pump flow. **IF** RCS press drops to less than 150 psig, **THEN** **ENSURE** RHR pump flow.

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

APPENDIX A
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EQUIPMENT VERIFICATION

5	**CHECK** cntmt isolation: a. Phase A isolation: • Train A GREEN. • Train B GREEN. b. Cntmt vent isolation: • Train A GREEN. • Train B GREEN.	**ACTUATE** Phase A and Cntmt Vent Isolation signal, **OR** Manually **CLOSE** valves and dampers as necessary.

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

6.	**CHECK** cntmt pressure: • Phase B DARK [MISSP]. • Cntmt Spray DARK [MISSP]. • Cntmt press less than 2.8 psig.	**PERFORM** the following: 1) **ENSURE** Phase B actuated. 2) **ENSURE** Cntmt Spray actuated. 3) **ENSURE** cntmt spray pumps running. 4) **ENSURE** cntmt spray flow. 5) **ENSURE** Phase B isolation: • Train A GREEN. • Train B GREEN • Manually **CLOSE** valves and dampers as necessary. 6) **STOP** all RCPs. 7) **ENSURE** MSIVs and bypasses CLOSED. 8) **PLACE** steam dump controls OFF. 9) **WHEN** 10 minutes has elapsed since Phase B actuated, **THEN** **ENSURE** air return fans start. 10) **USE** adverse cntmt [ADV] setpoints where provided.

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Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

7.	**CHECK** plant radiation NORMAL: • S/G blowdown rad recorder 1-RR-90-120 NORMAL prior to isolation [M-12]. • Condenser vacuum exhaust rad recorder 1-RR-90-119 NORMAL prior to trip [M-12]. • 1-RR-90-106 and 1-RR-90-112 raciation recorders NORMAL prior to isolation [M-12]. • S/G main steamline discharge monitors NORMAL [M-30]. • Upper and Lower containment high range monitors NORMAL [M-30]. • **NOTIFY** Unit Supervisor conditions NORMAL.	**NOTIFY** Unit Supervisor IMMEDIATELY.
8	**ENSURE** all D/Gs RUNNING.	**EMERGENCY START** D/Gs

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

9.	**ENSURE** ABGTS operation:	
	a. ABGTS fans RUNNING.	a. Manually **START** fans.
	b. ABGTS dampers OPEN: • FCO-30-146A. • FCO-30-146B. • FCO-30-157A. • FCO-30-157B.	b. Locally **OPEN** dampers.
10.	**ENSURE** at least four ERCW pumps RUNNING, one on each shutdown board preferred.	Manually **START** pumps as necessary.
11.	**ENSURE** ERCW supply valves OPEN to running D/Gs.	**IF** ERCW can **NOT** be aligned to running D/G, **THEN** **EMERGENCY STOP** affected D/G.
12.	**ENSURE** CCS HX C ALT DISCH TO HDR B, 0-FCV-67-152, is open to position A.	Manually **OPEN** 0-FCV-67-152 to position A.

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

13.	**CLOSE** CCS HX C DISCH TO HDR A, 0-FCV-67-144.	
14.	**MONITOR** EGTS operation: • EGTS fans RUNNING. • **ENSURE** dampers OPEN VERIFY filter bank dp between 5 and 9 inches of water.	Manually **START** fans **OPEN** dampers.
15.	**ENSURE** CCS pumps RUNNING: • 1A-A CCS pump. • 1B-B CCS pump. • C-S OR 2B-B CCS pump.	Manually **START** pumps as necessary.

NOTE
- The Upper and Lower Cntmt rad monitors sampling pumps should be shutdown if the sample flowpath is isolated.
- The following equipment is located on 1-M-9.

16.	**CHECK** CNTMT PURGE fans STOPPED:	**STOP** fans and **PLACE** handswitch in PULL-TO-LOCK.

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

17.	**CHECK** FUEL HANDLING EXH fans STOPPED, Fuel and Cask loading dampers CLOSED:	**STOP** fans and **PLACE** handswitch in PULL-TO-LOCK, manually **CLOSE** dampers.
18.	**ENSURE** AB GEN SUPPLY and EXH fans STOPPED.	**STOP** fans and **PLACE** handswitch in PULL-TO-LOCK.

NOTE • Dampers 1-HS-30-158 and 2-HS-30-270 remain open during ABI.

19.	**ENSURE** AB GEN SUP & EXH dampers CLOSED.	Manually **CLOSE** dampers.
20.	**ENSURE** MCR & SPREAD RM FRESH AIR dampers CLOSED: • FCV-31-3. • FCV-31-4.	Manually **CLOSE** dampers.

WBN	REACTOR TRIP OR SAFETY INJECTION	E-0 Rev 28

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

21.	**ENSURE** at least one CB EMER CLEANUP fan RUNNING and associated damper OPEN: • CB EMERG CLEANUP FAN A-A, OR Fan B-B RUNNING. • FCO-31-8, OPEN. OR FCO-31-7, OPEN.	Manually **START** fan. **NOTIFY** TSC if at least one damper NOT OPEN.
22.	**ENSURE** at least one CB EMER PRESS fan RUNNING and associated damper OPEN: • CB EMERG PRESS FAN A-A, OR FAN B-B RUNNING. • FCO-31-6, OPEN. OR FCO-31-5, OPEN.	Manually **START** fan. **NOTIFY** TSC if at least one damper NOT OPEN.

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

23.	**ENSURE** Control Building fans STOPPED and dampers CLOSED: • SPREADING ROOM SUPPLY and EXH FANS AND dampers. • TOILET & LKR RM EXHAUST FAN AND dampers.	Manually **STOP** fans. **NOTIFY** TSC if any damper NOT CLOSED.
24.	**INITIATE** Appendix B.	

Step	Action/Expected Response	Response Not Obtained

APPENDIX B
(E-0)
Page 1 of 1

PHASE B PIPE BREAK CONTINGENCIES

1.	**CHECK** PHASE B actuated. (MISSP - 1-XX-55-6C, -6D)	**WHEN** PHASE B actuation occurs; **THEN** **GO TO** step 2.
2.	**ENSURE** 1-FCV-32-110 CLOSED. (CISP - 1-XX-55-6E) [A-train, window 13]	**DISPATCH** AUO to perform ATTACHMENT B1.
3.	**ENSURE** 1-FCV-67-107 CLOSED. (CISP - 1-XX-55-6E) [A -train, window 43]	**DISPATCH** AUO to perform ATTACHMENT B2.
4.	**ENSURE** 1-FCV-70-92 CLOSED. (CISP - 1-XX-55-6E) [A -train, window 73]	**DISPATCH** AUO to perform ATTACHMENT B3.
5.	**ENSURE** 1-FCV-70-140 CLOSED. (CISP - 1-XX-55-6F) [B -train, window 74]	**DISPATCH** AUO to perform ATTACHMENT B4.

ATTACHMENT B1
(E-0)
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CONTROL AIR ISOLATION

1. **CLOSE** 0-ISV-32-1013 - CONTROL AIR EL 713 AB HDR ISOL [A6/S EL. 713] (chain operated - behind Fuel and Waste Handling Bd. A).

2. **IF** 0-ISV-32-1013 CANNOT BE CLOSED,
   THEN:

   OPEN and **DISCONNECT** C&SS air compressor breakers:

   a) 0-BKR-32-25 - 480V SD BD 1A2-A, C/3D

   b) 0-BKR-32-26 - 480V SD BD 1B1-B, C/3D

   c) 0-BKR-32-27 - 480V AUX BLDG COM BD, C/6C

   d) 0-BKR-32-4900A - 480V TURB BLDG COM BD, C/6C

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ATTACHMENT B2
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ERCW ISOLATION

1. **UNLOCK AND CLOSE** 1-ISV-67-523B - LOWER CNTMT VENT CLR 1B &1D ERCW SUP ISOL [A2U/692] (U-1 penetration room - North of AB Pipe Chase Cooler 1B-B in overhead)

ATTACHMENT B3
(E-0)
Page 1 of 1

CCS RETURN ISOLATION

1. **CLOSE** 1-ISV-70-700 RCP OIL COOLER CCS RETURN ISOLATION [A4/V EL. 710 U-1 Penetration Room] (approximately 10 ft. North of Penetration Room Cooler 1B-B on mezzanine above RHR Sump Valve Room)

ATTACHMENT B4
(E-0)
Page 1 of 1

CCS SUPPLY ISOLATION

1. **CLOSE** 1-ISV-70-516 REACTOR BUILDING CCS SUPPLY ISOLATION [A6/1 EL. 737] (Behind Elevator approximately 2 ft. west on mezzanine above "A" CCS Heat Exchanger)

3.3 BOP Realignment

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
CAUTION **Performance of this instruction should not be allowed to delay or interfere with actions required by applicable emergency procedures or abnormal operating procedures.**	
NOTE 1 Control room operators may initiate shutdown of pumps and equipment from the benchboard immediately after a trip. Performance of this instruction will subsequently verify proper secondary equipment alignment.	
NOTE 2 Steps in this section and items in Attachment 1 may be performed out of sequence.	
1. **DISPATCH** turbine building NAUO to perform Attachment 1.	
2. **NOTIFY** condensate demineralizer NAUO prior to Operator initiated press changes in condensate.	
3. **REMOVE** generator excitation from service:	
a. **PLACE** voltage regulator to TEST.	
b. **ZERO** exciter base adjuster.	
c. **OPEN** exciter field breaker.	
d. **PLACE** exciter regulator control to OFF.	

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3.3 BOP Realignment (Continued)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. **MONITOR** main turbine:	
a. **WHEN** less than 1500 rpm, **THEN**: • **ENSURE** seal oil backup pump RUNNING. • **ENSURE** turning gear oil pump RUNNING.	
b. **WHEN** less than 600 rpm, **THEN** **ENSURE** bearing lift oil pump RUNNING.	
c. **WHEN** turbine is at ZERO RPM, **THEN** **ENSURE** turbine on turning gear.	
d. **MAINTAIN** MTOT lube oil temp between 95° and 100°F (may require RCW isolation if TCV has excessive leakage).	
e. **MAINTAIN** GENERATOR H2 (Cold Gas) temp 95°F (may require RCW isolation if TCV has excessive leakage).	
f. **ENSURE** Gland Steam Spillover Bypass valve is CLOSED using 1-HS-47-191A.	

3.3 BOP Realignment (Continued)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **ALIGN** MSRs: a. **PUSH** RESET on MSR control panel. b. **CLOSE** MSR HP steam and bypass isol. c. **ENSURE** MSR warming valves CLOSED. d. **OPEN** MSR startup vents. e. **CLOSE** MSR operating vents.	
6. **CHECK** MSIVs OPEN.	**IF** vacuum is to be maintained, **THEN** **ENSURE** auxiliary boiler is aligned for steam seals.

3.3 BOP Realignment (Continued)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. **ENSURE** adequate FW press: a. **ENSURE** two hotwell pumps RUNNING. b. **IF** FW isolation reset, **THEN** **ENSURE** one condensate booster pump RUNNING if needed for unit conditions. c. **ENSURE** CNDS demin pumps OFF. d. **STOP** #3 HDT pumps, and **CLOSE** the discharge valves to condensate heater strings. Notify NAUO performing Attachment 1 that #3 HDT pumps are stopped. e. **STOP** #7 HDT pumps, and **CLOSE** the discharge valves to condensate heater strings.	
8. **SHUTDOWN** any MFW pump NOT required.	
9. **SHUTDOWN** any RCW pumps NOT required.	
10. **SHUTDOWN** any CCW pumps NOT required.	

3.3 BOP Realignment (Continued)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11. **ALIGN** extraction steam valves and drain valves: a. **CLOSE** #1 and #2 Heater extraction steam valves. b. **ENSURE** turbine drain valves OPEN. c. **OPEN** MFW pump turbine drain valves.	
12. **PERFORM** as required: a. **OBTAIN** switching instructions from NEAD, and **OPEN** main generator PCB(s) MODs. b. **PULL-TO-LOCK** bus duct cooling fans. c. **VERIFY** MTOT and seal oil temps STABLE and trending to 95°F.	
13. **IF** MFW isolated to steam generators, **THEN** **REQUEST** Chem Lab sample condensate and feedwater prior to re-admitting water to S/Gs from condensate-feedwater system.	

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3.3 BOP Realignment (Continued)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14. **IF** EGTS started, **THEN** **SHUTDOWN** one train after 30 minutes and place in P-AUTO: • **REFER TO** SOI-65.02, Emergency Gas Treatment System, section on Auto EGTS Actuation.	
15. **IF** ABGTS started, **THEN** **SHUTDOWN** one train after 30 minutes and place in P-AUTO: • **REFER TO** SOI-30.06, Auxiliary Building Gas Treatment System, section on Auto Start of ABGTS.	

CAUTION **Rx trip bkrs must be cycled to allow reset of MFW when isolated by SI, HI-HI S/G level, or flood level in MS valve vault room. If any SI signal is present with Auto SI blocked, cycling Rx trip bkrs will initiate SI actuation.**

16. **IF** MFW **NOT** in service, **THEN** **ESTABLISH** MFW: • **REFER TO** Attachment 2, Establishing MFW Following Reactor Trip.	

3.3 BOP Realignment (Continued)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. **CHECK** S/G NR levels between 38% and 50%.	**IF** S/G level can **NOT** be maintained, **THEN** **START** M-D AFW pumps.
18. **RETURN TO** applicable Instruction.	

- END OF SUBSECTION -

WBN	LOSS OF REACTOR OR SECONDARY COOLANT	E-1 Rev 15

APPENDIX E
(E-1)
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EQUIPMENT EVALUATION

1. **EVALUATE** plant equipment and systems needed to support long term cooling and recovery actions, as time and personnel availability permits:

   a. Cntmt Isolation Status.

   b. Emergency Gas Treatment System:
   One train in operation, **REFER TO** SOI-65.02.

   c. Auxiliary Building Gas Treatment:
   One train in operation, **REFER TO** SOI-30.06.

   d. Auxiliary Building Isolation alignment:
   REFER TO SOI-30.06.

   e. Main Control Room Isolation alignment:
   REFER TO SOI-31.01.

   f. ERCW System:
   Both trains in operation.

   g. Component Cooling Water System:
   Both trains in operation.

SHIFT TURNOVER CHECKLIST
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SHIFT TURNOVER CHECKLIST 5

Page _____ **of** _____

☐ SM
☒ US/MCR Unit _____
☐ UO Unit _____
☐ AUO Station _____
☐ STA (STA Function)

_____
Off-going - Name

_____
On-coming - Name

Part 1 - Completed by off-going shift/Reviewed by on-coming shift:

- Abnormal equipment lineup/conditions:
  A-A ERCW pump is out of service for motor bearing replacement. Pump has been out of service for 4 hours. LCO 3.6.6.A was entered 4 hours ago. Expected to be returned to service in 16 hours.

- SI/Test in progress/planned: (including need for new brief)

- Major Activities/Procedures in progress/planned:
  100% power, MOL. RCS boron concentration is 747 ppm. Control Bank D is at 220 steps
  Window 23-A, TURB/GEN VIBRATION HI/HI-HI is lit. Bearing 9 indicates 10.1 mils, and Bearing 10 indicates 9.0 mils. Operations Management and System Engineering have met, and directed that a power reduction to 90% at 2% per minute using AOI-39, "Rapid Load Reduction" be conducted as soon as shift relief and turnover is complete.
- Radiological changes in plant during shift:
  None planned

Part 2 - Performed by on-coming shift

☐ A review of the Operating Log since last held shift or 3 days, whichever is less.

☐ A review of the Rounds sheets/Abnormal readings (AUOs only)

Review the following for changes since last shift turnover:

☐ Standing Orders ☐ LCO(s) in actions (N/A for AUOs) ☐ PER review (N/A for AUOs)

☐ TACFs (N/A for AUOs) ☐ Operator workarounds, burdens and other challenges ☐ Immediate required reading.

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

☐ A walkdown of the MCR control boards (N/A for AUOs)

Relief Time: _____ Relief Date: _____

SHIFT TURNOVER CHECKLIST

SHIFT TURNOVER CHECKLIST

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- ☐ SM
- ☐ US/MCR Unit _____
- ☒ UO Unit _____
- ☐ AUO Station _____
- ☐ STA (STA Function)

Off-going - Name

On-coming - Name

Part 1 - Completed by off-going shift/Reviewed by on-coming shift:

- Abnormal equipment lineup/conditions:
  A-A ERCW pump is out of service for motor bearing replacement. Pump has been out of service for 4 hours. LCO 3.6.6.A was entered 4 hours ago. Expected to be returned to service in 16 hours.
- SI/Test in progress/planned: (including need for new brief)
- Major Activities/Procedures in progress/planned:
  100% power, MOL. RCS boron concentration is 747 ppm. Control Bank D is at 220 steps
  Window 23-A, TURB/GEN VIBRATION HI/HI-HI is lit. Bearing 9 indicates 10.1 mils, and Bearing 10 indicates 9.0 mils. Operations Management and System Engineering have met, and directed that a power reduction to 90% at 2% per minute using AOI-39, "Rapid Load Reduction" be conducted as soon as shift relief and turnover is complete.
- Radiological changes in plant during shift:

Part 2 - Performed by on-coming shift

- ☐ A review of the Operating Log since last held shift or 3 days, whichever is less.
- ☐ A review of the Rounds sheets/Abnormal readings (AUOs only)

Review the following for changes since last shift turnover:

- ☐ Standing Orders
- ☐ LCO(s) in actions (N/A for AUOs)
- ☐ PER review (N/A for AUOs)
- ☐ TACFs (N/A for AUOs)
- ☐ Operator workarounds, burdens and other challenges
- ☐ Immediate required reading.

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

- ☐ A walkdown of the MCR control boards (N/A for AUOs)

Relief Time: _____ Relief Date: _____