

Facility:	Watts Bar October 2011	Scenario No. 3	Op Test No.: 2	
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 1 Work Week. 1A-A Containment Spray (CS) pump is out-of-service for a pump bearing inspection. LCO 3.6.6 was entered 1 hour ago. 1A-A CS pump is expected to be returned to service in 24 hours. Protected equipment signs have been posted for 1B-B CS pump.				
Event No.	Malf. No.	Event Type*	Event Description	
1	ni07a	I-RO C-BOP TS-SRO	N41 POWER RANGE fails high.	
2	rw14a	C-BOP TS-SRO	Train A ERCW intake pumping station header ruptures at the common discharge of the A pumps.	
3	th05d	C-RO	Steam generator tube leak of approximately 25 gpm develops on SG 4	
4	n/a	R-RO N-BOP/SRO	AOI-39, "Rapid Plant Shutdown," is entered as required by AOI-33, "Steam Generator Tube Leak."	
5	th12d	M-ALL	Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated.	
6	ms13d 5	M- ALL	When the reactor is tripped, steam line break occurs outside containment on #4 SG.	
7	ch09a ch09b	C-BOP	Failure of automatic Control Room Isolation.	
(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor				

Scenario 3 - Summary

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

Turnover Train A/Channel 1 Work Week. 1A-A Containment Spray (CS) pump is out-of-service for a pump bearing inspection. LCO 3.6.6 was entered 1 hour ago. 1A-A CS pump is expected to be returned to service in 24 hours. Protected equipment signs have been posted for 1B-B CS pump.

Event 1 N41 POWER RANGE fails high. Requires RO to take IMMEDIATE OPERATOR ACTION to place rod control in MANUAL. Requires BOP operator to place bias controls for SG 1 and 4 in MANUAL. Requires entry into AOI-4, "Nuclear Instrumentation Malfunctions." Requires a Tech Spec evaluation and entry into LCO 3.3.1 for multiple functions.

Event 2 Train A ERCW intake pumping station header ruptures at the common discharge of the A pumps. Requires entry into AOI-13, "Loss of Essential Raw Cooling Water." Requires a Tech Spec evaluation and entry into LCO 3.0.3.

Event 3 Steam generator tube leak of approximately 25 gpm develops on SG 4. Requires entry into AOI-33, "Steam Generator Tube Leak." Requires a Tech Spec evaluation and entry into LCO 3.4.13.

Event 4 AOI-39, "Rapid Plant Shutdown," is entered as required by AOI-33, "Steam Generator Tube Leak."

Event 5 Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection."

Event 6 When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires transition to E-2, "Faulted Steam Generator Isolation," then a transition to E-3, "Steam Generator Tube Rupture," and entry into ECA-3.1, "SGTR and LOCA - Subcooled Recovery."

Event 7 Control Room Isolation (CRI) fails to occur automatically or manually. Contingency actions are required in accordance with E-0, "Reactor Trip and Safety Injection," Appendix A, "Equipment Verification."

Scenario 3 - Critical Task Summary

- | | |
|-----------------|---|
| Critical Task 1 | Perform contingency actions in response to the failure of automatic Control Room Isolation (CRI) signal prior to completion of E-0, "Reactor Trip or Safety Injection," Appendix A, "Equipment Verification." |
| Critical Task 2 | Isolate feedwater to the faulted and ruptured steam generator prior to transitioning to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." |

Watts Bar Nuclear Plant
10-2011 NRC Examination Scenario 3
Simulator Console Operators Instructions

SIMULATOR SETUP INFORMATION

1. ENSURE Examination Security has been established.
2. RESET to Initial Condition 302 by performing the following actions:
 - a. Select ICManger on the THUNDERBAR menu (right hand side of Instructor Console Screen).
 - b. Locate IC# 302.
 - c. Right "click" on IC# 302.
 - d. Select Reset on the drop down menu.
 - e. Right "click" on RESET.
 - f. Enter the password for IC 302.
 - g. Select "Yes" on the INITIAL CONDITION RESET pop-up window.
 - h. Perform SWITCH CHECK.
3. SELECT Director on the THUNDERBAR menu (right hand side of Instructor Console Screen).
4. ENSURE the following information appears on the Director Screen:

Key	Description	Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
hs-72-34a-1	05080 cs hdr a isol vlv sw(green)	O		00:00:00	00:00:00	00:00:00		Off	Off
hs-72-27a-1	05040 cntmt sump hdr a fcv(green)	O		00:00:00	00:00:00	00:00:00		Off	Off
hs-72-22a-1	05020 rwsr spray hdr a fcv(green)	O		00:00:00	00:00:00	00:00:00		Off	Off
hs-72-39a-1	06020 cntmt spray pump a mtr sw(green)	O		00:00:00	00:00:00	00:00:00		Off	Off
hs-72-44a-1	05060 cs pump a recirc fcv(green)	O		00:00:00	00:00:00	00:00:00		Off	Off
si09k	failure of auto si for control room isolation	M		00:00:00	00:00:00	00:00:00		Active	Active
ni07a	pr channel output signal failure pr chnl 1	M	1	00:00:00		00:00:00		120	100.315

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Simulator Console Operators Instructions

SIMULATOR SETUP INFORMATION

Key	Description	Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
ms13d	MSLB loop 4 outside containment upstream MSIV	M	19	00:00:00		00:00:00		5	0
rw14a	ercw ips header a break	M	2	00:00:00		00:00:00		45	0
rwr05	valve fcv-67-22 breaker position	R	21	00:00:00		00:00:00		close	open
rwr12	power to appendix r valve 67-147	R	22	00:00:00		00:00:00		on	00:00:00
rwr22	power to appendix r valve 1-fcv-67-458	R	24	00:00:00		00:00:00		on	00:00:00
rwr29	power to 2-fcv-67-22 strainer 2a-a inlet	R	25	00:00:00		00:00:00		on	off
th05d	steam generator tube failure sg #4	M	3	00:00:00		00:00:00		1	0
th05d	steam generator tube failure sg #4	M	4	00:00:00		00:00:00		18	0

5. Place simulator in RUN and acknowledge any alarms.

6. ENSURE 1-HS-72-27A, CNTMT SPRAY PMP A is in Stop, Pull-to-Lock position and a Hold Notice (Red) Tag is placed on the handswitch. Place pink PROTECTED EQUIPMENT tag on 1-HS-72-10A, CNTMT SPRAY PMP B.

7. ENSURE the "Train A Week - Channel 1" sign is placed on 1-M-30.

8. Place simulator in FREEZE.

9. ENSURE Watts Bar Nuclear Plant Unit 1 Reactivity Briefing Book (Simulator Copy) MOL (Middle Of Life) is provided to the crew as part of the Turnover Package, and that the MOL placards are on 1-M-6, below the Boric Acid and Primary Water Integrators.

10. WHEN prompted by the Chief Examiner, place the Simulator in RUN.

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Simulator Console Operators Instructions

Exam Event No.	Simulator Event No.	Description/Role Play
1	1	<p>Power Range N41 fails high.</p> <p>ROLE PLAY: <i>When contacted as Work Control, repeat back request to prepare a package to troubleshoot and repair PR N41</i></p> <p>ROLE PLAY: <i>When contacted as Work Control, repeat back request for performance of IML-160.</i></p> <p>ROLE PLAY: <i>When contacted as Operations Duty Manager, repeat back information provided for N41 failure.</i></p> <p>ROLE PLAY: <i>When contacted as Reactor Engineering, repeat back information provided for N41 failure.</i></p>
2	2	<p>ERCW pipe break in the Intake Pumping Station.</p> <p>ROLE PLAY: <i>When contacted as an AUO to go to the Intake Pumping Station to help determine location of leak, repeat back request.</i></p> <p>ROLE PLAY: <i>When contacted as an AUO to go to the Reactor MOV boards to perform breaker operations to support leak isolation, repeat back request.</i></p> <p>ROLE PLAY: <i>When BOP directs the AUO at the Rx MOV board to UNLOCK, and CLOSE bkr on Rx MOV Bd 1A2-A c/7B, 1-FCV-67-22, repeat back direction and insert remote function rwr05 to "close."</i></p> <p>ROLE PLAY: <i>When BOP directs the AUO at the Rx MOV board to UNLOCK, and CLOSE bkr on Rx MOV Bd 1A2-A c/11B, 1-FCV-67-147, repeat back direction and insert remote function rwr12 to "on."</i></p> <p>ROLE PLAY: <i>When BOP directs the AUO at the Rx MOV board to UNLOCK, and CLOSE bkr on Rx MOV Bd 1A2-A c/15E, 1-FCV-67-458, repeat back direction and insert remote function rwr22 to "on."</i></p>

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Simulator Console Operators Instructions

Exam Event No.	Simulator Event No.	Description/Role Play
2	2	<p>ERCW pipe break in the Intake Pumping Station. (continued)</p> <p>ROLE PLAY: When BOP directs the AUO at the Rx MOV board to UNLOCK and CLOSE bkr on Rx MOV Bd 2A2-A c7B, 2-FCV-67-22, repeat back direction and insert remote function rwr29 to "on."</p> <p>ROLE PLAY: When contacted as Work Control, repeat back request to prepare a package to troubleshoot and repair the A ERCW header at the Intake Pumping Station.</p> <p>ROLE PLAY: If the SRO contacts the Duty System Engineer, repeat back the request for an evaluation on CCS.</p>
3	3	<p>Steam Generator 4 tube leak.</p> <p>When contacted as Operations Manager, the Console Operator will repeat back information provided.</p> <p>ROLE PLAY: When contacted as Chemistry to sample S/Gs, wait 10 minutes and report back elevated activity levels in S/G 4.</p> <p>ROLE Play: When contacted as RAD PRO to survey secondary steam lines, wait 10 minutes and report back elevated radiation levels around MSIV 4 and associated piping.</p> <p>When contacted as the Shift Manager for EPIP-1 and NPG-SPP-3.05 evaluation, repeat back the information provided.</p>
4	4	<p>AOI-39 "Rapid Plant Shutdown"</p> <p>When contacted as Chemistry to sample RCS for power change exceeding 15% in one hour, repeat back the information provided.</p> <p>When contacted as the Shift Manager for EPIP-1, repeat back the information provided.</p> <p>When contacted as the Load Coordinator, repeat back the information provided.</p> <p>When contacted as the Cond Demin AUO of pending pump shutdown, repeat back the information provided.</p>

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Exam Event No.	Simulator Event No.	Description/Role Play
5	n/a	Steam Generator 4 tube leak progresses to tube rupture. <i>If contacted as the Shift Manager for reportability evaluation, repeat back the information provided.</i>
6	n/a	Steam line break outside containment on #4 S/G. <i>ROLE PLAY: When contacted as an AUC to perform Attachment 1 of E-0, wait 5 minutes and report back that power has been removed from all Ice Condenser Air Handling units.</i> <i>ROLE PLAY: When contacted as an AUC to perform shutdown Upper and Lower CNTMT rad monitors in E-0, wait 5 minutes and report back that Upper and Lower CNTMT rad monitors have been shutdown.</i>
		<i>ROLE PLAY: When contacted as Chemistry to sample S/Gs, wait 10 minutes and report back elevated activity levels in S/G 4.</i>
		<i>ROLE PLAY: When contacted as RAD PRO to survey secondary steam lines, wait 10 minutes and report back elevated radiation levels around # 4 S/G blowdown line and steam piping.</i>
		<i>ROLE PLAY: If dispatched as an AUC to look for steam leaks, wait 10 minutes and report that there is steam in the South Valve Vault Room making it inaccessible.</i>
		<i>If contacted as TSC, repeat back the information provided.</i>
		<i>When contacted as the Shift Manager to refer to EPIP-1, repeat back the information provided.</i>
		<i>ROLE PLAY: When contacted as an AUC to Open 1-FCV-14-3, input malfunction fw11 to open 1-FCV-14-3, and report back when the valve is open.</i>
		<i>When contacted as Chemistry to sample boron concentration, repeat back the information provided.</i>
		<i>ROLE PLAY: When contacted as an AUC to perform Appendix A of ECA-3.1 to restore power to 1-FCV-63-1, insert remote sir14, and report back when power has been restored.</i>
		<i>If contacted as an AUC to place unloaded D/Gs in standby, repeat back the information provided.</i>

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Simulator Console Operators Instructions

Exam Event No.	Simulator Event No.	Description/Role Play
7	n/a	Failure of automatic Control Room Isolation. <i>If contacted as TSC, repeat back the information provided.</i>

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Event Description: Power Range Channel N41 fails high. Requires RO to take IMMEDIATE OPERATOR ACTION to place rod control in MANUAL. Requires BOP operator to place bias controls for SG 1 and 4 in MANUAL. Requires entry into AOI-4, "Nuclear Instrumentation Malfunctions." Requires a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
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Indications:

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	Will perform IMMEDIATE ACTION step of AOI-4, Requires entry into AOI-4, "Nuclear Instrumentation Malfunctions." AOI-4, "Nuclear Instrumentation Malfunctions," Section 3.4, "Power Range Monitor (PRM) Failure," to PLACE control rods in MANUAL and CHECK rod motion has STOPPED.
	RO	May enter and take actions of ARI 83-A POWER RANGE OVERPOWER ROD WD STOP.
	RO	May enter and take actions of ARI 115-C POWER RANGE FLUX HI.
	SRO	Enters and direct actions of AOI-4, Requires entry into AOI-4, "Nuclear Instrumentation Malfunctions." AOI-4, "Nuclear Instrumentation Malfunctions," Section 3.4, "Power Range Monitor (PRM) Failure."
AOI-4		The following actions are taken from AOI-4, "Nuclear Instrumentation Malfunctions," Section 3.4, "Power Range Monitor (PRM) Failure."

NOTE

Steps 1 and 2 are IMMEDIATE ACTION steps

	RO	1. PLACE control rods in MANUAL. <i>Since this is an IMMEDIATE ACTION step, 1-RBSS ROD BANK SELECT should be in MANUAL.</i>
	RO	2. CHECK rod motion STOPPED.
	RO	3. CHECK N41 Normal <i>RO determines that 1-NI-41B PR FLUX % POWER indicates full scale high at 120% power.</i>

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Event Description: Power Range Channel N41 fails high. Requires RO to take IMMEDIATE OPERATOR ACTION to place rod control in MANUAL. Requires BOP operator to place bias controls for SG 1 and 4 in MANUAL. Requires entry into AOI-4, "Nuclear Instrumentation Malfunctions." Requires a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
	BOP	<p>3. RESPONSE NOT OBTAINED:</p> <p>PLACE S/G 1 and S/G 4 Main FW reg valves in MANUAL.</p> <p>BOP lifts the toggle switch for 1-FIC-3-35, SG -1 MFW REG VLV up to place the controller in MANUAL.</p> <p>BOP lifts the toggle switch for 1-FIC-3-103, SG -4 MFW REG VLV up to place the controller in MANUAL.</p> <p>PLACE all Bypass FW reg valves in MANUAL.</p> <p>With the plant at 100% power, all bypass FW reg valves will be in MANUAL.</p> <p>ADJUST FW as required to maintain S/G levels on program.</p> <p>BOP adjusts the toggle switch for 1-FIC-3-35, SG -1 MFW REG VLV in MANUAL.</p> <p>BOP adjusts the toggle switch for 1-FIC-3-103, SG -4 MFW REG VLV in MANUAL.</p> <p>PLACE S/G 1 and S/G 4 LEVEL - NIS BIAS controllers in MANUAL.</p> <p>BOP adjusts the toggle switch for 1-LIC-3-231, NUC PWR - SG -1 LEVEL CONTROL to place the controller in MANUAL.</p> <p>BOP adjusts the toggle switch for 1-LIC-3-234, NUC PWR - SG -4 LEVEL CONTROL to place the controller in MANUAL.</p> <p>ADJUST bias controllers for S/Gs 1 and 4 to match demand output on S/Gs 2 and 3.</p> <p>BOP adjusts the toggle switch for 1-LIC-3-231, NUC PWR - SG -1 LEVEL CONTROL to match output with 1-LIC-3-232, NUC PWR - SG -3 LEVEL CONTROL controller output.</p> <p>BOP adjusts the toggle switch for 1-LIC-3-234, NUC PWR - SG -1 LEVEL CONTROL to match output with 1-LIC-3-232, NUC PWR - SG -3 LEVEL CONTROL controller output</p>
	BOP	<p>4. CHECK N42 Normal</p> <p>RO determines that 1-NI-42B PR FLUX % POWER indicates 100% power.</p>
	BOP	<p>5. CHECK N43 and N44 NORMAL</p> <p>RO determines that 1-NI-43B PR FLUX % POWER and 1-NI-44B PR FLUX % POWER indicate 100% power</p>

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Time	Position	Applicant's Actions or Behavior							

	RO	<p>6. IF Main FW reg valves controlling S/G level, THEN:</p> <p>a. ENSURE S/G Main FW reg valve level demand and level are matched.</p> <p>b. PLACE affected S/G Main FW reg valves in AUTO.</p> <p>BOP places the toggle switch for 1-FIC-3-35, SG -1 MFW REG VLV down to place the controller in AUTO.</p> <p>BOP places the toggle switch for 1-FIC-3-103, SG -4 MFW REG VLV up to place the controller in AUTO.</p>
<p align="center">NOTE</p> <p>Control rod withdrawal may not be possible if a PRM has failed high due to the 103% Rod Withdrawal Stop (C-2) (Annunciator window 83-A).</p>		
	BOP	<p>7. MAINTAIN T-avg and T-ref within 3°F.</p> <p>RO observes Tref-Auct Tavg on 1-TR-68-2B and determines that Auct T-avg and T-ref are within 3°F.</p>
	SRO	<p>8. ENSURE 1-NR-92-145 recording an operable power range channel.</p>
<p align="center">NOTE</p> <p>Inputs to 1-TR-68-2A include power range monitor, pressurizer pressure, ΔT and T-avg. Selection of an operable channel should consider other failures in addition to the failed power range monitor channel.</p>		
	BOP	<p>9. ENSURE 1-TR-68-2A placed to operable ΔT/OTΔT/OPΔT channel using 1-XS-68-2B, ΔT RC DR TR-68-2A LOOP SELECT [1-M-5].</p>
	SRO	<p>10. DEFEAT affected PRM functions:</p> <ul style="list-style-type: none"> • REFER TO Attachment 1, PRM Function At NIS Rack.
<p>EXAMINER: The following actions are taken from AOI-4, "Nuclear Instrumentation Malfunctions," Attachment 1, "PRM Function At NIS Rack."</p>		
<p align="center">NOTE</p> <p>The following annunciators may be affected by defeating a PRM channel:</p> <ul style="list-style-type: none"> • [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. 		

Op Test No.: <u>2</u>	Scenario # <u>3</u>	Event # <u>1</u>	Page <u>4</u> of <u>38</u>
Event Description: Power Range Channel N41 fails high. Requires RO to take IMMEDIATE OPERATOR ACTION to place rod control in MANUAL. Requires BOP operator to place bias controls for SG 1 and 4 in MANUAL. Requires entry into AOI-4, "Nuclear Instrumentation Malfunctions." Requires a Tech Spec evaluation.			
Time	Position	Applicant's Actions or Behavior	

	RO	<p>A. PERFORM the following steps for the affected PRM:</p> <p>1. PLACE DETECTOR CURRENT COMPARATOR switch for UPPER SECTION to failed channel.</p> <p><i>RO rotates UPPER SECTION handswitch from NORMAL to the left to the PRN41 position.</i></p> <p><i>RO observes the WHITE CHANNEL DEFEAT light LIT</i></p> <p>2. PLACE DETECTOR CURRENT COMPARATOR switch for LOWER SECTION to failed channel.</p> <p><i>RO rotates LOWER SECTION handswitch from NORMAL to the left to the PRN41 position.</i></p> <p><i>RO observes the WHITE CHANNEL DEFEAT light LIT</i></p>
<p align="center">NOTE</p> <p>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.</p>		
	RO	<p>3. PLACE ROD STOP BYPASS switch to failed channel.</p> <p><i>RO locates the ROD STOP BYPASS switch for N41 and N43, and rotates the handswitch from OPERATE to the left to the PRN41 position.</i></p>
	RO	<p>4. PLACE POWER MISMATCH BYPASS switch to failed channel.</p> <p><i>RO locates the POWER MISMATCH switch for N41 and N43, and rotates the handswitch from OPERATE to the left to the PRN41 position</i></p>
<p align="center">NOTE</p> <p>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.</p>		
	RO	<p>5. PLACE COMPARATOR CHANNEL DEFEAT switch to failed channel.</p> <p><i>RO rotates COMPARATOR CHANNEL DEFEAT handswitch from NORMAL to the left to the PRN41 position.</i></p> <p><i>RO observes the WHITE COMPARATOR DEFEAT light LIT</i></p>
<p align="center">NOTE</p> <p>On the following step, annunciator window 115-E, POWER RANGE FLUX RATE HI, will clear if the positive rate trip light is LIT.</p>		
	RO	<p>6. IF POSITIVE RATE TRIP is LIT, THEN RESET RATE MODE switch.</p> <p><i>RO locates the RATE MODE handswitch on 1-DWR-92-N41A-1, POWER RANGE A drawer and rotates RATE MODE handswitch from NORMAL to the left to the RESET position.</i></p>

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Time	Position	Applicant's Actions or Behavior							

EXAMINER: The following actions are taken from AOI-4, "Nuclear Instrumentation Malfunctions," Section 3.4, "Power Range Monitor (PRM) Failure."

	BOP	<p>11. IF Bypass FW reg. valves are in MANUAL AND controlling S/G level, THEN:</p> <p>a. ENSURE Bypass FW reg valves level demand and level are matched.</p> <p>b. PLACE Bypass FW reg. valves in AUTO.</p> <p>BOP determines the step is not applicable since the bypass reg valves are NOT controlling SG level.</p>
<p>CAUTION</p> <p>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.</p>		
	RO	<p>12. WHEN failed PRM defeated AND AUTO rod control desired, THEN:</p> <p>a. ENSURE T-avg and T-ref within 1°F.</p> <p>RO observes T-avg and T-ref within 1°F on 1-TR-68-2B, TREF & AUCT TAVG - °F.</p> <p>b. ENSURE zero demand on control rod position indication [1-M-4].</p> <p>RO observes that there is a zero demand indicated on the PASSIVE SUMMER ROD DEMAND on both CERPI displays.</p> <p>c. PLACE control rods in AUTO.</p> <p>RO rotates 1-RBSS from the MANUAL position to the right to the AUTO position.</p>
	RO	<p>13. INITIATE repairs on failed channel.</p> <p>When contacted as Work Control, the Console Operator will repeat back request to prepare a package to troubleshoot and repair PR N41</p>
	RO	<p>14. NOTIFY Work Control to have IM trip failed channel bistables.</p> <p>When contacted as Work Control, the Console Operator will repeat back request for performance of IMI-160.</p>
<p>CAUTION</p> <p>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.</p>		
	RO	<p>15. WHEN notified bistables are tripped, THEN CHECK lights and alarms referenced in Appendix A are LIT.</p>

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Event Description: Power Range Channel N41 fails high. Requires RO to take IMMEDIATE OPERATOR ACTION to place rod control in MANUAL. Requires BOP operator to place bias controls for SG 1 and 4 in MANUAL. Requires entry into AOI-4, "Nuclear Instrumentation Malfunctions." Requires a Tech Spec evaluation.									
Time	Position	Applicant's Actions or Behavior							

	SRO	<p>16. REFER TO Tech Specs: 3.3.1-1, "Rx Trip System (RTS)"</p> <p>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 $\leq 75\%$ 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.</p> <p>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.</p> <p>6. Overtemperature ΔT Condition W. Place channel in trip within 72 hours OR be in Mode 3 within 78 hours.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>
		<p>17. NOTIFY Operations Duty Manager and Rx Engineering of failed channel.</p> <p>When contacted as Operations Duty Manager, the Console Operator will repeat back information provided for N41 failure.</p> <p>When contacted as Reactor Engineering, the Console Operator will repeat back information provided for N41 failure.</p>
		<p>18. DO NOT CONTINUE with this Instruction UNTIL failed PRM repair is completed.</p>
EXAMINER: The crew briefing is optional. The next event may be entered prior to the brief.		
	SRO	<p>Crew Brief would typically be conducted for this event as time allows prior to the next event.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>3</u>	Event #	<u>1</u>	Page	<u>7</u>	of	<u>38</u>
Event Description: Power Range Channel N41 fails high. Requires RO to take IMMEDIATE OPERATOR ACTION to place rod control in MANUAL. Requires BOP operator to place bias controls for SG 1 and 4 in MANUAL. Requires entry into AOI-4, "Nuclear Instrumentation Malfunctions." Requires a Tech Spec evaluation.									
Time	Position	Applicant's Actions or Behavior							

	SRO	<p>Notifications should be addressed as applicable if not specifically addressed by the procedure or in the crew brief.</p> <p><u>Operations Management</u> - Typically Shift Manager.</p> <p><u>Maintenance Personnel</u> - Typically Work Control Center (WCC). (Note: Maintenance notification may be delegated to the Shift Manager).</p>
Cue Console Operator to insert Event 2, if not previously inserted.		

Op Test No.: 2 Scenario # 3 Event # 2 Page 8 of 38

Event Description: Train A ERCW intake pumping station header ruptures at the common discharge of the A pumps. Requires entry into AOI-13, "Loss of Essential Raw Cooling Water." Requires a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
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Indications:

170-E IPS VLV & STRNR ROOM A SUMP LEVEL HI

	RO	Diagnoses and announces the leak in the ERCW system in the Intake Pumping Station.
	SRO	Enters and directs actions of AOI-13, "Loss of Essential Raw Cooling Water."
ARI 170-E		The following actions are taken from ARI 170-E IPS VLV & STRNR ROOM A SUMP LEVEL HI.
	RO	[1] DISPATCH Operator to determine cause of alarm.
	RO	[2] VERIFY Sump Pumps START.
	RO	[3] LOCATE source of influent, and ISOLATE , if possible.
	RO	[4] IF necessary to drain liquid-filled systems, THEN THROTTLE drain valves.

Op Test No.: <u>2</u>	Scenario # <u>3</u>	Event # <u>2</u>	Page <u>9</u> of <u>38</u>
Event Description: Train A ERCW intake pumping station header ruptures at the common discharge of the A pumps. Requires entry into AOI-13, "Loss of Essential Raw Cooling Water." Requires a Tech Spec evaluation.			
Time	Position	Applicant's Actions or Behavior	

AOI-13		The following actions are taken from AOI-13, "Loss of Essential Raw Cooling Water," Section 3.5, "Supply Header Rupture in IPS; Supply header flow low with Strainer DP alarm DARK, AND IPS sump alarm LIT."
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. <i>BOP dispatches an AUO to the Intake Pumping Station to help determine location of leak.</i>
	BOP	2. DISPATCH AUO, with a radio, to the Rx MOV Bds. <i>BOP dispatches an AUO to the Reactor MOV boards to perform breaker operations to support leak isolation.</i>
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. <i>BOP determines that Train A Supply Header pressures are NOT at expected values.</i>
		3. RESPONSE NOT OBTAINED: PERFORM the following: a. UNLOCK , and CLOSE bkr on Rx MOV Bd 1A2-A c/7B, 1-FCV-67-22. <i>BOP directs the AUO at the Rx MOV board to UNLOCK, and CLOSE bkr on Rx MOV Bd 1A2-A c/7B, 1-FCV-67-22. Console Operator repeats back direction and inserts remote function rwr05 to "close."</i> b. UNLOCK , and CLOSE bkr on Rx MOV Bd 1A2-A c/11B, 1-FCV-67-147. <i>BOP directs the AUO at the Rx MOV board to UNLOCK, and CLOSE bkr on Rx MOV Bd 1A2-A c/11B, 1-FCV-67-147. Console Operator repeats back direction and inserts remote function rwr12 to "on."</i> c. UNLOCK , and CLOSE bkr on Rx MOV Bd 1A2-A c/15E, 1-FCV-67-458. <i>BOP directs the AUO at the Rx MOV board to UNLOCK, and CLOSE bkr on Rx MOV Bd 1A2-A c/15E, 1-FCV-67-458. Console Operator repeats back direction and inserts remote function rwr22 to "on."</i>

Op Test No.: <u>2</u>	Scenario # <u>3</u>	Event # <u>2</u>	Page <u>10</u> of <u>38</u>
Event Description: Train A ERCW intake pumping station header ruptures at the common discharge of the A pumps. Requires entry into AOI-13, "Loss of Essential Raw Cooling Water." Requires a Tech Spec evaluation.			
Time	Position	Applicant's Actions or Behavior	

	BOP	<p>3. RESPONSE NOT OBTAINED: (Continued from previous page)</p> <p>PERFORM the following:</p> <p>d. UNLOCK, and CLOSE bkr on Rx MOV Bd 2A2-A c/7B, 2-FCV-67-22.</p> <p>BOP directs the AUO at the Rx MOV board to UNLOCK and CLOSE bkr on Rx MOV Bd 2A2-A c/7B, 2-FCV-67-22. Console Operator repeats back direction and inserts remote function rwr29 to "on."</p> <p>e. ENSURE 1-FCV-67-223, ERCW Hdr 1B To 2A Xtie, OPEN.</p> <p>BOP determines from the "PD O" label that 1-FCV-67-223 is OPEN with power disconnected.</p> <p>f. ENSURE 2-FCV-67-223, ERCW Hdr 2A To 1B Xtie, OPEN.</p> <p>BOP determines from the "PD O" label that 2-FCV-67-223 is OPEN with power disconnected.</p> <p>g. OPEN 1-FCV-67-458, CCS Hx A Sup From Hdr 1B.</p> <p>BOP rotates 1-HS-67-458 CCS HX A SUP FROM HDR 1B to the right to the OPEN position, verifies RED indicating light is LIT, GREEN indicating light is DARK.</p>
	BOP	<p>h. STOP, and PULL TO LOCK all Tr A ERCW Pumps.</p> <p>BOP places handswitches 1-HS-67-28A, ERCW PMP A-A, 1-HS-67-32A, ERCW PMP B-A 1-HS-67-38A ERCW PMP C-A, 1-HS-67-40A ERCW PMP D-A in the STOP, PULL-TO-LOCK position.</p> <p>i. CLOSE 1-FCV-67-22, Strainer 1A-A Inlet.</p> <p>BOP rotates 1-FCV-67-22, STRAINER 1A-A INLET to the right to the OPEN position, verifies RED indicating light is LIT, GREEN indicating light is DARK.</p> <p>j. CLOSE 2-FCV-67-22, Strainer 2A-A Inlet.</p> <p>BOP rotates 2-FCV-67-22, STRAINER 2A-A INLET to the right to the OPEN position, verifies RED indicating light is LIT, GREEN indicating light is DARK.</p> <p>k. START additional Tr B ERCW Pumps as required.</p> <p>SRO evaluates starting additional Train B ERCW pumps.</p> <p>l. OPEN 1-FCV-67-147, CCS Hx C Sup From Hdr 1A.</p> <p>BOP rotates 1-HS-67-147A, CCS HX C SUP FROM HDR 1A to the right to the OPEN position, verifies RED indicating light LIT and GREEN indicating light is DARK.</p> <p>m. ENSURE 2-FCV-67-147, CCS Hx C Sup From Hdr 2B, is OPEN.</p> <p>BOP determines from the "PD O" label that 2-FCV-67-147A is OPEN with power disconnected.</p> <p>n. GO TO Step 5.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>3</u>	Event #	<u>2</u>	Page	<u>11</u>	of	<u>38</u>
Event Description: Train A ERCW intake pumping station header ruptures at the common discharge of the A pumps. Requires entry into AOI-13, "Loss of Essential Raw Cooling Water." Requires a Tech Spec evaluation.									
Time	Position	Applicant's Actions or Behavior							

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. <i>SRO may request that the BOP remain at the ERCW panel to check flows and pressures.</i>
	SRO	6. CHECK pump amps within limits. <i>BOP determines that amps on each running ERCW pump are normal.</i>
	BOP	7. REFER TO Tech Specs: • 3.0.3, Applicability <i>Since ERCW Trains are cross-connected, LCO 3.0.3 is applicable and the most limiting Tech Spec.</i> • 3.4.6, RCS Loops-Mode 4 • 3.7.8, Essential Raw Cooling Water System (ERCW). • 3.8.1, AC Sources-Operating
	BOP	8. EVALUATE ERCW availability to DGs.
	SRO	9. INITIATE repair. <i>When contacted as Work Control, the Console Operator will repeat back request to prepare a package to troubleshoot and repair the A ERCW header at the Intake Pumping Station.</i>
	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. <i>If the SRO contacts the Duty System Engineer, the Console operator will repeat back the request for an evaluation on CCS.</i>
	SRO	11. REFER TO SOI-67.01, Essential Raw Cooling Water System for system realignment. <i>SRO may request that the BOP refer to SOI-67.01, Essential Raw Cooling Water System for system realignment.</i>
	SRO	12. RETURN TO instruction in effect.

EXAMINER: The crew briefing is optional. The next event may be entered prior to the brief.

Op Test No.: 2 Scenario # 3 Event # 2 Page 12 of 38

Event Description: Train A ERCW intake pumping station header ruptures at the common discharge of the A pumps. Requires entry into AOI-13, "Loss of Essential Raw Cooling Water."
Requires a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
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	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. <u>Operations Management</u> - Typically Shift Manager. <u>Maintenance Personnel</u> – Typically Work Control Center (WCC). (Note: Maintenance notification may be delegated to the Shift Manager).
Cue Console Operator to insert Event 3, if not already entered.		

Op Test No.:	<u>2</u>	Scenario #	<u>3</u>	Event #	<u>3</u>	Page	<u>13</u>	of	<u>38</u>
Event Description:		Steam generator tube leak of approximately 25 gpm develops on SG 4. Requires entry into AOI-33, "Steam Generator Tube Leak." Requires a Tech Spec evaluation.							
Time	Position	Applicant's Actions or Behavior							
Indications: 175-B VAC PMP EXH 1-RM-119 RAD HI.									
	BOP	Announces 175-B, ARI-175-B, VAC PMP EXH 1-RM-119 RAD HI, then uses the ICS computer to diagnose the SG tube leak on SG 4.							
	BOP	May call Chemistry and request sampling of SGs for activity, recommending that SG 4 be sampled first.							
	BOP	May call Rad Prot and request surveys of the secondary plant due to a suspected SG tube leak.							
	RO	Informs the SRO of changing level in the PZR and VCT.							
	SRO	Enters and directs actions of AOI-33, "Steam Generator Tube Leak."							
EXAMINER: Ten minutes after Chemistry and or Radiation Protection are contacted to evaluate the SGs, Chemistry and/or Radiation Protection will call and provide preliminary data to the crew.									
ARI 175-B		The following actions are taken from ARI-175-B, VAC PMP EXH 1-RM-119 RAD HI.							
	RO	[1] REFER TO AOI-33, Steam Generator Tube Leak.							
	RO	[2] CHECK 1-RM-90-120 (R1020A) and 1-RM-90-121 (R1021A).							
	RO	[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).							
	RO	[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.									
	RO	[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.									
	RO	[6] NOTIFY Chemistry to perform CM-9.09 "Effluent Radiation Monitor Alarm Guidelines."							
	RO	[7] NOTIFY Radiation Protection to investigate alarm.							
	RO	[8] IF monitor declared inoperable, THEN NOTIFY Chemistry Countroom to initiate compensatory sampling.							

Op Test No.: <u>2</u>	Scenario # <u>3</u>	Event # <u>3</u>	Page <u>14</u> of <u>38</u>
Event Description: Steam generator tube leak of approximately 25 gpm develops on SG 4. Requires entry into AOI-33, "Steam Generator Tube Leak." Requires a Tech Spec evaluation.			
Time	Position	Applicant's Actions or Behavior	
	RO	[9] REFER TO AOI-31, Abnormal Release Of Radioactive Material.	
AOI-33		The following actions are taken from AOI-33, "Steam Generator Tube Leak."	
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. MAINTAIN PZR Level: 1. MAINTAIN pzr Level: a. CONTROL charging flow using 1-FCV-62-93 and 1-FCV-62-89 as necessary to maintain pzr level. <i>RO may place 1-HIC-62-93A, CHARGING FLOW PZR LEVEL CONTROL in MANUAL and raise charging flow. RO may also adjust 1-HIC-62-89 to establish proper seal flows as charging flow is raised.</i> b. CHECK letdown flow is 75 gpm. <i>RO checks 1-FI-62-82, LETDOWN FLOW indicates 75 gpm.</i>	
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	c. MONITOR pzr level STABLE or INCREASING. <i>RO determines that PZR level is stable, with increased charging flow.</i>	
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, • RAD PROT survey of main steamlines and SG blowdown lines. b. MONITOR Condenser Vacuum Exhaust and SG Blowdown Radiation Monitors <i>BOP utilizes the ICS computer to evaluate steam and feed flow mismatch to each SG and determines that SG 4 is leaking.</i>	

Op Test No.: <u>2</u>	Scenario # <u>3</u>	Event # <u>3</u>	Page <u>15</u> of <u>38</u>
Event Description: Steam generator tube leak of approximately 25 gpm develops on SG 4. Requires entry into AOI-33, "Steam Generator Tube Leak." Requires a Tech Spec evaluation.			
Time	Position	Applicant's Actions or Behavior	
	RO	<p>3. INCREASE VCT Auto Makeup:</p> <p>a. DOUBLE setting on Boric Acid and PW flow controllers <i>RO changes value on 1-FC-62-142, PW TO BLENDER FCV 62-143 CONTROL from approximately 35 to 70%.</i></p> <ul style="list-style-type: none"> • 1-FC-62-142 <p><i>RO changes value on 1-FC-62-139, BA TO BLENDER FCV-62-140 CONTROL from approximately 21 to 42%.</i></p> <ul style="list-style-type: none"> • 1-FC-62-139 <p>b. ENSURE RED light lit on 1-HS-62-140A <i>RO observes 1-HS-62-140A, VCT MAKEUP CONTROL handswitch RED indicating light LIT, GREEN indicating light DARK.</i></p>	
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	<p>4. MAINTAIN VCT level greater than 13%.</p>	
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.			
<p>EXAMINER: The applicants have enough evidence to determine SG 4 is leaking, and the leakage rate is approximately 25 gpm.</p>			
	SRO	<p>5. DETERMINE if Plant Shutdown Is Required:</p> <ul style="list-style-type: none"> • High Secondary Radiation, <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> • pzr level continues to decrease, <p style="text-align: center;">OR</p> <p>Charging flow continues to rise.</p> <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • Primary to secondary leakage in EXCESS of TS LCO 3.4.13 limits. <p><i>SRO determines from the net charging that the leakage rate is approximately 25 gpm, which is in excess of the TS LCO 3.4.13 limit of 150 gpd primary-to-secondary leakage and orders a plant shutdown.</i></p>	

Op Test No.: <u>2</u>	Scenario # <u>3</u>	Event # <u>3</u>	Page <u>16</u> of <u>38</u>
Event Description: Steam generator tube leak of approximately 25 gpm develops on SG 4. Requires entry into AOI-33, "Steam Generator Tube Leak." Requires a Tech Spec evaluation.			
Time	Position	Applicant's Actions or Behavior	
	SRO	<p>6. NOTIFY The Following:</p> <p>a. Plant personnel via PA system.</p> <ul style="list-style-type: none"> • "Attention plant personnel. The Unit has developed a S/G tube leak and Unit shutdown is in progress. Treat all leaks as radioactive." <p>b. Operations Manager.</p> <p>When contacted as Operations Manager, the Console Operator will repeat back information provided.</p> <p>c. RADPRO to survey secondary plant and site environment.</p> <p>When contacted as RADPRO to perform surveys, the Console Operator will repeat the request. If 10 minutes have elapsed since the first call was made to RADPRO, the Console Operator will provide information confirming higher radiation levels near SG 4 steam line.</p> <p>d. Chemistry to initiate the following:</p> <ul style="list-style-type: none"> • Hourly RCS Cb sampling. • CM-5.01, Primary to Secondary Leak Rate Methods. • CM-9.93, Abnormal Release Assessment (for unmonitored steam releases such as SG PORVs and TD AFWP). • 1-ODI-90-2, Steam Generator Blowdown Release. <p>When contacted as Chemistry to perform samples, the Console Operator will repeat the request. If 10 minutes have elapsed since the first call was made to Chemistry, the Console Operator will provide information confirming higher activity levels in SG 4.</p>	
	RO	<p>7. PERFORM The Following Evaluations:</p> <p>a. EVALUATE Tech Specs for applicability:</p> <ul style="list-style-type: none"> • 3.4.13, RCS Operational Leakage, <p>Condition B. Required Action and associated Completion Time of Condition A not met, OR Pressure boundary LEAKAGE exists OR Primary-to-secondary LEAKAGE not within limit then Be in MODE 3 within 6 hours and be in MODE 5 within 36 hours.</p> <ul style="list-style-type: none"> • 3.7.5, Auxiliary Feedwater (AFW) System, • 3.7.6, Condensate Storage Tank (CST), • 3.7.14, Secondary Specific Activity, <p>b. EVALUATE EPIP-1, Emergency Plan Classification Matrix.</p> <p>SRO contacts the Shift Manager and Console Operator repeats back request that EPIP-1 be evaluated.</p> <p>c. EVALUATE NPG-SPP-03.5 reportability.</p> <p>SRO contacts the Shift Manager and Console Operator repeats back request for an evaluation of NPG-SPP-3.05.</p>	

Op Test No.:	<u>2</u>	Scenario #	<u>3</u>	Event #	<u>3</u>	Page	<u>17</u>	of	<u>38</u>
Event Description:		Steam generator tube leak of approximately 25 gpm develops on SG 4. Requires entry into AOI-33, "Steam Generator Tube Leak." Requires a Tech Spec evaluation.							
Time	Position	Applicant's Actions or Behavior							
	RO	8. CHECK Unit Load - GREATER THAN 30%.							
	RO	9. INITIATE unit shutdown USING AOI-39, Rapid Load Reduction while continuing with this procedure.							
	RO	10. MONITOR CST Level - GREATER THAN 200,000 GAL.							
	RO	11. MINIMIZE Secondary System Contamination: a. CONTROL Condensate return to CST: 1) PLACE 1-LIC-2-3, in MANUAL, and CLOSE. 2) MAINTAIN condenser level 1-LR-2-12 on- scale [1-M-3]. b. CHECK Cond DI - BYPASSED. c. INITIATE Attachment 1, Minimize Secondary Contamination, to realign turbine bldg sump to unlined pond.							
	RO	12. CHECK Reactor Trip Breakers - OPEN.							

Op Test No.: 2 Scenario # 3 Event # 4 Page 18 of 38

Event Description: AOI-39, "Rapid Plant Shutdown," is entered as required by AOI-33, "Steam Generator Tube Leak," Section 3.2, "Reactor power is greater than 50%."

Time

Position

Applicant's Actions or Behavior

AOI-39

The following actions are taken from AOI-39, "Rapid Load Reduction," Section 3.2, "Reactor power is greater than 50%."

CAUTION**Over boration may result in excessive rod withdrawal, T-avg lower than desired, and AFD oscillations.****NOTE**

- Rod Control should remain in automatic for T-avg 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

1. INITIATE a manual boration:

- DETERMINE** recommended boration flow rate and volume from Reactivity Briefing Sheet:

RO determines the recommended boration flow rate to be 31 to 40 gpm and the volume to add to be 910 gallons of boron.

- INITIATE** normal boration:

- ADJUST** BA flow controller, 1-FC-62-139, to desired flow rate.

RO adjusts 1-FC-62-139 to the value corresponding to the flow rate for the selected load reduction rate.

- ADJUST** BA batch counter 1-FQ-62-139 to required quantity.

RO adjusts 1-FQ-62-139 BA BATCH COUNTER as follows:

- Depresses and holds the black pushbutton.**
- While holding the pushbutton, the applicant raises the red translucent cover.**
- While still holding the pushbutton, the applicant enters "000910" in the display.**
- While still holding the pushbutton, the applicant lowers the red translucent cover, and then releases the pushbutton.**
- PLACE** mode selector 1-HS-62-140B to BOR.

RO rotates 1-HS-62-140B VCT MAKEUP MODE from AUTO to the right to BOR position.

- (p) PLACE** VCT makeup control 1-HS-62-140A, to START.

RO rotates 1-HS-62-140A, VCT MAKEUP CONTROL to the right to the START position.

- VERIFY** desired boric acid flow indicated on 1-FI-62-139.

RO observes the desired flow on 1-FI-62-139, BA TO BLENDER FLOW

Op Test No.: 2 Scenario # 3 Event # 4 Page 19 of 38

Event Description: AOI-39, "Rapid Plant Shutdown," is entered as required by AOI-33, "Steam Generator Tube Leak," Section 3.2, "Reactor power is greater than 50%."

Time

Position

Applicant's Actions or Behavior

CAUTION

- **Condenser Backpressure limits are on page 5.**
- **TURBINE MANUAL** Operation requires continuous operator monitoring and control.
- **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

BOP

2. **ESTABLISH** a turbine load reduction rate less than or equal to 5%/min:
- PLACE** turbine in IMP IN
BOP depressed the "IMP IN" pushbutton and observes the transfer from "IMP OUT" to "IMP IN" control complete.
 - SET** a desired load in the SETTER with the REFERENCE CONTROL.
BOP depresses the reference control ▽ (down) button to reduce the setter display to less than 20% load or as directed by the SRO.
 - SET** the LOAD RATE at less than or equal to 5%/min.
BOP selects the load reduction rate directed by the SRO using the LOAD RATE % PER MIN thumbwheel selector. It is expected that a load reduction rate of 2-4%/minute will be used
 - (p) **DEPRESS** GO pushbutton.
BOP depresses the REFERENCE CONTROL "GO" button.

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
SRO contacts the Shift Manager and Console Operator repeats back request that EPIP-1 be evaluated

SRO

5. **NOTIFY** the Load Coordinator of the required load reduction and expected ramp rate
When the SRO contacts Load Coordinator, the Console Operator will repeat back the information provided.

RO

6. **MONITOR** T-avg and T-ref:
- T-ave trending to T-ref.
 - Mismatch less than 5°F.

Op Test No.: 2 Scenario # 3 Event # 4 Page 20 of 38

Event Description: AOI-39, "Rapid Plant Shutdown," is entered as required by AOI-33, "Steam Generator Tube Leak," Section 3.2, "Reactor power is greater than 50%."

Time	Position	Applicant's Actions or Behavior
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	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, THEN NOTIFY Chemistry to initiate 1-SI-68-28.

EXAMINER: When load has been reduced to 90%, the Console Operator will increase the severity of the leak from 1.75 to 18% by entering Event 5.

The change in flowrate will require the crew to initiate a reactor trip, verify the trip and then actuate safety injection. These actions are based on AOI-33, Step 1.c. **RESPONSE NOT OBTAINED.**

AOI-33

The following actions are taken from AOI-33, "Steam Generator Tube Leak."

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	c. MONITOR pzr level STABLE or INCREASING. <i>RO determines that PZR level is dropping rapidly, with increased charging flow.</i>
		1.c. RESPONSE NOT OBTAINED: PERFORM the following; a. ISOLATE letdown as necessary. b. INCREASE chg flow, and start additional CCP as needed. c. IF loss of pzr level is imminent, THEN 1) (p) TRIP the reactor. 2) WHEN reactor trip is verified, THEN INITIATE Safety Injection. 3) GO TO E-0, Reactor Trip or Safety Injection, Step 1. d. IF second CCP was started, THEN NOTIFY SM for reportability evaluation.

Op Test No.:	<u>2</u>	Scenario #	<u>3</u>	Event #	<u>5, 6, and 7</u>	Page	<u>21</u>	of	<u>38</u>
Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.									
Time	Position	Applicant's Actions or Behavior							

E-0		The following actions are taken from E-0, "Reactor Trip or Safety Injection."
NOTE		
<ul style="list-style-type: none"> Steps 1 thru 4 are IMMEDIATE ACTION STEPS. Status Trees / SPDS should be monitored when transitioned to another instruction. 		
	RO	<p>1. ENSURE reactor trip:</p> <ul style="list-style-type: none"> Reactor trip and bypass breakers OPEN. <p><i>RO checks 1-52RTB, RX TRIP BKR A GREEN indicating light LIT on panel 1-M-4.</i></p> <p><i>RO checks 1-52RTB, RC TRIP BKR B GREEN indicating light LIT on panel 1-M-4</i></p> <p><i>RO checks 1-52BYA, BYPASS BKR A lights DARK</i></p> <p><i>RO checks 1-52BYB, BYPASS BKR B lights DARK</i></p> <ul style="list-style-type: none"> RPIs at bottom of scale. <p><i>RO observes 1-MON 85 5000/1 CERPI Monitor 1 and 1-MON-85 5000/2 CERPI MONITOR 2 for indication that all SHUTDOWN and CONTROL bank rods are inserted.</i></p> <ul style="list-style-type: none"> Neutron flux DROPPING. <p><i>RO observes neutron flux trending down on 1-NR-92-145, NEUTRON FLUX LEVEL RECORDER. May also observe levels decreasing on 1-NI-92-135A, CH I NEUTRON MON % PWR, and 1-NI-92-136A, CH II NEUTRON MON % PWR.</i></p>
	RO	<p>2. ENSURE Turbine Trip:</p> <ul style="list-style-type: none"> All turbine stop valves CLOSED. <p><i>RO observes that indicating lights on 1-XX-47-1000 EHC CONTROL for individual throttle and governor valves are GREEN.</i></p>
	RO	<p>3. CHECK 6.9 kV shutdown boards:</p> <p>a. At least one board energized from:</p> <p style="padding-left: 40px;">CSST (offsite),</p> <p style="padding-left: 40px;">OR</p> <p style="padding-left: 40px;">D/G (blackout).</p>

Op Test No.:	<u>2</u>	Scenario #	<u>3</u>	Event #	<u>5, 6, and 7</u>	Page	<u>22</u>	of	<u>38</u>
Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>4. CHECK SI actuated:</p> <p>a. Any SI annunciator LIT.</p> <p><i>RO will announce that the window 70-A, SI ACTUATED is LIT. May also announce that FIRST OUT 76-G SI MANUAL is LIT.</i></p> <p>b. Both trains SI ACTUATED.</p> <ul style="list-style-type: none"> • 1-XX-55-6C • 1-XX-55-6D
<p>EXAMINER: E-0, "Reactor Trip or Safety Injection," Appendixes A and B are included as Attachment 1.</p>		
<p>Critical Task 1</p> <p><i>Perform contingency actions in response to the failure of automatic Control Room Isolation (CRI) signal prior to completion of E-0, "Reactor Trip or Safety Injection," Appendix A, "Equipment Verification."</i></p>		
	BOP	<p>5. PERFORM Appendixes A and B, E-0, pages 16-30.</p> <p><i>BOP is assigned to perform actions contained in the Appendices. A separate copy of the Appendices is contained in this package for Examiner use.</i></p> <p><i>The Control Room Isolation has failed to actuate automatically.</i></p> <p><i>The failure of the signal to occur on either train is identified by observing</i></p> <p><i>1-XX-55-6C, MASTER ISOL SIGNAL STATUS PNL, CRI light DARK</i></p> <p><i>1-XX-55-6D, MASTER ISOL SIGNAL STATUS PNL, CRI light DARK.</i></p> <p><i>The signal is actuated manually using 1-HS-31-177A, MCR ISOL TR-A and 1-HS-31-177B, MCR ISOL TR-B.</i></p> <p><i>The BOP may also identify the failure of the Control Room Isolation (CRI) during the performance of E-0, "Reactor Trip or Safety Injection," Appendix A, "Equipment Verification," Steps 23, 24, 25 and 26.</i></p>
	SRO	<p>6. ANNOUNCE reactor trip and safety injection over PA system.</p>

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Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.									
Time	Position	Applicant's Actions or Behavior							

	RO	7. ENSURE secondary heat sink available with either: <ul style="list-style-type: none"> • Total AFW flow greater than 410 gpm, OR <ul style="list-style-type: none"> • At least one S/G NR level greater than 29% [39% ADV].
	RO	8. MONITOR RCS temperature stable at or trending to 557°F using: <ul style="list-style-type: none"> • RCS Loop T-avg with any RCP running, OR <ul style="list-style-type: none"> • RCS Loop T-cold with RCPs out-of-service.
	RO	8. RESPONSE NOT OBTAINED IF temp less than 557°F, THEN ENSURE steam dumps and S/G PORVs CLOSED. IF cooldown continues, THEN CONTROL total AFW flow to maintain greater than 410 gpm UNTIL NR level in at least one S/G greater than 29% [39% ADV]. <i>RO takes manual control of AFW LCV's and reduces AFW flow.</i> IF cooldown continues after AFW flow is controlled, THEN <ul style="list-style-type: none"> • PLACE steam dump controls OFF. <i>RO rotates 1-HS-1-103A, STEAM DUMP FSV A, and 1-HS-103B STEAM DUMP FSV B to the left to the "OFF RESET" position.</i> <ul style="list-style-type: none"> • CLOSE MSIVs. <i>RO rotates handswitches 1-HS-1-4A, 1-HS-1-11A, 1-HS-1-22A, and 1-HS-1-29A to the CLOSE position and verifies GREEN and BLUE lights LIT for each MSIV.</i> <ul style="list-style-type: none"> • ENSURE MSIV bypasses CLOSED. <i>RO observes bypass valves are closed with label plate PD/C (Power Disconnected Closed)</i> IF RCS temp greater than 564°F, THEN ENSURE either steam dumps or S/G PORVs OPEN.
	RO	9. ENSURE excess letdown valves CLOSED: <ul style="list-style-type: none"> • 1-FCV-62-54 • 1-FCV-62-55 <i>RO observes GREEN indicating lights LIT on handswitches 1-HS-62-54A, EXCESS LTDN ISOL, and 1-HS-62-55A, EXCESS LTDN.</i>

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Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>10. CHECK pZR PORVs and block valves:</p> <p>a. PZR PORVs CLOSED.</p> <p>b. At least one block valve OPEN.</p> <p><i>RO observes 1-HS-68-340AA, PZR PORV 340A, CLOSED, GREEN indicating light is LIT, RED indicating light is DARK.</i></p> <p><i>RO observes 1-HS-68-334A, PZR PORV 334, CLOSED, GREEN indicating light is LIT, RED indicating light is DARK.</i></p> <p><i>RO observes 1-HS-68-333A, BLOCK VLV FOR PORV 340A, OPEN, GREEN indicating light is DARK, RED indicating light is LIT.</i></p> <p><i>RO observes 1-HS-68-332A, BLOCK VLV FOR PORV 334, OPEN, GREEN indicating light is DARK, RED indicating light is LIT.</i></p>
	RO	<p>11. CHECK pZR safety valves CLOSED:</p> <ul style="list-style-type: none"> EVALUATE tailpipe temperatures and acoustic monitors. <p><i>RO observes response of 1-TI-68-330, SAFETY 68-563 TAILPIPE TEMP, 1-TI-68-329, SAFETY 68-564 TAILPIPE TEMP, and 1-TI-68-328, SAFETY 68-565, stable at approximately 110 °F.</i></p> <p><i>BOP may observe 1-XI-68-363, PZR VALVES ACOUSTIC MONITOR indicating lights are DARK for 1-XI-68-363 (68-563), 1-XI-68-364 (68-564) and 1-XI-68-365 (68-565)</i></p>
	RO	<p>12. CHECK pZR sprays CLOSED.</p> <p><i>RO observes the pZR spray valves closed by GREEN indicating lights LIT for 1-XI-68-340B, PZR SPRAY LOOP 2 and 1-XI-68-340D, PZR SPRAY LOOP 1.</i></p>
<p style="text-align: center;">NOTE</p> <p>Seal injection flow should be maintained to all RCPs.</p>		
	RO	<p>13. CHECK if RCPs should remain in service:</p> <p>a. Phase B signals DARK [MISSP].</p> <p>b. RCS pressure greater than 1500 psig.</p>

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Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.

Time	Position	Applicant's Actions or Behavior
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	RO	<p>14. CHECK S/G pressures:</p> <ul style="list-style-type: none"> • All S/G pressures controlled or rising. <p>RO observes PAM pressure instruments on SG 1 through 4 (black labels) and determines that SG 4 pressure is dropping. May also observe trends on 1-PR-1-2, SG 1 & 2 PRESS PSIG, and 1-PR-1-23, SG 3 & 4 PRESS PSIG to assess this step.</p> <ul style="list-style-type: none"> • All S/G pressures greater than 120 psig. <p>RO observes PAM pressure instruments on SG 1 through 4 (black labels) and determines that pressures are greater than 120 psig.</p>
		<p>14. RESPONSE NOT OBTAINED:</p> <p>IF S/G pressure low OR dropping uncontrolled, THEN GO TO E-2, Faulted Steam Generator Isolation.</p>

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Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.

Time	Position	Applicant's Actions or Behavior
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E-2

The following steps 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.
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: <ul style="list-style-type: none"> • 1-HS-1-103A, STEAM DUMP FSV "A". • 1-HS-1-103B, STEAM DUMP FSV "B". Step already performed as part of E-0.
	RO	3. CHECK for at least one Intact S/G: <ul style="list-style-type: none"> • Any S/G pressure controlled or rising, OR <ul style="list-style-type: none"> • Any S/G pressure greater than P-sat for RCS incore temperature. BOP determines that SG 1, 2 and 3 are intact.
		4. IDENTIFY Faulted S/G based on ANY of the following: <ul style="list-style-type: none"> • Any S/G pressure dropping in an uncontrolled manner, OR <ul style="list-style-type: none"> • Any S/G pressure less than 120 psig, OR <ul style="list-style-type: none"> • S/G enclosure temps high: <ol style="list-style-type: none"> 1) T1002A for 2 and 3, 2) T1003A for 1 and 4. OR <ul style="list-style-type: none"> • Local indication of break in any of the following: <ul style="list-style-type: none"> • Main steam lines, • Main feedwater lines, • Other secondary piping. BOP determines from SG 4 pressure response that it is the faulted SG.

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Event Description:	5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.								
Time	Position	Applicant's Actions or Behavior							

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 S/G.
- RCS cooldown requires the availability of at least one S/G.

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Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.

Time	Position	Applicant's Actions or Behavior
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Critical Task 2

Isolate feedwater to the faulted and ruptured steam generator prior to transitioning to ECA-3.1, "SGTR and LOCA - Subcooled Recovery."

		<p>5. ISOLATE Faulted S/G:</p> <p>a. ISOLATE AFW flow to Faulted S/G.</p> <p>BOP rotates 1-HS-3-171 SG 4 SUPPLY LCV-3-171 CNTL to the ACC RESET MODULATE position, then rotates the handswitch to the CLOSE position and Pulls the switch to lock.</p> <p>BOP may depress 1-LIC-3-171A, SG 4 SUPPLY FRM PMP B-B "M" pushbutton and lock the "slider" in the CLOSED position.</p> <p>BOP rotates 1-HS-3-174 SG 4 SUPPLY LCV-3-175 CNTL to the ACC RESET MODULATE position, then rotates the handswitch to the CLOSE position and Pulls the switch to lock.</p> <p>BOP may depress 1-LIC-3-175A, SG 4 SUPPLY FRM TD PMP "M" pushbutton and lock the "slider" in the CLOSED position.</p> <p>b. ENSURE MFW ISOLATED to Faulted S/G:</p> <ul style="list-style-type: none"> • MFW isolation and bypass isolation valves CLOSED. • MFW reg and bypass reg valves CLOSED. • MFPs TRIPPED. <p>c. ENSURE Faulted S/G PORV CLOSED.</p> <p>BOP places 1-HS-1-31, SG 4 PORV PCV-1-30 in the "CLOSE" position.</p> <p>d. ENSURE Faulted S/G blowdown ISOLATED.</p> <p>BOP observes 1-HS-1-32/184, SG 4 BLOWDOWN VLVE is CLOSED by RED indicating light DARK and GREEN indicating light LIT.</p>
<p style="text-align: center;">NOTE</p> <p>TD AFW pump steam supply should NOT be aligned from a S/G with a known primary to secondary leak if other AFW sources are available.</p>		
		<p>6. ENSURE TD AFW pump being supplied from Intact S/G.</p> <p>BOP determines that the TD AFW pump is being supplied from SG 1.</p>
		<p>7. MONITOR CST volume greater than 200,000 gal.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>3</u>	Event #	<u>5, 6, and 7</u>	Page	<u>29</u>	of	<u>38</u>
Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.									
Time	Position	Applicant's Actions or Behavior							

		8. WHEN RCS temperature is stable or rising following Faulted S/G blowdown, THEN ADJUST Intact S/G PORV controllers in AUTO to: <ul style="list-style-type: none"> • P-sat for the highest RCS temp (one or more RCPs running) <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • P-sat for the highest T-cold temp (no RCPs running)
		9. CHECK secondary side radiation: <ul style="list-style-type: none"> • S/G discharge monitors NORMAL. • Condenser vacuum exhaust rad monitors NORMAL. <p><i>SRO recalls that a tube leak event was in progress prior to the trip and enters the RESPONSE NOT OBTAINED column for actions.</i></p> <ul style="list-style-type: none"> • S/G blowdown rad monitor recorders NORMAL trend prior to isolation. • S/G sample results by Chemistry.
		9. RESPONSE NOT OBTAINED: IF rad monitors NOT available, THEN: <ol style="list-style-type: none"> a. NOTIFY Radiation Protection to survey main steam lines and S/G blowdown lines. b. NOTIFY Chemistry to sample S/G activity. <p>IF radiation is high, THEN ** GO TO E-3, Steam Generator Tube Rupture.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>3</u>	Event #	<u>5, 6, and 7</u>	Page	<u>30</u>	of	<u>38</u>
Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.									
Time	Position	Applicant's Actions or Behavior							

E-3		The following steps are taken from E-3
NOTE		
Early notification of Radiation Protection 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.		
	RO	2. CHECK if RCPs should remain in service: a. Phase B DARK [MISSP]. b. RCS pressure greater than 1500 psig.
	SRO	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 • RP Survey. OR • Chemistry sample. <i>Previous diagnosis had indicated that SG 4 was the Ruptured SG.</i>

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Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.									
Time	Position	Applicant's Actions or Behavior							

	SRO	<p>4. ENSURE Ruptured S/G PORV aligned:</p> <p>a. ENSURE controller in AUTO set at 90%.</p> <p>b. ENSURE HS in P-AUTO.</p> <p><i>During performance of E-2 actions, SG 4 PORV may have been placed in the CLOSED position.</i></p> <p>c. WHEN Ruptured S/G pressure less than 1130 psig. THEN</p> <p>1) ENSURE Ruptured S/G PORV CLOSED,</p> <p>OR</p> <p>2) OBTAIN Radiation Protection support AND Locally CLOSE Ruptured S/G isolation valve:</p> <ul style="list-style-type: none"> • Loop 1, 1-ISV-1-619 [South Valve Room]. • Loop 2, 1-ISV-1-620 [North Valve Room]. • Loop 3, 1-ISV-1-621 [North Valve Room]. • Loop 4, 1-ISV-1-622 [South Valve Room].
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	<p>5. ENSURE TD AFW pump being supplied from Intact S/G.</p> <p><i>BOP determines that the TD AFW pump is being supplied from SG 1.</i></p>
<p>EXAMINER: Since SG 1 is supplying steam to the TD AFW pump, the RESPONSE NOT OBTAINED actions may not be immediately required. However, the action is provided for evaluation WHEN SG 1 pressure drops to a point where it can no longer provide required steam flow.</p>		
	BOP	<p>5. RESPONSE NOT OBTAINED:</p> <p>ENSURE at least one MD AFW pump aligned to an Intact S/G, AND ISOLATE steam to TD AFW pump:</p> <p>a. INITIATE electrical overspeed trip USING 1-HS-46-55A-S.</p> <p>b. CLOSE 1-FCV-1-17.</p> <p>c. CLOSE 1-FCV-1-18.</p>
	SRO	<p>6. ENSURE Ruptured S/G blowdown isolated.</p> <p><i>BOP observes 1-HS-1-32/184, SG 4 BLOWDOWN VLVE is CLOSED by RED indicating light DARK and GREEN indicating light LIT.</i></p>

Op Test No.:	<u>2</u>	Scenario #	<u>3</u>	Event #	<u>5, 6, and 7</u>	Page	<u>32</u>	of	<u>38</u>
Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.									
Time	Position	Applicant's Actions or Behavior							

CAUTION		
At least one S/G must be maintained available for RCS cooldown.		
	RO	7. CLOSE Ruptured S/G MSIV and bypass valve. <i>RO rotates 1-HS-1-29A, MSIV SG 4 to the left to the CLOSE position.</i> <i>RO determines that 1-HS-1-150, SG 4 MSIV BYPASS WARNING LINE has power disconnected and is closed, based on the PD C label.</i>
CAUTION		
If any Ruptured S/G is also faulted, feed flow should remain isolated in subsequent steps UNLESS needed for RCS cooldown.		
	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]. <i>BOP abides by the CAUTION and does not feed SG 4.</i>
	RO	9. PLACE dumpback valve to CST, 1-LIC-2-3, in MANUAL AND CLOSE valve. <i>BOP places 1-LIC-2-3, DUMPBACK TO CST FROM HW PMP DISCH slider in the "M" position to take manual control of the controller.</i> <i>BOP depresses the CLOSE pushbutton and verifies that the position indicator indicates CLOSE.</i>
	BOP	10. MAINTAIN condenser level 1-LR-2-12 on-scale [M-3]
	SRO	10. RESPONSE NOT OBTAINED: NOTIFY TSC to evaluate options: • Dumpback to CST A or B, OR • Drain hotwell to TB Sump.

Op Test No.:	<u>2</u>	Scenario #	<u>3</u>	Event #	<u>5, 6, and 7</u>	Page	<u>33</u>	of	<u>38</u>
Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.									
Time	Position	Applicant's Actions or Behavior							

	BOP	11. DISPATCH operator to OPEN 1-FCV-14-3 to bypass condensate DI. <i>BOP observes 1-ZI-14-3 CNDS DEMIN BYPASS FCV-14-2 RED light LIT and GREEN light DARK. If/When the BOP dispatches the Cond DI AUO to ensure 1-FCV-14-3 is OPEN locally, report back that the valve is OPEN.</i>
	SRO	12. ENSURE Radiation Protection dispatched to survey secondary plant. <i>BOP contacts Radiation Protection and the Console Operator repeats back request survey the secondary plant.</i>
	SRO	13. NOTIFY Chemistry to obtain samples as necessary for confirming Ruptured S/G. <i>BOP contacts Chemistry and Console Operator repeats back request to continue sampling of SGs.</i>
	SRO	14. NOTIFY plant personnel of potential contaminated release.
	SRO	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. <i>SRO observes that flowpaths have been isolated.</i>
	BOP	16. CHECK Ruptured S/G pressure greater than 690 psig.
	SRO	16. RESPONSE NOT OBTAINED: GO TO ECA-3.1, SGTR and LOCA - Subcooled Recovery.

Op Test No.:	<u>2</u>	Scenario #	<u>3</u>	Event #	<u>5, 6, and 7</u>	Page	<u>34</u>	of	<u>38</u>
Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.									
Time	Position	Applicant's Actions or Behavior							

ECA-3.1		The following steps are taken from ECA-3.1, "SGTR and LOCA - Subcooled Recovery."
SRO		<p>1. PREPARE for switchover to RHR cntmt sump:</p> <p style="margin-left: 20px;">a. RESTORE power to 1-FCV-63-1 USING Appendix A (ECA-3.1), 1-FCV-63-1 Breaker Operation.</p> <p style="margin-left: 20px;">b. WHEN RWST level is less than 34%, THEN GO TO ES-1.3, Transfer to RHR Containment Sump.</p> <p><i>RO dispatches an AUO to perform Appendix A of ECA-3.1 to restore power to 1-FCV-63-1. Console Operator repeats back direction and inserts remote function sir14 to "on."</i></p>
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		<p>2. RESET SI, AND CHECK the following:</p> <ul style="list-style-type: none"> • SI ACTUATED permissive DARK. • AUTO SI BLOCKED permissive LIT. <p><i>RO depresses SI RESET pushbuttons and verifies SI ACTUATED (70-A) is DARK and AUTO SI BLOCKED (70-B) is LIT.</i></p>
RO		<p>3. RESET Phase A and Phase B.</p> <p><i>RO depresses each PHASE A RESET pushbuttons and verifies ϕA indicators on 1-XX-55-6C and 1-XX-55-6D are DARK.</i></p> <p><i>RO depresses both PHASE B RESET pushbuttons and verifies ϕB indicators on 1-XX-55-6C and 1-XX-55-6D are DARK.</i></p>
BOP		<p>4. ENSURE cntmt air in service:</p> <p style="margin-left: 20px;">a. Aux air press greater than 75 psig [M-15].</p> <p style="margin-left: 20px;">b. Cntmt air supply valves OPEN [M-15]:</p> <ul style="list-style-type: none"> • 1-FCV-32-80. • 1-FCV-32-102. • 1-FCV-32-110. <p><i>BOP verifies air pressure on 0-PI-32-104A and 0-PI-32-105A is greater than 75 psig. BOP verifies RED indicating light is LIT for handswitches 1-HS-32-80A, 1-HS-32-102A, and 1-HS-32-110A.</i></p>

Op Test No.:	<u>2</u>	Scenario #	<u>3</u>	Event #	<u>5, 6, and 7</u>	Page	<u>35</u>	of	<u>38</u>
Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.									
Time	Position	Applicant's Actions or Behavior							

	SRO	<p>5. MONITOR electrical board status:</p> <ul style="list-style-type: none"> a. CHECK offsite power available. b. CHECK all shutdown boards ENERGIZED by offsite power. c. CHECK all unit boards ENERGIZED. d. PLACE any unloaded D/G in standby USING SOI-82 Diesel Generators. <p>BOP verifies the normal feeder breakers are shut for 1A and 1B Shutdown Boards and both boards are energized using meters 1-EI-57-39 and 1-EI-57-66.</p>
NOTE		
Backup heater C bank may need to be placed in AUX at the breaker compt to ensure it is turned OFF.		
	SRO	<p>6. ENSURE pwr heaters off:</p> <ul style="list-style-type: none"> • PLACE Backup heaters A-A OFF. • PLACE Backup heaters B-B OFF. • PLACE Backup heaters C OFF. • PLACE Control heaters D OFF. <p>RO will place handswitches 1-HS-68-341A and 1-HS-68-341D to OFF for A-A and B-B heaters. RO will rotate handswitches 1-HS-68-341H and 1-HS-68-341F to OFF for C and D heaters. RO may dispatch and AUO to place C bank Normal/Aux switch in AUX.</p>
CAUTION		
If any Ruptured S/G is also faulted, feed flow should remain isolated in subsequent steps UNLESS needed for RCS cooldown.		
	BOP	<p>7. CONTROL Ruptured S/G level:</p> <ul style="list-style-type: none"> a. CHECK Ruptured S/G NR level greater than 29% [39% ADV]. b. ISOLATE feed flow to Ruptured S/G. c. CONTROL Ruptured S/G NR level greater than 29% [39% ADV]. <p>BOP recognizes that S/G 4 is also ruptured and takes no actions to feed S/G 4. BOP verifies that AFW is isolated to S/G 4.</p>

Op Test No.: 2 Scenario # 3 Event # 5, 6, and 7 Page 36 of 38

Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.

Time	Position	Applicant's Actions or Behavior
	RO	<p>8. DETERMINE if RHR pumps should be stopped:</p> <p>a. CHECK RHR suction aligned from RWST.</p> <p>RO verifies RED lights are LIT for handswitches 1-HS-74-3A and 1-HS-74-21A.</p> <p>b. CHECK RCS pressure:</p> <ul style="list-style-type: none"> • RCS pressure greater than 150 psig. • RCS pressure stable or rising. <p>RO verifies RCS pressure IS greater than 150 psig and stable.</p> <p>c. STOP RHR pumps, AND PLACE in A-AUTO.</p> <p>RO places handswitches 1-HS-74-10A for 1A RHR pump and 1-HS-74-20A for 1B RHR pump to STOP, verifies the GREEN indicating light is LIT, and allows them to spring return to A-AUTO.</p> <p>d. MONITOR RCS pressure greater than 150 psig.</p>
	RO	<p>9. DETERMINE if cntmt spray should be stopped:</p> <p>a. MONITOR cntmt pressure less than 2.0 psig.</p> <p>b. CHECK at least one cntmt spray pump RUNNING.</p> <p>c. RESET cntmt spray signal.</p> <p>d. STOP cntmt spray pumps, AND PLACE in A-AUTO.</p> <p>e. CLOSE cntmt spray discharge valves 1-FCV-72-2 and 1-FCV-72-39.</p> <p>RO determines that no Containment Spray pumps are running or required.</p>
	SRO	<p>9. RESPONSE NOT OBTAINED:</p> <p>b. IF both spray pumps stopped, THEN GO TO Step 10.</p>
	SRO	<p>10. NOTIFY Chemistry of event status and plant conditions.</p> <p>SRO contacts Chemistry and Console Operator repeats back the information provided.</p>
	SRO	<p>11. NOTIFY Radiation Protection of event status and plant conditions.</p> <p>SRO contacts Radiation Protection and Console Operator repeats back the information provided.</p>
	BOP	<p>12. EVALUATE plant equipment status:</p> <ul style="list-style-type: none"> • REFER TO Appendix D (ECA-3.1), Equipment Evaluation.

Op Test No.:	<u>2</u>	Scenario #	<u>3</u>	Event #	<u>5, 6, and 7</u>	Page	<u>37</u>	of	<u>38</u>
Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.									
Time	Position	Applicant's Actions or Behavior							

	RO	13. CHECK S/G pressure: <ul style="list-style-type: none"> • All S/G pressures controlled or rising. • All S/Gs pressures greater than 120 psig. <i>RO determines that S/G 4 pressure is NOT controlled or rising.</i>
	SRO	13. RESPONSE NOT OBTAINED: IF steamline AND feedline isolation has been performed or attempted for the Faulted S/G, THEN GO TO Step 14. <i>SRO determines that steamline and feedline isolation has been performed for S/G 4.</i>
	BOP	14. MAINTAIN Intact S/G NR levels: <ul style="list-style-type: none"> a. MONITOR levels greater than 29% [39% ADV]. b. CONTROL intact S/G levels between 29% and 50% [39% and 50% ADV]. <i>BOP determines that S/Gs 1, 2, and 3 are intact and greater than 29% level being maintained by automatic control of AFW LCVs.</i>
CAUTION		
If on natural circulation, the following boration will result in a CB in the ACTIVE portion of the RCS which will be higher than the calculated CB.		
	SRO	15. MONITOR shutdown margin during cooldown: <ul style="list-style-type: none"> a. NOTIFY Chemistry to initiate sampling for boron concentration: <ul style="list-style-type: none"> • Ruptured S/G. • RCS. <i>SRO contacts Chemistry and Console Operator repeats back the request.</i> <ul style="list-style-type: none"> b. REFER TO 1-SI-0-10, Shutdown Margin OR REACTINW Computer Program. c. INITIATE boration as necessary: <ul style="list-style-type: none"> • REFER TO SOI-62.02, CVCS Boron Concentration Control.
NOTE		
After the low steamline pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.		

Op Test No.: 2 Scenario # 3 Event # 5, 6, and 7 Page 38 of 38

Event Description: 5) Steam generator tube leak progresses to a tube rupture, requiring a reactor trip and safety injection to be actuated. Requires entry into E-0, "Reactor Trip or Safety Injection." 6) When the reactor is tripped, steam line break occurs outside containment on #4 SG. Requires entry into E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," then to E-3, "Steam Generator Tube Rupture," and then to ECA-3.1, "SGTR and LOCA - Subcooled Recovery." 7) Control room isolation fails to occur. Manual actions must be taken to align components.

Time	Position	Applicant's Actions or Behavior
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	SRO	<p>16. INITIATE RCS cooldown to cold shutdown:</p> <p>a. MAINTAIN T-cold cooldown rate less than 100°F in one hour. BOP will initiate a cooldown using S/G 1,2,3 PORV controllers 1-PIC-1-6A, 1-PIC-1-13A, and 1-PIC-1-24A.</p> <p>b. IF RHR in service, THEN USE RHR cooling.</p> <p>c. DUMP steam to condenser from Intact S/Gs.</p> <p>d. WHEN RCS pressure is less than 1962 psig (P-11), THEN</p> <ul style="list-style-type: none"> • BLOCK low pZR pressure SI. • BLOCK low steam pressure SI.
<p>EXAMINER: When the decision concerning RCS cooldown is made, state "another crew will continue from this point." Cue the Console Operator to place the simulator in FREEZE.</p>		
<p>END OF SCENARIO</p>		

SHIFT TURNOVER CHECKLIST

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SHIFT TURNOVER CHECKLIST			
Page <u>1</u> of <u>1</u>			
<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	SM US/MCR UO AUO STA (STA Function)	Unit Unit Station _____	_____ _____ _____ _____
			Off-going - Name
			On-coming - Name
Part 1 - Completed by off-going shift / Reviewed by on-coming shift:			
RCS Cb = 747 ppm			
<ul style="list-style-type: none"> • Abnormal equipment lineup / conditions: <u>1A-A Containment Spray (CS) pump is out-of-service for a pump bearing inspection. LCO 3.6.6 was entered 1 hour ago. 1A-A CS pump is expected to be returned to service in 24 hours. Protected equipment signs have been posted for 1B-B CS pump.</u> • SI/Test in progress/planned: (including need for conduct of evolution briefings) _____ _____ _____ • Major Activities/Procedures in progress/planned: <u>Train A/Channel 1 Work Week.. Maintain current plant conditions. 100% power, BOL. RCS boron is 747 ppm.</u> <u>Control Bank D is at 220 steps.</u> • _____ • Radiological changes in plant during shift: _____ _____ _____ 			
Part 2 - Completed by on-coming shift prior to assuming duties			
<input type="checkbox"/> Review station rounds / Abnormal reading (AUOs only) <input type="checkbox"/> Review Narrative Logs (previous day and carry-over items) <input type="checkbox"/> Current qualification status <input type="checkbox"/> Review the current controlling Reactivity Management Plans (N/A for AUOs) <input type="checkbox"/> Review current TS/TRM/ODCM/FPR Required Actions (N/A for AUOs) <input type="checkbox"/> Walkdown MCR Control Boards with off-going Operator (N/A for AUOs, as applicable for SM/STAs) <input type="checkbox"/> SR/PER reviews complete for previous shift (SM/US/STA) Relief Time: _____ Relief Date: _____			
Part 3 - Completed by on-coming shift. These items may be reviewed after assuming duties:			
<input type="checkbox"/> Review Operator Workarounds, Burdens and Challenges (applicable Unit/Station) <input type="checkbox"/> Review applicable ODMI actions (first shift of shift week) <input type="checkbox"/> Review changes in Standing / Shift Orders (since last shift worked) <input type="checkbox"/> Review changes to TACFs issued (since last shift worked) (N/A for AUOs) <input type="checkbox"/> Review Control Room Deficiencies (first shift of shift week) (N/A for AUOs) <input type="checkbox"/> Review Component Deviation Log (N/A for AUOs)			

SHIFT TURNOVER CHECKLIST

Page 1 of 2

SHIFT TURNOVER CHECKLIST			
Page <u>1</u> of <u>1</u>			
<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	SM US/MCR UO AUO STA (STA Function)	Unit Unit Station _____	<div style="text-align: right;"> <u>Off-going - Name</u> <u>On-coming - Name</u> </div>
Part 1 - Completed by off-going shift / Reviewed by on-coming shift: RCS Cb = 747 ppm			
<ul style="list-style-type: none"> • Abnormal equipment lineup / conditions: <u>1A-A Containment Spray (CS) pump is out-of-service for a pump bearing inspection. LCO 3.6.6 was entered 1 hour ago. 1A-A CS pump is expected to be returned to service in 24 hours. Protected equipment signs have been posted for 1B-B CS pump.</u> • SI/Test in progress/planned: (including need for conduct of evolution briefings) _____ _____ _____ • Major Activities/Procedures in progress/planned: <u>Train A/Channel 1 Work Week.. Maintain current plant conditions. 100% power, BOL. RCS boron is 747 ppm.</u> <u>Control Bank D is at 220 steps.</u> • Radiological changes in plant during shift: _____ _____ _____ 			
Part 2 - Completed by on-coming shift prior to assuming duties			
<input type="checkbox"/> Review station rounds / Abnormal reading (AUOs only) <input type="checkbox"/> Review Narrative Logs (previous day and carry-over items) <input type="checkbox"/> Current qualification status <input type="checkbox"/> Review the current controlling Reactivity Management Plans (N/A for AUOs) <input type="checkbox"/> Review current TS/TRM/ODCM/FPR Required Actions (N/A for AUOs) <input type="checkbox"/> Walkdown MCR Control Boards with off-going Operator (N/A for AUOs, as applicable for SM/STAs) <input type="checkbox"/> SR/PER reviews complete for previous shift (SM/US/STA) Relief Time: _____ Relief Date: _____			
Part 3 - Completed by on-coming shift. These items may be reviewed after assuming duties:			
<input type="checkbox"/> Review Operator Workarounds, Burdens and Challenges (applicable Unit/Station) <input type="checkbox"/> Review applicable ODMI actions (first shift of shift week) <input type="checkbox"/> Review changes in Standing / Shift Orders (since last shift worked) <input type="checkbox"/> Review changes to TACFs issued (since last shift worked) (N/A for AUOs) <input type="checkbox"/> Review Control Room Deficiencies (first shift of shift week) (N/A for AUOs) <input type="checkbox"/> Review Component Deviation Log (N/A for AUOs)			

Scenario 3 Attachment 1

E-0, "Reactor Trip or Safety
Injection"

Appendix A and B
Attachments 1 through 5

Contains CRITICAL TASK
ELEMENTS

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix A
(Page 1 of 9)**

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
1.	ENSURE PCBs OPEN: <ul style="list-style-type: none"> • PCB 5084. • PCB 5088. 	OPEN manually.
2.	ENSURE AFW pump operation: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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. • #3 HDT Pumps TRIPPED. • #7 HDT Pumps TRIPPED. 	Manually CLOSE valves AND STOP pumps, as necessary. IF any valves can NOT be closed, THEN CLOSE #1 heater outlet valves.

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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Appendix A
(Page 2 of 9)

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
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4. **MONITOR** ECCS operation:

- | | |
|---|---|
| a. Charging pumps RUNNING. | a. Manually START charging pumps. |
| b. Charging pump alignment: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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 Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix A
(Page 3 of 9)**

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
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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 Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix A
(Page 4 of 9)**

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
6.	<p>CHECK cntmt pressure:</p> <ul style="list-style-type: none"> Phase B DARK [MISSP]. Cntmt Spray DARK [MISSP]. Cntmt press less than 2.8 psig. 	<p>PERFORM the following:</p> <ol style="list-style-type: none"> ENSURE Phase B actuated. ENSURE Cntmt Spray actuated. ENSURE cntmt spray pumps running. ENSURE cntmt spray flow. ENSURE Phase B isolation: <ul style="list-style-type: none"> Train A GREEN. Train B GREEN Manually CLOSE valves and dampers as necessary. STOP all RCPs. ENSURE MSIVs and bypasses CLOSED. PLACE steam dump controls OFF. WHEN 10 minutes has elapsed since Phase B actuated, THEN ENSURE air return fans start. USE adverse cntmt [ADV] setpoints where provided.
7.	<p>DISPATCH AUO to perform Attachment 1 (E-0), Ice Condenser AHU Breaker Operation.</p>	

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix A
(Page 5 of 9)**

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
8.	<p>CHECK plant radiation NORMAL:</p> <ul style="list-style-type: none"> 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.
9.	ENSURE all D/Gs RUNNING.	EMERGENCY START D/Gs
10.	<p>ENSURE ABGTS operation:</p> <p>a. ABGTS fans RUNNING.</p> <p>b. ABGTS dampers OPEN:</p> <ul style="list-style-type: none"> FCO-30-146A. FCO-30-146B. FCO-30-157A. FCO-30-157B. 	<p>a. Manually START fans.</p> <p>b. Locally OPEN dampers.</p>

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix A
(Page 6 of 9)**

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
11.	ENSURE at least four ERCW pumps RUNNING, one on each shutdown board preferred.	Manually START pumps as necessary.
12.	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.
13.	ENSURE 0-FCV-67-152, CCS HX C ALT DISCH TO HDR B, is open to position A.	Manually OPEN 0-FCV-67-152 to position A.
14.	CLOSE 0-FCV-67-144, CCS HX C DISCH TO HDR A.	
15.	MONITOR EGTS operation: <ul style="list-style-type: none"> EGTS fans RUNNING. ENSURE dampers OPEN VERIFY filter bank dp between 5 and 9 inches of water. 	Manually START fans AND OPEN dampers.
16.	ENSURE CCS pumps RUNNING: <ul style="list-style-type: none"> 1A-A CCS pump. 1B-B CCS pump. C-S or 2B-B CCS pump. 	Manually START pumps as necessary.
17.	DISPATCH AUO to shutdown Upper and Lower CNTMT rad monitors USING SOI-90.02.Gaseous Process Radiation Monitors	

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix A
(Page 7 of 9)**

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
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18. **WHEN** Attachment 1 is complete (Ice Condenser AHU Breakers OPEN),
THEN

ENERGIZE hydrogen igniters
[1-M-10]:

- 1-HS-268-73 ON.
- 1-HS-268-74 ON.

NOTE The following equipment is located on 1-M-9.

- | | | |
|-----|--|--|
| 19. | CHECK CNTMT PURGE fans STOPPED. | STOP fans AND

PLACE handswitch in PULL-TO-LOCK. |
| 20. | CHECK FUEL HANDLING EXH fans STOPPED, Fuel and Cask loading dampers CLOSED: | STOP fans AND

PLACE handswitch in PULL-TO-LOCK,
THEN

Manually CLOSE dampers. |
| 21. | 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.

- | | | |
|-----|--|--------------------------------|
| 22. | ENSURE AB GEN SUP & EXH dampers CLOSED. | Manually CLOSE dampers. |
|-----|--|--------------------------------|

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix A
(Page 9 of 9)**

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
26.	<p>ENSURE Control Building fans STOPPED and dampers CLOSED:</p> <ul style="list-style-type: none"> SPREADING ROOM SUPPLY and EXH FANS AND dampers. TOILET & LKR RM EXHAUST FAN AND dampers. 	<p>Manually STOP fans AND</p> <p>NOTIFY TSC if any damper NOT CLOSED.</p>
27.	<p>INITIATE Appendix B (E-0), Phase B Pipe Break Contingencies.</p>	

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix B
(Page 1 of 1)**

Phase B Pipe Break Contingencies

Step	Action/Expected Response	Response Not Obtained
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 2 (E-0).
3.	ENSURE 1-FCV-67-107 CLOSED. [CISP - 1-XX-55-6E] (A -train, window 43)	DISPATCH AUO to perform Attachment 3 (E-0).
4.	ENSURE 1-FCV-70-92 CLOSED. [CISP - 1-XX-55-6E] (A -train, window 73)	DISPATCH AUO to perform Attachment 4 (E-0).
5.	ENSURE 1-FCV-70-140 CLOSED. [CISP - 1-XX-55-6F] (B -train, window 74)	DISPATCH AUO to perform Attachment 5 (E-0).

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Attachment 1
(Page 1 of 1)**

Ice Condenser AHU Breaker Operation

OPEN the following to remove power from ice condenser air handling units AND
REPORT completion to UO:

BOARD	COMPT	NOMENCLATURE
480 V Reactor Vent Board 1A-A	13D	1-BKR-232-A000/13D ICE COND 1-AHU-61-1/4/8/12/16/20/24/28
480 V Reactor Vent Board 1A-A	14D	1-BKR-232-A000/14D ICE COND 1-AHU-61-3/7/11/15/19/23/27
480 V Reactor Vent Board 1B-B	13D	1-BKR-232-B000/13D ICE COND 1-AHU-61-2/6/10/14/18/22/26/30
480 V Reactor Vent Board 1B-B	14D	1-BKR-232-B000/14D ICE COND 1-AHU-61-5/9/13/17/21/25/29

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Attachment 2
(Page 1 of 1)
Control Air Isolation

A. **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).

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

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

1. 0-BKR-32-25 [480V SD BD 1A2-A, C/3D]
2. 0-BKR-32-26 [480V SD BD 1B1-B, C/3D]
3. 0-BKR-32-27 [480V AUX BLDG COM BD, C/6C]
4. 0-BKR-32-4900A [480V TURB BLDG COM BD, C/6C]

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**Attachment 3
(Page 1 of 1)
ERCW Isolation**

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 4
(Page 1 of 1)**

CCS Return Isolation

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)

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**Attachment 5
(Page 1 of 1)
CCS Supply Isolation**

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



Watts Bar Nuclear Plant

Unit 1

Periodic Instruction

1-PI-OPS-1-MCR

Main Control Room

Revision 0055

Quality Related

Level of Use: Reference Use

Effective Date: 05-10-2011

Responsible Organization: OPS, Operations

Prepared By: John Lovell

Approved By: Brian McNay

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Revision Log

Rev or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
48	12/03/09	2, 14, 22	Changed the point monitored to 10 min average (U2118RA) from 5 min average (U211805) and enhanced action to take if power approaches or exceeds the Thermal Power Limit.
49	02/09/10	2, 7, 18, 20	Administrative change to update CSST tap changer alternate alignments IAW EDC 54778-A and to update section 6.1 step E to account for DCN 52019 (PCR 4031)
50	04/12/10	2, 14, 22	Administrative change to change control to the one hour average from the 10 minute average. Added descriptive usage of the 10 minute average.
51	04/16/10	2, 18	Administrative change to add requirement to maintain B phase of main generator 525±5KV.
52	07/07/10	2, 7, 10, 12, 13, 20, 19, 25	Added clarifying note to Section 5.3 and added 15E500-3 to the Developmental References (PER 226140). Deleted Section 5.1.2 Subsection 3 (PER 232132/PCR 4093). Deleted requirement for having SQN #2 Line in service and added new incoming Mvars limit while WBN-SQN #2 and WBN-Roane lines are out of service, in Section 5.4. Added TRO-TO-SOP-10.130 to Developmental References. Reformatted source notes and deleted source notes 2-4.
53	09/10/10	2, 24	Added date block to Appendix A. [PER 239770]
54	11/12/10	2, 8, 10, 16-19	Minor/editorial revision: Updated references of NEAD to Load Dispatcher (PCR 4556). Updated WO to SR.
55	05/10/11	2, 8, 17, 18	Removed references to no longer used, "Base Adjust" to implement DCN 52769, which replaced the Westinghouse generator voltage regulator with the digital dual channel Unitrol 5000 Excitation Control System.

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1.0 INTRODUCTION

1.1 Purpose

This Instruction details selected MCR responsibilities for licensed operators.

1.2 Scope

This Instruction includes guidance to Unit Operators (UOs) for the proper method of performing Main Control Room (MCR) walk down/inspections. This Instruction also includes guidance for responding to selected off normal events identified during MCR monitoring of plant status.

1.3 Applicability

This Instruction is applicable in all Modes. Portions of this Instruction, which are only applicable in Modes 1 through 4, are specifically identified.

1.4 Background - Leading Edge Flow Monitor (LEFM)

NOTE

LEFM and venturi-based ICS Points are listed in Table 1-1.

The LEFM uses ultrasonic transducers placed in a section of Main Feedwater piping and measures transient time of ultrasonic sound waves. It is very accurate and substantially lowers the uncertainty associated with using venturi-based flow measurement in the secondary side power calorimetrics to determine thermal output of the core. The U1118 Series ICS Points measuring system consists of nozzle venturis placed in the feedwater lines to the individual steam generators. Using the venturi-based flow measurement accuracies associated with reactor power measurement have a 2% uncertainty. A revision to NRC rules provides for a core power (Rated Thermal Power) rise to 3459 MWT when LEFM Calorimetric is used because its uncertainty is 0.6%.

The core power calculation, as determined by secondary side calorimetrics, will be made using the LEFM inputs of feedwater mass flow and temperature. Control of feedwater flow will be by the existing controls from the nozzle venturis. The LEFM is backed up by the venturi-based flow monitoring system. Loss of LEFM results in reverting to the venturi-based monitoring system. Plant equipment is operated in the same manner at the 3459 MWT power level as it is at the 3411 MWT level. If the LEFM becomes unavailable for a duration that exceeds the conditions of the Tech Requirements Manual, the secondary side calorimetrics, is performed with inputs from the nozzle venturis and requires a core power adjustment toward a lower core power based on the 2% uncertainty associated with the nozzle inaccuracies.

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1.4 Background - Leading Edge Flow Monitor (LEFM) (continued)

The LEFM System includes a fault indication alarm that is provided as part of the plant computer software. This alarm is an audible and visual alarm through the ICS. This alarm is provided as a new stand-alone screen through ICS and indicates NORMAL, ALERT, or FAIL. Operations is alerted to this by the ICS LEFM points which will turn blue when it is in an abnormal condition.

The venturi-based measurement's alarms are suppressed by the LEFM System as long as the system is **NOT** failed. The alarms become active when the LEFM system is failed. The U1127 Series ICS Points display LEFM, but "toggle" and display venturi-based measurement upon LEFM failure. For example, should the LEFM system fail and the venturi-based measurement indicates a core power above the 3411 MWT, computer alarms will be enabled and displayed on the alarm display.

TABLE 1-1		
ICS POINT	UNITS	DESCRIPTION
U1118	MWT	REACTOR TOTAL THERMAL Q
U111805	MWT	REACTOR TOTAL THERMAL 5 MIN AVG
U1118RA	MWT	10 MINUTE AVERAGE OF U1118
U1125	MWT	REACTOR TOTAL THERMAL Q 1 HR AVG
U1126	MWT	REACTOR TOTAL THERMAL Q 8 HR AVG
U1127*	%	PERCENT CORE THERMAL POWER
U1127H*	%	1 HR AVG REACTOR THERMAL Q
U1127H24*	MW	CORE THERMAL POWER 24 HR AVG
U1127H8*	%	8 HR AVG REACTOR THERMAL Q
U1127MWT*	MW	CORE THERMAL POWER
U1127TM*	%	10 MIN AVG REACTOR THERMAL Q
U1254	%	10 MIN AVG % PWR BASED ON 3411 MWT
U2118	MWT	LEFM REACTOR TOTAL THERMAL Q
U2125	MWT	LEFM RX TOTAL THERMAL Q 1 HR AVG
U2126	MWT	LEFM RX TOTAL THERMAL Q 8 HR AVG

* U1127 Series ICS computer points toggle between LEFM calorimetric, venturi-based calorimetric, and delta temperature % power based on plant conditions and the new RTP of 3459 MWT.

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2.0 REFERENCES

2.1 Performance References

- A. Good Practice OP-206, INPO 84-030, Rev 1, Generic Round Sheets and Shift Operating Practices.
- B. SPP-3.5, Regulatory Reporting Requirements.
- C. OPDP-1, Conduct of Operations.
- D. OPDP-8, Limiting Conditions For Operation Tracking

2.2 Developmental References

- A. 1-SI-0-2 Series, Shift and Daily Surveillance Log.
- B. Drawings:
 - 47E235-42, -45
 - 15E500-3
- C. WBN Grid Voltage Study, dated 4/9/01 (E32 010409 601)
- D. TI-12.15, 161 kV Offsite Power Requirements
- E. Standard VAR-002-1 - Generator Operation for Maintaining Network Voltage Schedule.
- F. NRC Discussion of "Licensed Power Level" (AITS F14580H2) Dated August 22, 1980
- G. NEI Position Statement on Licensed Power Limit, Project Number 689, Dated June 23, 2008.
- H. NRC Regulatory Issue Summary 2007-21, Rev 1, Adherence to Licensed Power Limits. Dated February 9, 2009
- I. Watts Bar Nuclear Plant, Unit 1 Facility Operating License NPF-90, Docket NO 50-390. Amendment No. 81
- J. DCN 52019 - Provide a robust flash storage drive for Thermowestronic recorders
- K. TRO-TO-SOP-10.130, WBN Grid Operating Guide

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3.0 PRECAUTIONS AND LIMITATIONS

- A. This Instruction does **NOT** supersede or replace other documents necessary for safe operation of the plant.
- B. 1-SI-0-2 Series and other similar Surveillance Instructions will have precedence over this Instruction.
- C. The Load Dispatcher is to be notified within 30 minutes when the Main Generator Voltage Regulator is **NOT** in automatic.

4.0 PREREQUISITE ACTIONS

None

4.1 Preliminary Actions

None

4.2 Field Preparations

None

4.3 Approvals and Notifications

None

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5.0 GENERAL

5.1 General Duties

5.1.1 Unit Operator Duties

NOTE

Steps in this Instruction may be performed in any sequence.

[1] WHEN assigned, THEN

- [1.1] **PERFORM** assigned duties and inspections, including a joint walk down of at least one Board section (This is in addition to the OPDP-1 requirements). [C.1]
- [1.2] **NOTIFY** US of difficulties in performing assigned tasks.
- [1.3] **VERIFY** the following:
 - A. Equipment labels are **NOT** unreadable due to Caution Tags or Hold Orders.
 - B. Indicating lights are energized as required.
 - C. Recorders are operating properly.
 - D. Alarm panels in Main Control Room test satisfactorily.
 - E. Computer is operable.
 - F. Floor space open, allowing access to all panels.
 - G. Gauges are in expected range and operating properly (i.e., no stuck indicators, no unexpected swings, no off scale high or low).
 - H. US/SM has performed the shiftly PER operability review.
- [1.4] **PERFORM** handswitch alignment check (e.g., CS, AFW, EGTS, Rad Monitor Block Switch). [C.1]
- [1.5] **ENSURE** alarms that are LIT are fully understood and expected or a corrective action is in progress.

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5.1.1 Unit Operator Duties (continued)

- [2] **WHEN** problems arise, **THEN**:
- [2.1] **NOTIFY** US of abnormal conditions.
 - [2.2] **TROUBLESHOOT** problems, **AND**
DETERMINE corrective action(s).
 - [2.3] **INITIATE** Service Request as required.
 - [2.4] **ASSIST** maintenance personnel as required.

5.1.2 Unit Supervisor Duties

NOTES

- 1) LCO Tracking Only entries are defined in OPDP-8, Limiting Conditions for Operation Tracking.
- 2) The following duties can be performed by the Unit Supervisor or his designee.

- [1] **REVIEW** the following:
- [1.1] ICS computer points out of scan
 - [1.2] Substituted value logs
 - [1.3] Alarms suppressed logs
- [2] US/STA **ENSURES** MCR UNIT SUPV operator rounds are completed daily by day shift (0700-1900).

5.2 Reactor Thermal Power

SEC. 5.2.1 AND SEC. 5.2.2 APPLIES AT ALL TIMES. SECTIONS 5.2.3, AND 5.2.4 SHALL BE USED, AS APPROPRIATE, TO ENSURE COMPLIANCE: [C.5]

Watts Bar is authorized to operate at a Licensed Power Limit (LPL) not to exceed 3459 megawatts thermal as measured by the eight hour average. The one hour core thermal power average over eight hours shall be monitored to ensure Reactor Thermal Power is maintained at or below the LPL as measured by the eight hour average.

Reactor power limits and any required actions are also contained in Attachment 1. This attachment may be laminated and made available for the OAC to use as a reference during operations.

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5.2.1 Specific Guidance for Controlling Thermal Power

A. Steady State

The term "steady state" implies that temperatures, pressures, and flows are stable such that the nominal value of reactor power remains stable, subject to statistical uncertainties and normal fluctuations (e.g., feedwater oscillations).

Normal fluctuations (i.e., automatic control system response), random processes (i.e., feedwater temperature changes), and instrument uncertainties (i.e., flow meter measurement uncertainties) may slightly affect core thermal power indications, but these affects do not result in a violation of the licensed power limit license condition when operating at steady state conditions.

B. Pre-Planned Evolutions

If an evolution is expected to cause core thermal power to exceed 3459 MWT, then action should be taken to reduce power, (prior to the evolution) in order to maintain sufficient margin from the limit.

C. Compliance

No actions are allowed that would intentionally raise core thermal power above the Licensed Power Limit (LPL) of 3459 MWT for any period of time. Operators may not intentionally operate or authorize operation above 3459 MWT. Small, short-term fluctuations in power that are not under the direct control of a license reactor operator (e.g., fluctuations caused by secondary-side control valve oscillations) are not considered intentional.

Prompt action is to be taken to ensure reactor thermal power is maintained with in stated limits following any un-planned event.

Closely monitor thermal power during steady state power operation with the goal of maintaining the one-hour thermal power average at or below the LPL. If the core thermal power average for a one-hour period is found to exceed the LPL, take prompt action specified in Section 5.2.2 to ensure that thermal power is less than or equal to LPL.

The eight hour average is not to exceed LPL.

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5.2.1 Specific Guidance for Controlling Thermal Power (continued)

NOTES

- 1) The 5 and 10-minute average (U211805 and U2118RA) can be of particular value to the operating crew when conducting operations with particular sensitivity to affecting core thermal power. The 5 and 10-minute average are used for trending purposes to allow anticipatory response to changing plant conditions. This can be used as a leading indicator in making decisions for taking prompt action to mitigate rising power conditions.
- 2) The licensed thermal power limit is **NOT** considered to be exceeded when short duration peaks are normal fluctuations inherent in the design of the controlling system as long as the one-hour average (U2125) is at or below the licensed thermal power limit.

- D. **IF** core thermal power one-hour average (U2125) exceeds 3459 MWt or an increasing power trend which will exceed 3459 MWt is observed,
THEN

ENSURE immediate action is taken to decrease reactor power as necessary.

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5.2.2 Reactor Power Limits

NOTE

Due to the calculation method used for U2125 and U2126, the one and eight-hour averages may occasionally change by large amounts. The Operator is responsible for being aware of the entire previous period's trend.

- E. REACTOR THERMAL POWER AVERAGED OVER EIGHT HOURS (U2126) SHALL BE MAINTAINED BELOW 3459 MWT AT ALL TIMES. Routine monitoring of power indications should be used to maintain indicated power at or below 3459 MWT (U2126, NIS Power Indication).
- F. If U2126 exceeds 3459 MWT the Unit SRO shall be notified, Reactor Thermal Power must be reduced below 3459 MWT and the requirements of SPP-3.5, Regulatory Reporting Requirements met.

NOTE

3457 MWT is a value based on steady state plant conditions, trended experience, and equipment operating properly. If equipment conditions change, such that "normal fluctuations change in magnitude or frequency, a new target value should be discussed by shift management, (in consultation with Operations department management). Any new target will be set to ensure sufficient Operating Margin is maintained.

- G. Reactor Thermal Power averaged over one hour (U2125) should be maintained at a target of 3457 MWT.
- H. The Unit SRO shall be notified when Reactor Thermal Power is above 3459 MWT on one-hour average (U2125). Action shall be initiated promptly to ensure power trends to less than or equal to 3459 MWT (U2125).
- I. The Operations Manager should be notified immediately if the one-hour average of core thermal power (U2125) exceeds 3475 MWT.
- J. An SR shall be initiated on any unplanned transient that results in an adverse trend in thermal power. (heater string isolation, MSR isolation, FW reg valve transient, etc)

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5.2.3 Monitoring ICS Instantaneous Reactor Power

NOTE

The input to U1127 automatically toggles between U2118, U1118, and UO484, as conditions warrant.

- A. The ICS Points U2118 series, U2125, U2126 and U1127 series are available for monitoring trends or to alert operators to transient conditions.
- B. When U2118 is identified as being unreliable other available ICS indications and NIS power indications must be used to monitor Reactor Power for compliance with Section 5.2.2. **REFER TO** Section 5.2.4 for the Determination of Reactor Power.
- C. If the LEFM calorimetric is or has been unreliable:
 1. Power operation may continue per Sections 5.2.2, at 100% RTP (3459 MWT) until the next scheduled performance of SR 3.3.1.2. **REFER TO** TRM 3.3.7.
 2. The most limiting of the indications provided in Section 5.2.4 shall be used to determine Reactor Power as applicable to this Section and Section 5.2.2.
 3. Monitoring using U1127 will toggle between LEFM and venturi-based calculations, if available.
 4. Monitoring using U1118 series points, U1125 and U1126 may be available or may become available.

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5.2.4 Determination of Reactor Power

The following should be used on an as needed basis to compensate for a lack of reliable computer data, or as necessary to ensure compliance with Section 5.2.2:

NOTES

- 1) Items A and B are to be used following LEFM failure until the next performance of SR 3.3.1.2.
- 2) Item C may be used for trending when LEFM is failed but the venturi-based calorimetric is good. U1125, U1126 and U1127 series trends will trend down over time following power reduction to ≤ 3411 MWT.

- A. For reactor power at or above 50% AND T_{avg} within 0.5°F of T_{ref} , the average NIS Power Range drawer meter readings [1-M-13] (if calibrated per SR 3.3.1.6) shall be used. Do not exceed 102% on valid indicated power.
- B. For reactor power below 50% OR T_{avg} **NOT** within 0.5°F of T_{ref} , the higher reading of the following shall be used:
 1. The average NIS Power Range drawer meter readings [1-M-13] (if calibrated per SR 3.3.1.6).

OR

 2. The average ΔT power readings [1-M-5].

NOTE

U1127 series points should be maintained reliable as they toggle between their applicable inputs U2118 and U1118, however, the LEFM data will be included in the trends.

- C. Following performance of 1-SI-92-1 (SR 3.3.1.2), the trends for U1118, U1125, and U1126 may be available for use to maintain core power at or below 3411 MWT. U1127 series trends may also be used following LEFM data removal from the averages. (e.g. U1127TM may be used 10 minutes after LEFM failure when U1118 calculation is still available.)

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5.3 Voltage Control Monitoring

NOTES

- 1) Bus 1 'B' Phase is the point used to determine WBN 500KV switchyard voltage. This may be monitored using ICS point LG1-1219.
- 2) Transmission Voltage Schedule is to be maintained 525+/-5Kv.

[1] **WHEN** CSST tap changer(s) are in OFF (Pushed In), **OR**

Voltage Schedule can NOT be maintained, **THEN**

[1.1] **RECORD** generator and 500Kv voltage readings on Appendix A.

[1.2] **TRANSMIT** Appendix A to Management Services when completed.

[2] **IF** 500Kv voltage is outside the Transmission Voltage Schedule and cannot be returned to the required voltage, **THEN**

PERFORM the following:

A. **NOTIFY** the Transmission Operator within 30 minutes.

B. **DOCUMENT** the notification in the narrative log.

NOTE

VARs are to be maintained in accordance with section 5.4.

C. **IF** 500Kv voltage is high, **THEN**

ENSURE Main Generator VARs are incoming.

D. **IF** 500Kv voltage is low, **THEN**

ENSURE Main Generator VARs are outgoing.

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5.3 Voltage Control Monitoring (continued)

NOTE

Tap Changers are normally operated in auto but can be operated in manual at SRO discretion. Operation in manual is considered an alternate alignment with respect to the operating requirements and limitations imposed by the WBN grid operating guide. Technical Specification operability is maintained in alternate alignment configuration for CSST Load Tap Changers by ensuring transmission alignments (TRO-TO-SOP-10.130 "WBN Grid Operating Guide") are adequate to ensure minimum voltage requirements are met. The Load Dispatcher shall be notified when the alternate alignments are planned, entered, and exited.

[3] **WHEN** CSST tap changer(s) have been placed in any of the following alternative alignments:

- 6.9kV Common Board A or B Loads on Alternate Feeders
- 480V Turbine Building Common Board A or B on Alternate Feeder
- Common Station Service Transformer C or D Controls on Alternate Feeder
- Common Station Service Transformer C or D Load Tap Changer Loss of Power or De-energized
- Common Station Service Transformer C or D Load Tap Changer in OFF or in Manual During Modes 1 - 4

THEN,

NOTIFY Load Dispatcher of the alternative alignment.

[4] **NOTIFY** Load Dispatcher within 30 minutes when Main Generator Voltage Regulator is **NOT** in automatic.

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5.4 Monitoring Generator Loading

NOTE

If operating the generator with incoming Mvars, ICS alarm(s) should actuate at -90 (LO) and -100 Mvars (LO-LO).

- [1] **ADJUST** 1-HS-57-22, EXCITER VOLTAGE ADJUSTER [1-M-1], to maintain 500kV bus voltage within Load Dispatcher Voltage Schedule.

- [1.1] **IF** the generator is to be operated with incoming Mvars, **THEN**

ENSURE the following parameters are maintained:

- Generator voltage between 22,800 and 24,400 volts.
- Mvar loading no more negative than -100 Mvars by observing 1-EI-57-8, MEGAVARS [1-M-1] or ICS point Q2823A.
- With WBN-SQN #2 and WBN-Roane Lines out of service maximum incoming Mvar limit is -50 Mvars.

- [1.2] **IF** the generator is to be operated with zero or outgoing Mvars, **THEN**

ENSURE the following parameters are maintained:

- Generator voltage between 22,800 and 24,400 volts
- Mvar loading within limits specified by the Generator Capability Curve (See SOI-47.02, Appendix E)

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6.0 PERFORMANCE

6.1 Unit Operator

A minimum of one Control Board (e.g., 1-M-1, 1-M-6, 1-M-26) will be walked down by UO and SRO (US, STA, or SM) each shift (this is in addition to the OPDP-1 requirements).

- A. If any Technical Specification or Technical Requirement parameter is out of limits, then US must be notified immediately.
- B. Tours will be conducted using electronic data recorder at the frequency directed by the Operations Superintendent and when the site network is available. The data recorders contain logic to detect noted and out of limit data, and indicate audibly and visually on the data recorder when data is entered. When the data is transferred to the network database, the abnormal and out of limit data indicate visually when viewed or printed. Noted and out of limit data shall be reviewed by the Unit Supervisor and corrective action taken when required.
- C. When electronic data recording is unavailable, tours will be conducted at the frequency directed by the Operations Superintendent using a printout of the tour as a guideline. The Unit Supervisor will discuss equipment status with the performer and corrective actions taken when required. When electronic recording becomes available, the data should be entered in the database, and the printout discarded.
- D. Service Requests will be written as appropriate.
- E. **IF** a video graphic recorder has not been changed to wrap mode IAW reference J, **THEN**

REMOVE AND REPLACE with a new card when the video graphic recorder's flash card is 90% full and alarms (indicated by a flashing red box on the toolbar at the bottom of the recorder's display screen). The full card will be transmitted to Document Control in accordance with SPP-2.4, "Records Management."

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7.0 RECORDS

7.1 QA Records

Appendix A, 500KV and Generator Voltage Schedule

7.2 Non-QA Records

None

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**Attachment 1
(Page 1 of 1)**

REACTOR THERMAL POWER (RTP) LIMITS AND ACTIONS

LIMIT	VALUE	SOURCE	ACTION
Eight-hour average Reactor Power	3459 MWT (100%)	U2126, NIS Power Indication	RTP shall be maintained at or below 3459 MWT (100% NIS) for any eight-hour period. Notify the SRO if U2126 is greater than 3459 AND reduce RTP below 3459 MWT.
One-hour RTP average	3459 MWT	U2125	If U2125 rises above 3459 MWT. Notify Unit SRO and immediately initiate actions to ensure RTP trends to less than or equal to 3459 MWT.

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**Appendix A
(Page 1 of 1)**

500Kv And Generator Voltage Schedule

Date _____

NOTE

Readings are to be taken every two hours whenever CSST tap changer hand switches are OFF, or when Voltage Schedule can **NOT** be maintained. For voltage schedule go to the following web site: <http://troweb.cha.tva.gov/VoltageSchedule/>.
The four CSST C & D tap changer hand switches for X and Y windings are located on ECBs 2 and 3 and are normally aligned to PULL-FOR-AUTO.

	500 kV BUS VOLTAGE		GENERATOR UNIT 1 0-EI-245-CB-63B	
TIME	BUS 1 VOLTS (B PHASE)	BUS 2 SECTION 3 VOLTS (B PHASE)	MW (0-ECB-6)	MVAR (0-ECB-6)

DAY SHIFT

0800 ET				
0700 CT				
1000 ET				
0900 CT				
1200 ET				
1100 CT				
1400 ET				
1300 CT				
1600 ET				
1500 CT				
1800 ET				
1700 CT				

NIGHT SHIFT

2000 ET				
1900 CT				
2200 ET				
2100 CT				
0000 ET				
2300 CT				
0200 ET				
0100 CT				
0400 ET				
0300 CT				
0600 ET				
0500 CT				

WBN Unit 1	Main Control Room	1-PI-OPS-1-MCR Rev. 0055 Page 23 of 23
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**Source Notes
(Page 1 of 1)**

Requirements Statement	Source Document	Implementing Statement
Both EGTS ΔP controllers were found in A-Auto Standby position.	WBPER960189 (LER 50-390/96010)	C.1
	DELETED	C.2
	DELETED	C.3
	DELETED	C.4
Revise GOs to provide guidance to prevent exceeding (power) limits. Specify instruments to be monitored.	WBPER960260	C.5

Facility:	Watts Bar October 2011	Scenario No. 4	Op Test No.: 2
Examiners:	_____	Operators:	SRO
	_____		RO
	_____		BOP
Initial Conditions: 82% Reactor Power, BOL conditions. RCS boron concentration is 1114 ppm. Control Bank D is at 191 steps.			
Turnover: Train B/Channel II Work Week. 1B-B CCP is out-of-service for repairs to the electrical connections to the motor. Protected equipment signs have been posted for 1A-A CCP. LCO 3.5.2 and TR 3.1.4 were entered 16 hours ago. Repairs are expected to be completed in 4 hours. Repairs have been completed on the 1C 6.9 KV Unit Board Normal Feeder Breaker 1122 and transfer from Alternate to Normal is to be performed as soon as practical after assuming the shift. Repairs to the control oil system for the 1B MFP are in progress, and power is to be maintained at 82% until repairs are complete.			
Event No.	Malf. No.	Event Type*	Event Description
1	n/a	N-BOP/SRO	Transfer 1C 6.9 KV Unit Board from Alternate to Normal.
2	cc02a cc21a cc21b	C-BOP	Thermal barrier heat exchanger leak (RCS into CCS).
3	th09	C- RO TS-SRO	High RCS activity (DE-131 at 22 μ ci/gm) is reported by the Chemistry Lab.
4	fw46a	TS-SRO	1-LS-3-402D, SOUTH VLV VAULT ROOM LEVEL fails high.
5	rx11a	I-RO TS-SRO	1-PT-1-73, HP TURBINE IMPULSE PRESS TR A fails high.
6	fw06	R-RO C-BOP	Standby Main Feedwater Pump trips due to instantaneous overcurrent.
7	rc09b rp01b rprt1 close cv17b cv18b cv38b	M-ALL	Loop 2 RCP shaft shears, causing its seal package to fail. Automatic reactor trip fails to occur. 1-RT-1, REACTOR TRIP switch (1-M-4) fails to cause a reactor trip.
8	ed06a	C-BOP	1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips.
9	si08d	C-BOP	1B-B Safety Injection pump fails to automatically start on the safety injection signal.
10	n/a	M-ALL	Loss of Seal injection flow and loss of thermal barrier flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA. Requires entry into E-1, "Loss of Reactor or Secondary Coolant," and transition to ES-1.2, "Post-LOCA Cooldown and Depressurization."
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Scenario 4 - Summary

Initial Condition 82% Reactor Power, BOL conditions. RCS boron concentration is 1114 ppm. Control Bank D is at 191 steps.

Turnover Train B/Channel II Work Week. 1B-B CCP is out-of-service for repairs to the electrical connections to the motor. Protected equipment signs have been posted for 1A-A CCP. LCO 3.5.2 and TR 3.1.4 were entered 16 hours ago. Repairs are expected to be completed in 4 hours. Repairs have been completed on the 1C 6.9 KV Unit Board Normal Feeder Breaker 1122 and transfer from Alternate to Normal is to be performed as soon as practical after assuming the shift. Repairs to the control oil system for the 1B MFP are in progress, and power is to be maintained at 82% until repairs are complete.

- Event 1** Transfer 1C 6.9 KV Unit Board from Alternate to Normal. Requires the BOP to perform SOI-201.03, "6.9kV Unit Board 1C," Section 8.1, "Transfer from Alternate to Normal."
- Event 2** Thermal barrier heat exchanger for RCP 1 fails with a leak of 12 gpm; component cooling thermal barrier heat exchanger isolation valves fail to close. CCS radiation levels rise. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)," and manual isolation of the thermal barrier flow path and tripping of the thermal barrier booster pumps.
- Event 3** High RCS activity (DE-131 at 22 $\mu\text{Ci/gm}$) is reported by the Chemistry Lab. Requires entry into AOI-28, "High Activity in Reactor Coolant." Requires a Tech Spec evaluation.
- Event 4** 1-LS-3-402D, SOUTH VLV VAULT ROOM LEVEL fails high. Requires entry into ARI 57-C NORTH/SOUTH VALVE VAULT RM LEVEL HI/ MFW ISOLATION. Requires a Tech Spec evaluation and entry into LCO 3.3.2, Function 5.e. South Valve Vault Room Water Level - High, Condition O.
- Event 5** 1-PT-1-73, HP TURBINE IMPULSE PRESS TR A fails high. Requires the RO to take IMMEDIATE OPERATOR ACTION to place rod control to MANUAL to stop rod motion. Requires entry into AOI-2, "Malfunction of Reactor Control System." Requires a Tech Spec evaluation.
- Event 6** Standby Main Feedwater Pump trips due to instantaneous overcurrent. Requires a load reduction using AOI-16, "Loss of Normal Feedwater," Section 3.7, "Standby MFWP TRIP."
- Event 7** Loop 2 RCP shaft shears, causing its seal package to fail. Automatic reactor trip fails to occur. Reactor Trip switch RT-1 (1-M-4) fails to cause a reactor trip. Requires reactor trip to be initiated from RT-2 (1-M-6). Requires entry into E-0, "Reactor Trip or Safety Injection."
- Event 8** 1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips. Causes loss of the remaining CCP, and leads to RCP seal failures due to loss of seal injection flows and thermal barrier flows.
- Event 9** 1B-B Safety Injection pump fails to automatically start on the safety injection signal. Requires manual start by BOP.
- Event 10** Loss of Seal injection flow and loss of thermal barrier flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA. Requires entry into E-1, "Loss of Reactor or Secondary Coolant," and transition to ES-1.2, "Post-LOCA Cooldown and Depressurization."

Scenario 4 - Critical Task Summary

- | | |
|-----------------|---|
| Critical Task 1 | Manually trip the reactor from the control room prior to entry into FR-S.1, "Nuclear Power Generation/ATWS." |
| Critical Task 2 | Manually start at least one Safety Injection pump before transition out of E-0, "Reactor Trip or Safety Injection." |

Watts Bar Nuclear Plant
10-2011 NRC Examination Scenario 4
Simulator Console Operators Instructions

SIMULATOR SETUP INFORMATION

1. ENSURE Examination Security has been established.
2. RESET to Initial Condition 303 by performing the following actions:
 - a. Select ICManger on the THUNDERBAR menu (right hand side of Instructor Console Screen).
 - b. Locate IC# 303.
 - c. Right "click" on IC# 303.
 - d. Select Reset on the drop down menu.
 - e. Right "click" on RESET.
 - f. Enter the password for IC 303.
 - g. Select "Yes" on the INITIAL CONDITION RESET pop-up window.
 - h. Perform SWITCH CHECK.
3. SELECT Director on the THUNDERBAR menu (right hand side of Instructor Console Screen).
4. ENSURE the following information appears on the Director Screen:

Key	Description	Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
si08d	failure of auto si and blackout signals sip 1b-b	M		00:00:00	00:00:00	00:00:00		Active	Active
rp01b	automatic reactor trip signal failure (atws)	M		00:00:00	00:00:00	00:00:00		Active	Active
cv01b	charging pump b trip	M		00:00:00	00:00:00	00:00:00		Active	Active
cc21a	failure of fds-70-81e to operate	M		00:00:00	00:00:00	00:00:00		Active	Active
cc21b	failure of fds-70-81b to operate	M		00:00:00	00:00:00	00:00:00		Active	Active
th09	fuel cladding failure	M	3	00:00:00		00:00:00		1e006	0

Watts Bar Nuclear Plant
10-2011 NRC Examination Scenario 4
Simulator Console Operators Instructions

SIMULATOR SETUP INFORMATION

Key	Description	Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
cv38b	RCP 2, #3 SEAL FAILURE	M	19	00:00:00		00:00:00		100	0
cv38a	RCP 1, #3 SEAL FAILURE	M	19	00:00:00		00:00:00		100	0
cv38c	RCP3, #3 SEAL FAILURE	M	19	00:00:00		00:00:00		100	0
ed06a	loss of 6.9 kv shutdown board bus 1a-a	M	19	00:00:00		00:00:00		Active	InActive
cv38d	RCP4, #3 SEAL FAILURE	M	19	00:00:00		00:00:00		100	0
cv17a	rcp 1 seal failure rcp #1	M	19	00:00:00		00:00:00		100	0
cv17d	rcp 1 seal failure rcp #4	M	19	00:00:00		00:00:00		100	0
cv17c	rcp 1 seal failure rcp #3	M	19	00:00:00		00:00:00		100	0
cv17b	rcp 1 seal failure rcp #2	M	19	00:00:00		00:00:00		100	0
cv18c	rcp 2 seal failure rcp #3	M	19	00:00:00		00:00:00		100	0
cv18d	rcp 2 seal failure rcp #4	M	19	00:00:00		00:00:00		100	0
cv18b	rcp 2 seal failure rcp #2	M	19	00:00:00		00:00:00		100	0
cv18a	rcp 2 seal failure rcp #1	M	19	00:00:00		00:00:00		100	0
cc02a	rcp-1 thermal barrier heat exchanger tube leak	M	2	00:00:00		00:00:00		100	0
fw46a	false level signal to ls-3-402d south ms valve vault	M	4	00:00:00		00:00:00		12	0
rx11a	impulse pressure transmitter 1-73 fail to position	M	5	00:00:00		00:00:00		100	75.0362
fw06	electrical feed pump trip	M	6	00:00:00		00:00:00		Active	InActive
rc09b	rcp loop 2 sheared shaft	M	7	00:00:00		00:00:00		Active	InActive

5. Place simulator in RUN and acknowledge any alarms.
6. ENSURE 1-HS-62-104A, CCP B-B (ECCS) is in Stop, Pull-to-Lock position and a Hold Notice (Red) Tag is placed on the handswitch. Place pink PROTECTED EQUIPMENT tag on 1-HS-62-108A, CCP A-A (ECCS).
7. ENSURE the "Train B Week - Channel II" sign is placed on 1-M-30.
8. Place simulator in FREEZE.

Watts Bar Nuclear Plant
10-2011 NRC Examination Scenario 4
Simulator Console Operators Instructions

SIMULATOR SETUP INFORMATION

9. ENSURE Watts Bar Nuclear Plant Unit 1 Reactivity Briefing Book (Simulator Copy) BOL (Beginning Of Life) is provided to the crew as part of the Turnover Package, and that the BOL placards are on 1-M-6, below the Boric Acid and Primary Water Integrators.
10. WHEN prompted by the Chief Examiner, place the Simulator in RUN.

Watts Bar Nuclear Plant
10-2011 NRC Examination Scenario 4
Console References

Exam Event No.	Simulator Event No.	Description/Role Play
1	n/a	Transfer 1C 6.9 KV Unit Board from Alternate to Normal. ROLE PLAY: <i>If/when contacted as the TB AUO, repeat back request to walk down the 1C 6.9 KV Unit Board. After the board is transferred, report that no relays operated and that the 1C 6.9 KV Unit Board is normal.</i>
2	2	Thermal barrier heat exchanger leak (RCS into CCS). ROLE PLAY: <i>When contacted as an AUO, repeat back request to perform inspections of CCS piping,</i> ROLE PLAY: <i>When contacted as Work Control, acknowledge the request for a troubleshooting and repair package for the thermal barrier piping.</i>
3	3	High RCS activity (DE-131 at 17 $\mu\text{Ci/gm}$) is reported by the Chemistry Lab. ROLE PLAY: <i>Call received from Chemistry stating that Dose Equivalent Iodine 131 is confirmed to be 17 $\mu\text{Ci/gm}$.</i> ROLE PLAY: <i>If/When contacted as Chemistry, state that additional samples are being performed.</i> ROLE PLAY: <i>When contacted as Reactor Engineering, the Console Operator will repeat back the request to implement TI-7.004, "Fuel Integrity Assessment Program."</i> ROLE PLAY: <i>When contacted as the Shift Manager, repeat back the request to refer to EPIP-1, "Emergency Plan Classification Flowchart," due to high RCS activity.</i> ROLE PLAY: <i>When contacted as Chemistry, state that the Cation Demin is NOT REQUIRED at this time.</i> ROLE PLAY: <i>When contacted as Radiation Protection, repeat back that letdown flow adjustments are planned and may affect radiological conditions.</i>
4	4	1-LS-3-402D, SOUTH VLV VAULT ROOM LEVEL fails high. ROLE PLAY: <i>If/When contacted as an AUO to the valve vault room, the Console Operator will repeat back the request. Report back that there is no indication of leakage in either valve vault room.</i>

Watts Bar Nuclear Plant
10-2011 NRC Examination Scenario 4
Console References

Exam Event No.	Simulator Event No.	Description/Role Play
5	5	<p>1-PT-1-73, HP TURBINE IMPULSE PRESS TR A fails high.</p> <p>ROLE PLAY: <i>When contacted as Work Control, repeat back request to prepare a troubleshooting and repair package for 1-PT-1-73, HP TURBINE IMPULSE PRESS TR A.</i></p> <p>ROLE PLAY: <i>If/when dispatched as the TB AUO, repeat back request to inspect 1-PT-1-73 for leaks. Report back that there are no leaks visible.</i></p>
6	6	<p>Standby Main Feedwater Pump trips due to instantaneous overcurrent.</p> <p>ROLE PLAY: <i>When contacted as Work Control, will repeat back request to prepare a troubleshooting and repair package for the SBMFP.</i></p> <p>ROLE PLAY: <i>When contacted as an AUO, repeat request to inspect the SFMP locally. Report back that the bearings on the pump are extremely hot.</i></p> <p>ROLE PLAY: <i>When contacted as an AUO, repeat back request to inspect the breaker for the SBMFP at the 1D 6.9 KV Unit board.</i></p> <p><i>IF the pump tripped with no operator action, state that the pump tripped on instantaneous overcurrent.</i></p> <p><i>IF the BOP stopped the SBMFP MANUALLY, state that there are no relays picked up.</i></p>
7	7	<p>Loop 2 RCP shaft shears, causing its seal package to fail. Automatic reactor trip fails to occur. 1-RT-1, REACTOR TRIP switch (1-M-4) fails to cause a reactor trip.</p> <p>ROLE PLAY: <i>None</i></p>
8	n/a	<p>1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips.</p> <p>ROLE PLAY: <i>When contacted as an AUO repeat back request to locally inspect the 1A-A 6.9 KV Shutdown Board. Report that differential relay operation caused the board to be lost, and that there is extensive damage to the board, but NO fire.</i></p>
9	n/a	<p>1B-B Safety Injection pump fails to automatically start on the safety injection signal.</p> <p>ROLE PLAY: <i>None</i></p>

Watts Bar Nuclear Plant
10-2011 NRC Examination Scenario 4
Console References

Exam Event No.	Simulator Event No.	Description/Role Play
10	n/a	<p>Loss of Seal injection flow and loss of thermal barrier flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA.</p> <p>ROLE PLAY: When contacted as the Shift Manager, repeat back information and need to refer to EPIP-1, "Emergency Plan Classification Flowchart."</p> <p>ROLE PLAY: When contacted, the Console Operator will repeat back request to perform Appendices A, B and C of E-1.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>1</u>	Page	<u>1</u>	of	<u>39</u>
Event Description: Transfer 1C 6.9 KV Unit Board from Alternate to Normal. Requires the BOP to perform SOI-201.03, "6.9kV Unit Board 1C," Section 8.1, "Transfer from Alternate to Normal."									
Time	Position	Applicant's Actions or Behavior							

SOI-201.03		The following actions are taken from SOI-201.03, "6.9kV Unit Board 1C," Section 8.1, "Transfer from Alternate to Normal."
	BOP	[1] OBTAIN SRO approval. <i>SRO approves board transfer.</i>
<p align="center">NOTES</p> <p>1) IF the Unit is out of service, the board may be energized by USST 1B, if energized by backfeeding the USSTs.</p> <p>2) The Unit Bd may be energizing 6.9kV Shutdown Bd via Maint Brkr.</p>		
	BOP	<p>[2] CHECK 6560-7260V to Bkr 1122, on one of the following (N/A unused blank):</p> <p>[2.1] 6.9KV UNIT BOARD 1C, VOLTMETER NORMAL SUPPLY [Pnl 12].</p> <p>[2.2] 1-EI-57-58, USST 1B VOLTS [1-M-1].</p> <p><i>BOP observes 1-EI-57-58, USST 1B VOLTS indicating approximately 7000 volts.</i></p>
	BOP	<p>[3] PLACE 1-XS-57-63, 6.9 UNIT BD 1C XFER SELECTOR [1-M-1], in MANUAL.</p> <p><i>BOP locates 1-XS-57-63, 6.9 UNIT BD 1C XFER SELECTOR and observes that the handswitch is in the MANUAL position.</i></p>
	BOP	[4] MONITOR that amp load transfers from Alternate To Normal supply as transfer is performed.
<p>EXAMINER: Steps 5 and 6 must be performed using two-handed operation. 1-HS-67-64 must be held in the CLOSE position and 1-HS-57-62 then placed in the TRIP position in order to transfer the board. These steps are marked as critical steps in SOI-201.03, "6.9kV Unit Board 1C," Section 8.1, "Transfer from Alternate to Normal."</p>		
	BOP	<p>Start of Critical Step(s)</p> <p>[5] PLACE 1-HS-57-64, 1122 NORMAL- 6.9 UNIT BD 1C FROM USST 1B [1-M-1], to CLOSE, and HOLD UNTIL transfer is complete.</p> <p><i>BOP rotates 1-HS-57-64 to the CLOSE position and maintains the handswitch in the CLOSE position.</i></p>

Op Test No.: 2 Scenario # 4 Event # 1 Page 2 of 39

Event Description: Transfer 1C 6.9 KV Unit Board from Alternate to Normal. Requires the BOP to perform SOI-201.03, "6.9kV Unit Board 1C," Section 8.1, "Transfer from Alternate to Normal."

Time	Position	Applicant's Actions or Behavior
	BOP	<p>[6] PLACE 1-HS-57-62, 1524 ALT- 6.9 UNIT BD 1C FROM START BUS A [1-M-1], to TRIP, and CHECK Bkr 1524, OPEN, and CHECK Bkr 1122, CLOSED.</p> <p>End of Critical Step(s)</p> <p><i>BOP rotates 1-HS-57-62 to the TRIP position.</i></p> <p><i>The BOP verifies board transfer by observing 1-HS-57-62 RED indicating light is DARK, GREEN indicating light is LIT. 1-HS-57-64 RED indicating light is LIT, GREEN indicating light is DARK.</i></p>
	BOP	<p>[7] CHECK 6.9kV Unit Bd volts 6560-7260V [1-EI-57-60, 6.9 UB 1C VOLTS, on 1-M-1; or local Pnl 3, VOLTMETER MAIN BUS].</p> <p><i>BOP observes 1-EI-57-60, UB 1C VOLTS and determines approximately 7000 volts are indicated.</i></p>
	BOP	<p>[8] PLACE 1-XS-57-63, 6.9 UNIT BD 1C XFER SELECTOR [1-M-1], in AUTO.</p> <p><i>BOP locates 1-XS-57-63, 6.9 UNIT BD 1C XFER SELECTOR and rotates the handswitch from the MANUAL position to the right to the AUTO position.</i></p>
	BOP	<p><i>If/when the BOP dispatches an AUO to the 1C 6.9kV Unit Board to determine if any relay operation occurred after the transfer, the Console Operator will repeat back the request.</i></p>
Cue Console Operator to insert Event 2.		

Op Test No.: 2 Scenario # 4 Event # 2 Page 3 of 39

Event Description: Thermal barrier heat exchanger 1 fails with a leak of greater than 50 gpm; component cooling thermal barrier heat exchanger isolation valves fail to close; Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)," manual isolation of the thermal barrier flow path and tripping of the thermal barrier booster pumps.

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

Indications:

237-D RCP THRM BAR RET HDR TEMP HI

	BOP	Diagnoses and announces the leak in the thermal barrier heat exchanger on RCP 1.
	BOP	May enter and take actions of ARI 237-D, TH BAR RET HDR TEMP.
	SRO	May direct the RO to monitor RCP seal parameters on 1-M-4 and/or the ICS computer.
	SRO	Enters and directs actions of AOI-15, "Loss of Component Cooling Water System," Section 3.2, "Surge Tank level greater than 72% or rising uncontrolled, OR CCS Rad Monitor alarm."
ARI 237-D		The following actions are taken from ARI 237-D, TH BAR RET HDR TEMP.
	RO	[1] CHECK 1-TI-70-88, TH BAR RET HDR TEMP [0-M-27B].
	SRO	[2] ENSURE TB Booster Pump ON.
	SRO	[3] CHECK the following for indication of TB leak: <ul style="list-style-type: none"> • 1-LI-70-63A, UNIT 1 SURGE TANK A SIDE LEVEL [0-M-27B] • 1-LI-70-99A, UNIT 1 SURGE TANK B SIDE LEVEL [0-M-27B] • 1-RM-90-123, CCS HX A OUTLET LIQUID [0-M-12] • 0-RM-90-123A, CCS HX C OUTLET LIQUID [0-M-12]
	RO	[4] IF TB leak indicated, THEN GO TO AOI-15, LOSS OF COMPONENT COOLING WATER (CCS).
	RO	[5] CHECK 1-FI-67-222, CCS HX A SUP FLOW [0-M-27A], AND
	RO	[6] ADJUST ERCW to CCS Hxs as necessary.
	RO	[7] START additional CCS pumps OR REDUCE CCS loads as necessary.

Op Test No.: <u>2</u>	Scenario # <u>4</u>	Event # <u>2</u>	Page <u>4</u> of <u>39</u>
Event Description: Thermal barrier heat exchanger 1 fails with a leak of greater than 50 gpm; component cooling thermal barrier heat exchanger isolation valves fail to close; Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)," manual isolation of the thermal barrier flow path and tripping of the thermal barrier booster pumps.			
Time	Position	Applicant's Actions or Behavior	

AOI-15

The following actions are taken from AOI-15, "Loss of Component Cooling Water (CCS)," Section 3.3, "Surge Tank level greater than 72% or rising uncontrolled, OR CCS Rad Monitor alarm."

	BOP	1. ENSURE 1-LCV-70-63, U1 SURGE TANK MAKEUP LCV [0-M-27], CLOSED. <i>BOP observes that 1-LCV-70-63, U1 SURGE TANK MAKEUP LCV is CLOSED with RED indicating light DARK and GREEN indicating light LIT.</i>
NOTE		
CCS HX outlet Rad Monitor rising indicates possible RCS in-leakage.		
	BOP	2. CHECK CCS Rad Monitors NORMAL. <i>RO may use ICS display to monitor liquid radiation monitors. If the ICS computer display is used, the RO will observe rising counts on 1-RM-90-123, CCS HX A OUTLET LIQUID.</i>
	BOP	2. RESPONSE NOT OBTAINED: ENSURE U1 & U2 CCS Surge Tank Vents CLOSED. <i>With radiation levels rising, the SRO may direct the BOP to close 1-HS-70-66A, U1 SURGE TANK VENT, and 2-HS-70-66A, U2 SURGE TANK VENT.</i>
NOTE		
Thermal Barrier Booster pumps will trip on differential flow. This indicates in-leakage from RCS.		
	BOP	3. CHECK Thermal Barrier Booster pump and flows NORMAL: <ul style="list-style-type: none"> • 1 Thermal Barrier Booster pump running, • Thermal Barrier flow 40 - 50 gpm <i>BOP observes that 1-FI-70-115, TH BAR 1 FLOW is pegged high, and that 1-PDI-70-117, TH BAR 1 HX ΔP is at a lower value than the other RCPs.</i>

Op Test No.: <u>2</u>	Scenario # <u>4</u>	Event # <u>2</u>	Page <u>5</u> of <u>39</u>
Event Description: Thermal barrier heat exchanger 1 fails with a leak of greater than 50 gpm; component cooling thermal barrier heat exchanger isolation valves fail to close; Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)," manual isolation of the thermal barrier flow path and tripping of the thermal barrier booster pumps.			
Time	Position	Applicant's Actions or Behavior	

	BOP	<p>3. RESPONSE NOT OBTAINED:</p> <p>ENSURE RCP seal injection flow NORMAL, THEN:</p> <p>a. ENSURE Thermal Barrier Booster pumps STOPPED.</p> <p>BOP places 1B 1-HS-70-130A, THRM BAR BSTR PMP 1B (TBBP) in the STOP, PULL-TO-LOCK position. BOP places 1-HS-70-131A, THRM BAR BSTR PMP 1A (TBBP) in the STOP, PULL-TO-LOCK position.</p> <p>b. ENSURE the following isol valves CLOSED:</p> <ul style="list-style-type: none"> • 1-FCV-70-133 or 1-FCV-70-134, Thermal Barrier Supply CIV. <p>BOP rotates either 1-HS-70-133A, THERMAL BAR SUP CIV -φB OR 1-HS-70-134A, THERMAL BAR SUP CIV -φB, to the CLOSE position. Closing BOTH valves is also acceptable.</p> <ul style="list-style-type: none"> • 1-FCV-70-87 or 1-FCV-70-90, Thermal Barrier Return CIV. <p>BOP rotates either 1-HS-70-87A, THERMAL BAR RET CIV -φB OR 1-HS-70-90A, THERMAL BAR RET CIV -φB, to the CLOSE position. Closing BOTH valves is also acceptable.</p> <p>c. IF RCP lower bearing temp rising uncontrolled (180°F max), THEN REFER TO AOI-24, Reactor Coolant Pump Seal Abnormalities.</p>
	BOP	<p>4. CHECK CVCS Letdown HX NORMAL:</p> <ul style="list-style-type: none"> • Letdown flow, 1-FI-70-190, Normal 500 - 1000 gpm [0-M-27]. • Letdown temp, 1-TI-70-191, Normal 90 - 135°F [0-M-27]. • Radiation Protection survey. <p>BOP determines that CVCS Letdown HX flows and temperatures are NORMAL.</p>
<p style="text-align: center;">CAUTION</p> <p>If Seal Water HX is source of in-leakage, CCP mini-flow and cooling will be lost if HX is isolated from CVCS. CVCS temperature must be monitored for system operability.</p>		
	RO	<p>5. CHECK RCP Seal Water HX NORMAL:</p> <ul style="list-style-type: none"> • CCS return temp, 1-TI-70-175 normal 70 - 110°F [0-M-27]. • HX outlet flow, 1-FI-70-176 greater than 200 gpm [0-M-27]. • Radiation Protection survey. <p>BOP determines that RCP Seal Water HX flows and temperatures are NORMAL.</p>
	BOP	<p>6. DISPATCH Operators, with Radiation Protection support, to inspect CCS HXs and plant equipment.</p> <p>When BOP dispatches personnel to perform inspections, the Console Operator will repeat back request.</p>

Op Test No.: <u>2</u>	Scenario # <u>4</u>	Event # <u>2</u>	Page <u>6</u> of <u>39</u>
Event Description: Thermal barrier heat exchanger 1 fails with a leak of greater than 50 gpm; component cooling thermal barrier heat exchanger isolation valves fail to close; Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)," manual isolation of the thermal barrier flow path and tripping of the thermal barrier booster pumps.			
Time	Position	Applicant's Actions or Behavior	

	SRO	<p>7. LOCATE leaking HX by any of the following:</p> <ul style="list-style-type: none"> • Raised CCS outlet temp from equipment HXs. • Raised noise at any HX. • Chemistry analysis indicates high chloride levels or RCS contamination. • Raised CCS Rad Monitor indications. <p><i>SRO determines that the thermal barrier flowpath was the leaking component.</i></p>
	SRO	<p>8. IF CCS heat exchanger(s) is source of in-leakage, THEN MONITOR CCS Surge Tank level AND ADJUST ERCW pressure as required to be slightly greater than or equal to CCS pressure to minimize tube in-leakage.</p> <p><i>SRO determines that the CCS heat exchanger is NOT the source of in-leakage and marks the step as not applicable.</i></p>
	SRO	<p>9. CHECK CCS HX can remain in service:</p> <ul style="list-style-type: none"> • CCS Surge Tank levels, • CCS chemistry, • CCS temperature, • Availability of alternate equipment, • Ability to repair failed equipment. <p><i>SRO determines that the CCS heat exchangers may remain in service.</i></p>
	RO	<p>10. IF leak is on individual component HX, THEN:</p> <ol style="list-style-type: none"> REMOVE affected equipment from service. ISOLATE associated equipment HX. <p><i>SRO determines that the leaking component has been isolated.</i></p>
	RO	<p>11. NOTIFY Work Control to initiate repairs.</p> <p><i>When contacted as Work Control, the Console Operator will acknowledge the request for a troubleshooting and repair package for the thermal barrier piping.</i></p>
	RO	<p>12. REFER TO the following Tech Specs:</p> <ul style="list-style-type: none"> • 3.5.2, ECCS - Operating • 3.5.3, ECCS - Shutdown • 3.7.7, - Component Cooling Water System (CCS) <p><i>SRO determines that isolating the leaking thermal barrier flowpath does not render the CCS system inoperable.</i></p>

Op Test No.: 2 Scenario # 4 Event # 2 Page 7 of 39

Event Description: Thermal barrier heat exchanger 1 fails with a leak of greater than 50 gpm; component cooling thermal barrier heat exchanger isolation valves fail to close; Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)," manual isolation of the thermal barrier flow path and tripping of the thermal barrier booster pumps.

Time	Position	Applicant's Actions or Behavior
	RO	<p>13. WHEN repairs are complete, THEN:</p> <p>a. ENSURE Surge Tank Vents are OPEN:</p> <ul style="list-style-type: none"> • 1-FCV-70-66 • 2-FCV-70-66 <p>b. ENSURE 1-HS-70-63A, U1 SURGE TANK MAKEUP LCV in P-AUTO.</p> <p>c. ENSURE CCS, CVCS, and Locked Valves and Breakers are returned to normal alignment USING the following Instructions:</p> <ul style="list-style-type: none"> • SOI-70.01, Component Cooling Water (CCS). • SOI-62.01, CVCS - Charging and Letdown. • 0-PI-OPS-17.0, 18 Month Locked Valve Verification. • 0-PI-OPS-17.1, 18 Month Locked Breaker Verification. <p><i>SRO determines that the conditions of the step have not been satisfied and that the actions cannot be completed.</i></p>
EXAMINER: The crew briefing is optional. The next event may be entered prior to the brief.		
	SRO	Crew Brief would typically be conducted for this event as time allows prior to the next event.
	SRO	<p>Notifications should be addressed as applicable if not specifically addressed by the procedure or in the crew brief.</p> <p><u>Operations Management</u> - Typically Shift Manager.</p> <p><u>Maintenance Personnel</u> – Typically Work Control Center (WCC).</p> <p>(Note: Maintenance notification may be delegated to the Shift Manager).</p>
		14. RETURN TO Instruction in effect.
Cue Console Operator to enter Event 3, if not already entered.		

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>3</u>	Page	<u>8</u>	of	<u>39</u>
Event Description: High RCS activity (DE-131 at 22 μ Ci/gm) is reported by the Chemistry Lab. Requires entry into AOI-28, "High Activity in Reactor Coolant." Requires a Tech Spec evaluation.									
Time	Position	Applicant's Actions or Behavior							

Indications:		
Call received from Chemistry stating that Dose Equivalent Iodine 131 is confirmed to be 22 μ Ci/gm.		
	SRO	After receiving the call from Chemistry, enters and directs actions of AOI-28, High Activity in Reactor Coolant."
AOI-28		The following actions are taken from AOI-28, "High Activity in Reactor Coolant."
	RO	1. MONITOR area radiation monitors and recorder 1-RR-90-1 NORMAL.
	RO	2. ENSURE Chemistry is performing Isotopic Analysis of the RCS. <i>When the SRO calls Chemistry, the Console Operator will state that additional samples are being performed.</i>
	RO	3. NOTIFY Reactor Engineering to implement TI-7.004, Fuel Integrity Assessment Program. <i>When the SRO calls Reactor Engineering, the Console Operator will repeat back the request to implement TI-7.004, "Fuel Integrity Assessment Program."</i>
	RO	4. CHECK analysis in Step 2 confirms high RCS activity. <i>SRO notes that the initial call from Chemistry states that a confirming sample has been taken.</i>
<p align="center">NOTE</p> <p>Required action C of LCO 3.4.16 requires that the reactor must be brought to Mode 3 with Tavg less than 500°F within 6 hours if the Dose Equivalent Iodine (I-131) is greater than 21 μCi/gm. The Functional Evaluation for PER 360041 documents that the actual limit for Action C is greater than 14 μCi/gm. The greater than 14 μCi/gm limit is being administratively controlled through step 5 and 6 below until NRC's approval of a License Amendment Request can be obtained.</p>		
	SRO	5. REFER TO Tech Spec 3.4.16, RCS Specific Activity, AND MONITOR plant conditions for continued operation. <i>SRO refers to Tech Spec 3.4.16, RCS Specific Activity.</i>
	SRO	6. WHEN Dose Equivalent Iodine (I-131) is greater than 14 μ Ci/gm THEN COMPLY with action C of LCO 3.4.16. <i>Since the reported value of Dose Equivalent Iodine (I-131) is greater than 14 μCi/gm (22 μCi/gm), SRO enters Action C, which requires the plant to be in Mode 3 with Tavg <500°F within 6 hours.</i>

Op Test No.: 2 Scenario # 4 Event # 3 Page 9 of 39

Event Description: High RCS activity (DE-131 at 22 μ ci/gm) is reported by the Chemistry Lab. Requires entry into AOI-28, "High Activity in Reactor Coolant." Requires a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
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	RO	7. REFER TO EPIP-1, Emergency Plan Classification Flowchart. <i>When the SRO calls the Shift Manager, the Console Operator will repeat back the request to refer to EPIP-1, "Emergency Plan Classification Flowchart."</i>
NOTE		
Charging may need to be augmented prior to raising letdown flow.		
	SRO	8. PLACE CVCS Mixed Bed Demin in service at 120 gpm indicated on 1-FI-62-82, LETDOWN FLOW [1-M-6], using SOI-62.01, Charging and Letdown, or SOI-62.04, CVCS Purification System.
	SRO	9. CHECK Chemistry has determined that the Cation Demin should be placed in service. <i>When the SRO calls Chemistry, the Console Operator will state that the Cation Demin is NOT REQUIRED at this time.</i>
EXAMINER: The following steps are taken from SOI-62.01, "CVCS - Charging and Letdown," Section 6.3, "Adjusting Letdown Flow."		
WARNING		
Increasing letdown flow may increase radiation levels along letdown flowpaths.		
CAUTION		
Flashing in the letdown line may occur if 1-PCV-62-81 is opened excessively.		
NOTE		
Maximum letdown flow is 120 gpm.		
	SRO	[1] NOTIFY Radiation Protection of potential changes in radiological conditions due to adjusting letdown flow. <i>When the SRO calls Radiation Protection, the Console Operator will repeat back that letdown flow adjustments are planned and may affect radiological conditions.</i>
	RO	[2] PLACE 1-HIC-62-81A, LETDOWN PRESS CNTL, in MANUAL and ADJUST to between 40% and 50% OPEN if using 75 gpm orifice (20-30% OPEN if using 45 gpm orifice). <i>RO places 1-HIC-62-81A, LETDOWN PRESS CNTL, in MANUAL by lifting the toggle switch up into the MANUAL position. The RO opens 1-HIC-62-81A to 40-50% by moving the toggle switch to the left until the position indication reads between 40 and 50% OPEN.</i>
NOTE		
If letdown flow is to be raised, charging flow should first be raised by approximately the amount that letdown will be raised, to prevent high letdown temperature out of the regenerative heat exchanger and prevent bringing in annunciator 110-A, REGEN HX LTDN LINE TEMP HI.		

Op Test No.: 2 Scenario # 4 Event # 3 Page 10 of 39

Event Description: High RCS activity (DE-131 at 22 μ ci/gm) is reported by the Chemistry Lab. Requires entry into AOI-28, "High Activity in Reactor Coolant." Requires a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
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	RO	<p>[3] IF letdown is to be raised, THEN, ADJUST 1-HIC-62-89A, CHARGING HDR RCP SEALS FLOW CONTROL, and 1-HIC-62-93A, CHARGING FLOW PZR LEVEL CONTROL, to raise charging flow to prevent high letdown temperature out of the REGEN HX, and MAINTAIN between 8 and 13 gpm RCP Seal flow.</p> <p>RO makes adjustment to 1-HIC-63-93 and 1-HIC-62-89 to raise charging flow while maintaining 8-13 gpm seal injection flow to each RCP.</p>
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CAUTION

When swapping letdown orifices, steps [4] and [5] must be performed concurrently to prevent flashing in the letdown line.

		<p>[4] CLOSE Letdown Orifice(s) FCV(s) to be isolated (N/A orifices NOT selected):</p>																				
	RO	<table><tr><th>NOMENCLATURE</th><th>LOCATION</th><th>UNID</th><th>PERF INITIAL</th></tr><tr><td>LETDOWN ORIFICE A 45 GPM CIV-ØA</td><td>1-M-6</td><td>1-HS-62-72A</td><td></td></tr><tr><td>LETDOWN ORIFICE B 75 GPM CIV-ØA</td><td>1-M-6</td><td>1-HS-62-73A</td><td></td></tr><tr><td>LETDOWN ORIFICE C 75 GPM CIV-ØA</td><td>1-M-6</td><td>1-HS-62-74A</td><td></td></tr><tr><td>LETDOWN ORIFICE 5 GPM CIV-ØA</td><td>1-M-6</td><td>1-HS-62-76A</td><td></td></tr></table>	NOMENCLATURE	LOCATION	UNID	PERF INITIAL	LETDOWN ORIFICE A 45 GPM CIV-ØA	1-M-6	1-HS-62-72A		LETDOWN ORIFICE B 75 GPM CIV-ØA	1-M-6	1-HS-62-73A		LETDOWN ORIFICE C 75 GPM CIV-ØA	1-M-6	1-HS-62-74A		LETDOWN ORIFICE 5 GPM CIV-ØA	1-M-6	1-HS-62-76A	
NOMENCLATURE		LOCATION	UNID	PERF INITIAL																		
LETDOWN ORIFICE A 45 GPM CIV-ØA		1-M-6	1-HS-62-72A																			
LETDOWN ORIFICE B 75 GPM CIV-ØA		1-M-6	1-HS-62-73A																			
LETDOWN ORIFICE C 75 GPM CIV-ØA		1-M-6	1-HS-62-74A																			
LETDOWN ORIFICE 5 GPM CIV-ØA		1-M-6	1-HS-62-76A																			
	<p><i>RO indicates that NO orifice valves are to be isolated and marks the step as “not applicable.”</i></p>																					

Op Test No.: 2 Scenario # 4 Event # 3 Page 11 of 39

Event Description: High RCS activity (DE-131 at 22 μ ci/gm) is reported by the Chemistry Lab. Requires entry into AOI-28, "High Activity in Reactor Coolant." Requires a Tech. Spec evaluation.

Time	Position	Applicant's Actions or Behavior																				
	RO	<p>[5] WHEN either of the following conditions exist:</p> <ul style="list-style-type: none"> Letdown pressure begins to reduce, OR It is desired to place an additional letdown orifice in service, THEN PLACE and HOLD handswitch for Letdown Orifice(s) to be placed in service, to OPEN (N/A orifices NOT opened): <table border="1"> <thead> <tr> <th>NOMENCLATURE</th> <th>LOCATION</th> <th>UNID</th> <th>PERF INITIAL</th> </tr> </thead> <tbody> <tr> <td>LETDOWN ORIFICE A 45 GPM CIV-ϕA</td> <td>1-M-6</td> <td>1-HS-62-72A</td> <td></td> </tr> <tr> <td>LETDOWN ORIFICE B 75 GPM CIV-ϕA</td> <td>1-M-6</td> <td>1-HS-62-73A</td> <td></td> </tr> <tr> <td>LETDOWN ORIFICE C 75 GPM CIV-ϕA</td> <td>1-M-6</td> <td>1-HS-62-74A</td> <td></td> </tr> <tr> <td>LETDOWN ORIFICE 5 GPM CIV-ϕA</td> <td>1-M-6</td> <td>1-HS-62-76A</td> <td></td> </tr> </tbody> </table> <p>RO locates 1-HS-62-72A, LETDOWN ORIFICE A 45 GPM CIV-ϕA and rotates the handswitch to the right to the OPEN position, and holds the handswitch until the RED indicating light is LIT and the GREEN indicating light is DARK.</p>	NOMENCLATURE	LOCATION	UNID	PERF INITIAL	LETDOWN ORIFICE A 45 GPM CIV- ϕ A	1-M-6	1-HS-62-72A		LETDOWN ORIFICE B 75 GPM CIV- ϕ A	1-M-6	1-HS-62-73A		LETDOWN ORIFICE C 75 GPM CIV- ϕ A	1-M-6	1-HS-62-74A		LETDOWN ORIFICE 5 GPM CIV- ϕ A	1-M-6	1-HS-62-76A	
NOMENCLATURE	LOCATION	UNID	PERF INITIAL																			
LETDOWN ORIFICE A 45 GPM CIV- ϕ A	1-M-6	1-HS-62-72A																				
LETDOWN ORIFICE B 75 GPM CIV- ϕ A	1-M-6	1-HS-62-73A																				
LETDOWN ORIFICE C 75 GPM CIV- ϕ A	1-M-6	1-HS-62-74A																				
LETDOWN ORIFICE 5 GPM CIV- ϕ A	1-M-6	1-HS-62-76A																				
	RO	<p>[6] ADJUST 1-HIC-62-89A, CHARGING HDR RCP SEALS FLOW CONTROL, and 1-HIC-62-93A, CHARGING FLOW PZR LEVEL CONTROL, to control charging flow at the desired rate, and MAINTAIN between 8 and 13 gpm RCP Seal flow.</p> <p>RO makes adjustment to 1-HIC-63-93 and 1-HIC-62-89 to raise charging flow while maintaining 8-13 gpm seal injection flow to each RCP.</p>																				
	RO	<p>[7] ADJUST 1-HIC-62-81A, LETDOWN PRESS CONTROL, to maintain between 320 and 350 psig.</p> <p>The RO closes 1-HIC-62-81A by moving the toggle switch to the right, while monitoring 1-PI-62-81, LP LETDOWN PRESS. RO adjusts 1-HIC-62-81 until the pressure is established between 320 and 350 psig.</p>																				
<p align="center">NOTE</p> <p>During periods of high river water temperature, river water temperature will limit the ability of TCV-70-192 to control letdown temperature at lower temperatures. Refer to P & L 3.0C.</p>																						
	RO	<p>[8] PLACE 1-HIC-62-78A, LETDOWN HX OUTLET TEMP TCV-70-192 CNTL, in MANUAL, and ADJUST 1-HIC-62-78A to maintain less than 127°F AND MAINTAIN 1-TCV-70-192 less than full open.</p>																				

Op Test No.: 2 Scenario # 4 Event # 3 Page 12 of 39

Event Description: High RCS activity (DE-131 at 22 μ ci/gm) is reported by the Chemistry Lab. Requires entry into AOI-28, "High Activity in Reactor Coolant." Requires a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
	RO	<p>[9] PLACE the following valves in AUTO, if desired (N/A valve(s) NOT placed in AUTO):</p> <p>[9.1] 1-HIC-62-81A, LETDOWN PRESS CONTROL.</p> <p>RO returns 1-HIC-62-81A, LETDOWN PRESS CONTROL to AUTO by pushing down on the toggle switch.</p> <p>[9.2] 1-HIC-62-78A, LETDOWN HX OUTLET TEMP TCV-70-192 CNTL.</p> <p>RO returns 1-HIC-62-78A, LETDOWN HX OUTLET TEMP TCV-70-192 CNTL, to AUTO by pushing down on the toggle switch.</p>
	RO	<p>[10] STABILIZE Charging and Letdown.</p> <p>RO makes adjustment to 1-HIC-63-93 and 1-HIC-62-89 to stabilize charging flow while maintaining 8-13 gpm seal injection flow to each RCP, with letdown flow of 120 gpm.</p>
	RO	<p>[11] PLACE 1-HIC-62-93A to AUTO when PZR level is on program, as directed by US/SM.</p> <p>SRO directs the RO to return 1-HIC-62-93 to AUTO</p>
EXAMINER: The following actions are taken from AOI-28, "High Activity in Reactor Coolant."		
<p style="text-align: center;">NOTE</p> <p>Cation Demin maximum flow is 75 gpm, and is indicated on 1-FI-62-113, MIXED BED FLOW TO CATION BED [1-L-57, A3T/713].</p>		
	SRO	<p>10. PLACE Cation Demin in service using SOI-62.04, CVCS Purification System.</p> <p>Based on the earlier communication with Chemistry, the SRO marks the step as "not applicable."</p>
	SRO	<p>11. REQUEST Chemistry monitor Demin outlets to determine cleanup effectiveness.</p> <p>When the SRO calls Chemistry, the Console Operator will repeat back the request to monitor demin outlets to determine cleanup effectiveness.</p>
	SRO	12. RETURN TO Instruction in effect.
EXAMINER: The crew briefing is optional. The next event may be entered prior to the brief.		
	SRO	Crew Brief would typically be conducted for this event as time allows prior to the next event.

Op Test No.: 2 Scenario # 4 Event # 3 Page 13 of 39

Event Description: High RCS activity (DE-131 at 22 μ ci/gm) is reported by the Chemistry Lab.
Requires entry into AOI-28, "High Activity in Reactor Coolant." Requires a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
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	SRO	<p>Notifications should be addressed as applicable if not specifically addressed by the procedure or in the crew brief.</p> <p><u>Operations Management</u> - Typically Shift Manager.</p> <p><u>Maintenance Personnel</u> – Typically Work Control Center (WCC).</p> <p>(Note: Maintenance notification may be delegated to the Shift Manager).</p>
Cue Console Operator to insert Event 4, if not already entered.		

Op Test No.: 2 Scenario # 4 Event # 4 Page 14 of 39

Event Description: 1-LS-3-402D, SOUTH VLV VAULT ROOM LEVEL fails high. Requires entry into ARI 57-C NORTH/SOUTH VALVE VAULT RM LEVEL HI/ MFW ISOLATION.

Time	Position	Applicant's Actions or Behavior
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Indications:

57-C NORTH/SOUTH VALVE VAULT RM LEVEL HI/MFW ISOLATION

	BOP	Diagnoses and announces 57-C NORTH/SOUTH VALVE VAULT RM LEVEL HI/ MFW ISOLATION.
	BOP	May enter and take actions of ARI 57-C NORTH/SOUTH VALVE VAULT RM LEVEL HI/MFW ISOLATION.
	SRO	Evaluates Tech Specs due to the failure of 1-LS-3-40D, SOUTH VLV VAULT ROOM LEVEL switch.
ARI 57-C		The following actions are taken from ARI 57-C, NORTH/SOUTH VALVE VAULT RM LEVEL HI/ MFW ISOLATION.
	BOP	<p>[1] CHECK steam flow and feed flow indications for evidence of a flow imbalance (leak indication).</p> <p><i>BOP observes steam and feedwater flow instrumentation on panel 1-M-4 and determines that there is no evidence of a leak. BOP may also observe steam flow and feedwater flow on the ICS display and determine that there is no evidence of a leak. If/When the BOP dispatches an AUO to the valve vault room, the Console Operator will repeat back the request. The Console Operator will report back that there is no indication of leakage in either valve vault room.</i></p>
	BOP	<p>[2] IF there is indication of a leak, THEN EVALUATE plant conditions, AND PERFORM the following, if warranted:</p> <p>[2.1] IF the unit power is less than P-9, THEN Manually TRIP the Turbine, AND GO TO AOI-17, TURBINE TRIP.</p> <p>[2.2] IF the unit power is greater than P-9, THEN Manually TRIP the Reactor, AND GO TO E-0, REACTOR TRIP OR SAFETY INJECTION.</p> <p><i>After receiving reports from the BOP and the AUO, the SRO determines that no leak exists and marks this step as not applicable.</i></p>
	SRO	<p>[3] IF level switch failure has occurred, THEN REFER TO Tech Specs.</p> <p><i>LCO 3.3.2, Function 5.e. South Valve Vault Room Water Level - High, Condition O With one MSVV Room Water Level High channel inoperable, place channel in trip within 72 hours OR be in MODE 3 within 78 hours.</i></p>
EXAMINER: The crew briefing is optional. The next event may be entered prior to the brief.		
	SRO	Crew Brief would typically be conducted for this event as time allows prior to the next event.

Op Test No.: 2 Scenario # 4 Event # 4 Page 15 of 39

Event Description: 1-LS-3-402D, SOUTH VLV VAULT ROOM LEVEL fails high. Requires entry into ARI 57-C NORTH/SOUTH VALVE VAULT RM LEVEL HI/ MFW ISOLATION.

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. <u>Operations Management</u> - Typically Shift Manager. <u>Maintenance Personnel</u> – Typically Work Control Center (WCC). (Note: Maintenance notification may be delegated to the Shift Manager).
Cue Console Operator to insert Event 5, if not already entered.		
	RO	

Op Test No.: 2 Scenario # 4 Event # 5 Page 16 of 39

Event Description: 1-PT-1-73, HP TURBINE IMPULSE PRESS TR A fails high. Requires the RO to take IMMEDIATE OPERATOR ACTION to place rod control to MANUAL to stop rod motion. Requires entry into AOI-2, "Malfunction of Reactor Control System." Requires a Tech Spec evaluation.

Time

Position

Applicant's Actions or Behavior

Indications:

94-A AUCT TAVG-TREF DEVIATION

	RO	Diagnoses and announces the failure of 1-PT-1-73, % HP TURBINE POWER TR A.
	RO	If control rods are in AUTO, performs IMMEDIATE OPERATOR ACTIONS of AOI-2, "Malfunction of Reactor Control System," Section 3.2, "Uncontrolled rod movement," and places 1-RBSS ROD BANK SELECT in MAN. After MAN is selected, confirms outward rod motion has stopped.
	SRO	Enters and directs actions of AOI-2, "Malfunction of Reactor Control System," Section 3.2, "Uncontrolled rod movement."
AOI-2		The following actions are taken from AOI-2, "Malfunction of Reactor Control System," Section 3.2, "Uncontrolled rod movement."

NOTE

Step 1 is an IMMEDIATE ACTION step.

	RO	<p>1. STOP uncontrolled rod motion:</p> <p>a. PLACE control rods in MAN.</p> <p><i>RO placed 1-RBSS ROD BANK SELECT in MAN during performance of IMMEDIATE ACTION.</i></p> <p>b. CHECK control rod movement STOPPED.</p> <p><i>RO observed rod motion stopped when 1-RBSS ROD BANK SELECT was placed in MAN.</i></p>
EXAMINER: AOI-2, "Malfunction of Reactor Control System," Attachment 1, "REACTOR POWER VS TAVG/TREF TEMPERATURE AND PZR LEVEL" is contained as Attachment 1.		
	RO	<p>2. MAINTAIN T-ave on PROGRAM. (Reference Attachment 1)</p> <ul style="list-style-type: none"> • (p) USE control rods. <p><i>RO evaluates Tavg and may adjust control rod position in MAN.</i></p> <p>OR</p> <ul style="list-style-type: none"> • (p) ADJUST turbine load.
	RO	<p>3. CHECK loop T-ave channels NORMAL.</p> <p><i>RO observes Tavg normal on 1-TI-68-2E, LOOP 1 TAVG, 1-TI-68-25E, LOOP 2 TAVG, 1-TI-68-44E, LOOP 3 TAVG, and 1-TI-68-67E, LOOP 4 TAVG.</i></p>
	RO	<p>4. CHECK Auct T-avg NORMAL on 1-TR-68-2B.</p> <p><i>RO observes that the GREEN pen (Tavg) is normal on 1-TR-68-2B, TREF & AUCT TAVG - °F.</i></p>

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Event Description: 1-PT-1-73, HP TURBINE IMPULSE PRESS TR A fails high. Requires the RO to take IMMEDIATE OPERATOR ACTION to place to place rod control to MANUAL to stop rod motion. Requires entry into AOI-2, "Malfunction of Reactor Control System." Requires a Tech Spec evaluation.

Time

Position

Applicant's Actions or Behavior

	RO	<p>5. CHECK NIS power range channels NORMAL.</p> <p><i>RO observes 1-NI-41B, PR FLUX % POWER, 1-NI-42B, PR FLUX % POWER, 1-NI-43B, PR FLUX % POWER, 1-NI-44B, PR FLUX % POWER are indicating normal (approximately 82% power.)</i></p>
	BOP	<p>6. CHECK the following:</p> <ul style="list-style-type: none"> • Turbine impulse pressure channel 1-PI-1-73, NORMAL. <p><i>RO observes 1-PI-1-73, % HP TURBINE POWER TR A, and after comparing the output to 1-PI-1-72, % HP TURBINE POWER TR B determines that it is failed high.</i></p> <ul style="list-style-type: none"> • T-ref and Auct T-avg NORMAL on 1-TR-68-2B (Reference Attachment 1). <p><i>RO observes that the RED pen (Tref) is failed high on 1-TR-68-2B, TREF & AUCT TAVG - °.</i></p> <p><i>RO observes that the GREEN pen (Tavg) is normal on 1-TR-68-2B, TREF & AUCT TAVG - °.</i></p>
	BOP	<p>6. RESPONSE NOT OBTAINED:</p> <p>PLACE steam dumps in pressure mode as follows:</p> <ol style="list-style-type: none"> PLACE steam dumps to OFF. <p><i>BOP rotates 1-HS-1-103A, STEAM DUMP FSV "A" to the left to the "OFF RESET" position. BOP rotates 1-HS-1-103B, STEAM DUMP FSV "B" to the left to the "OFF RESET" position.</i> <ol style="list-style-type: none"> PLACE mode selector HS to STEAM PRESS. <p><i>BOP rotates 1-HS-1-103D, STEAM DUMP MODE to the right to the STEAM PRESS position.</i></p> <ol style="list-style-type: none"> ADJUST steam dump demand to zero. <p><i>BOP observes 1-XI-1-33, STEAM DUMP DEMAND dropping to zero.</i></p> <ol style="list-style-type: none"> PLACE steam dumps to ON. <p><i>BOP rotates 1-HS-1-103A, STEAM DUMP FSV "A" to the right to the "ON" position. BOP rotates 1-HS-1-103B, STEAM DUMP FSV "B" to the right to the "ON" position.</i></p> <ol style="list-style-type: none"> ENSURE controller set at 84% (1092 psig). <p><i>BOP observes that 1-PIC-1-33, STM DUMP PRESS CONTROL dial is set to 84%.</i></p> <ol style="list-style-type: none"> WHEN conditions allow, THEN REFER TO SOI-1.02 and PLACE steam dumps in TAVG Mode. <p><i>SRO maintains this step open until repairs are made.</i></p> </p>

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Event Description: 1-PT-1-73, HP TURBINE IMPULSE PRESS TR A fails high. Requires the RO to take IMMEDIATE OPERATOR ACTION to place to place rod control to MANUAL to stop rod motion. Requires entry into AOI-2, "Malfunction of Reactor Control System." Requires a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
	RO	<p>7. MONITOR core power distribution parameters:</p> <ul style="list-style-type: none"> • Power range channels • Δ Flux Indicators • T-ave • Loop ΔT • Incore TCs • Feed flow/Steam flow
	SRO	<p>8. INITIATE repairs to failed equipment.</p> <p><i>When the SRO contacts Work Control, the Console Operator will repeat back request to prepare a troubleshooting and repair package for 1-PT-1-73, HP TURBINE IMPULSE PRESS TR A.</i></p>
	SRO	<p>9. REFER TO Tech Specs:</p> <ul style="list-style-type: none"> • 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, Reactor Trip System (RTS) Instrumentation <p>Function 16.f. Turbine Impulse Pressure, P-13. 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.</p> <ul style="list-style-type: none"> • 3.3.2, Engineered Safety Features Actuation System (ESFAS) Instrumentation- Not applicable
	SRO	<p>10. NOTIFY Chemistry of any reactor power changes greater than 15% in one hour.</p>
	SRO	<p>11. WHEN ready to restore repaired ΔT and loop T-avg channels, THEN:</p> <p><i>SRO determines that the conditions of the step cannot be made and continues to the next step.</i></p>
<p align="center">CAUTION</p> <p>Allowing at least 5 minutes between any rod control input change (i.e., T-ave, T-ref, or NIS) and placing rods in AUTO, will help prevent undesired control rod movement.</p>		

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Event Description: 1-PT-1-73, HP TURBINE IMPULSE PRESS TR A fails high. Requires the RO to take IMMEDIATE OPERATOR ACTION to place rod control to MANUAL to stop rod motion. Requires entry into AOI-2, "Malfunction of Reactor Control System." Requires a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
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	SRO	12. WHEN auto rod control desired, THEN: <i>SRO determines that the conditions of the step cannot be made and continues to the next step.</i>
	SRO	13. WHEN conditions allow auto PZR level control, THEN <i>SRO determines that the conditions of the step cannot be made and continues to the next step.</i>
	SRO	14. RETURN TO Instruction in effect.
EXAMINER: The crew briefing is optional. The next event may be entered prior to the brief.		
	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. <u>Operations Management</u> - Typically Shift Manager. <u>Maintenance Personnel</u> – Typically Work Control Center (WCC). (Note: Maintenance notification may be delegated to the Shift Manager).
Cue Console Operator to insert Event 6, if not already entered.		

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Event Description: Standby Main Feedwater Pump trips due to instantaneous overcurrent. Requires a load reduction using AOI-16, "Loss of Normal Feedwater," Subsection 3.7, "Standby MFWP TRIP."

Time	Position	Applicant's Actions or Behavior
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Indications:

14-E M-1 THRU M-6 MOTOR TRIPOUT

63-F SG LEVEL DEVIATION

	BOP	Diagnoses and announces the trip of the Standby Main Feedwater Pump (SMFP).
	SRO	Enters and directs actions of AOI-16, "Loss of Normal Feedwater," Section 3.7, "Standby MFWP TRIP."
AOI-16		The following actions are taken from AOI-16, "Loss of Normal Feedwater," Section 3.7, "Standby MFWP TRIP."
EXAMINER: There are two potential success paths for the loss of the Standby Main Feedwater Pump (SFMP) at the current power level. Both of the paths are provided.		
	BOP	1. CHECK both MFWPs in service.
SUCCESS PATH 1		
	BOP	2. ENSURE adequate feed flow for existing conditions: <ul style="list-style-type: none"> • Feed flow greater than or equal to steam flow. • S/G levels returning to program.

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Event Description: Standby Main Feedwater Pump trips due to instantaneous overcurrent. Requires a load reduction using AOI-16, "Loss of Normal Feedwater," Subsection 3.7, "Standby MFWP TRIP."

Time	Position	Applicant's Actions or Behavior
	BOP	<p>2. RESPONSE NOT OBTAINED:</p> <p>(p) REDUCE turbine load as needed:</p> <p>a. PLACE turbine in IMP IN.</p> <p><i>BOP depressed the "IMP IN" pushbutton and observes the transfer from "IMP OUT" to "IMP IN" control complete.</i></p> <p>b. REDUCE turbine load with REFERENCE CONROL:</p> <p>1) SET LOAD RATE at 5%/min.</p> <p><i>BOP selects the load reduction rate to 5%/minute using the LOAD RATE % PER MIN thumbwheel selector.</i></p> <p>2) SET target (10% drop) in SETTER with REFERENCE CONTROLV (lower).</p> <p><i>BOP depresses the reference control V (down) button to reduce the setter display to the load directed by the SRO.</i></p> <p>3) PUSH GO button.</p> <p><i>BOP depresses the REFERENCE CONTROL "GO" button.</i></p> <p>4) WHEN desired load reached, THEN PUSH HOLD button</p> <p>OR</p> <p>c. REDUCE turbine load with MANUAL control:</p> <p>1) ENSURE turbine control in MANUAL as indicated by the TURBINE MANUAL pushbutton back lighted,</p> <p>2) MOMENTARILY DEPRESS the G. V. LOWER until desired load reached.</p>
	SRO	<p>3. INITIATE repairs on Standby MFWP.</p> <p><i>When the SRO contacts Work Control, the Console Operator will repeat back request to prepare a troubleshooting and repair package for the SBMFWP.</i></p>
	SRO	4. RETURN TO Instruction in effect.
SUCCESS PATH 2		
	BOP	<p>1. RESPONSE NOT OBTAINED:</p> <p>IF loss of Standby pump is coincident with loss of a TDMFWP, THEN GO TO 3.1 Diagnostics.</p>
EXAMINER: When the applicants return to 3.1, Diagnostics, the applicants will decide to go to Section 3.4, "TDMFWP Trip OR Loss of Flow."		
	BOP	<p>1. (p) IF loss of S/G level is imminent, THEN TRIP reactor, and GO TO E-0, Reactor Trip or Safety Injection.</p> <p><i>BOP evaluates SG level trends and determines that loss of SG level is NOT imminent.</i></p>

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Event Description: Standby Main Feedwater Pump trips due to instantaneous overcurrent. Requires a load reduction using AOI-16, "Loss of Normal Feedwater," Subsection 3.7, "Standby MFWP TRIP."

Time	Position	Applicant's Actions or Behavior
	SRO	2. ENSURE failed MFP TRIPPED. <i>SRO states that 1B MFW pump is tripped due to an earlier problem.</i>
	BOP	3. CHECK turbine load less than or equal to 1000 MWe (85%). <i>BOP determines that turbine load is greater than 1000 MWe.</i>
		3. RESPONSE NOT OBTAINED: ENSURE Standby MFWP running. <i>BOP determines that the SBMFP is NOT in service and cannot be started.</i> (p) ENSURE turbine load reduced to less than 1000 MWe with valve position limiter. <i>BOP depresses the VLV POS LIMIT ▽ button on 1-XX-47-1000, EHC CONTROL panel to reduce load to less than 1000 MWe.</i>
	BOP	4. PLACE tripped MFP recirc valve controller in MANUAL, and CLOSE recirc valve. <i>BOP locates 1-FIC-3-84, MFWP B RECIRC CONTROL and determines from the valve demand position indication that the valve is closed.</i>
	BOP	5. CHECK turbine load less than 800 MWe (67%). <i>BOP determines that load is greater than 800 MWe.</i>
	BOP	5. RESPONSE NOT OBTAINED: ENSURE Standby MFWP running. (p) ENSURE turbine load reduced to less than 800 MWe with valve position limiter. <i>BOP depresses the VLV POS LIMIT ▽ button on 1-XX-47-1000, EHC CONTROL panel to reduce load to less than 800 MWe.</i>
	BOP	6. ENSURE MFWP speed rising to control S/G Δ-P and levels on program. <i>BOP determines that 1A MFP speed has increased and that S/G Δ-P and SG levels are returning to program.</i>
CAUTION Continued load reductions below 800 MWe should be done using normal turbine controls at less than or equal to 5% min.		
NOTE Load will not change until VALVE POS LIMIT light is cleared.		

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>23</u>	of	<u>39</u>
Event Description: Standby Main Feedwater Pump trips due to instantaneous overcurrent. Requires a load reduction using AOI-16, "Loss of Normal Feedwater," Subsection 3.7, "Standby MFWP TRIP."									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>7. ENSURE adequate feed flow for existing conditions:</p> <ul style="list-style-type: none"> • Feed flow greater than or equal to steam flow. • S/G levels returning to program. <p><i>BOP determines that feedwater flow is adequate for existing conditions.</i></p>
	RO	<p>8. MONITOR T-avg trending to within 3°F of T-ref.</p> <p><i>RO adjust rod position manually to control Tavg within 3°F of T-ref.</i></p>
<p>CAUTION</p> <p>Runback may result in exceeding Tech Spec 3.2.3 limits on Axial Flux Difference (AFD).</p>		
	RO	<p>9. MAINTAIN AFD within limits. (ρ) INITIATE boration as required</p> <p>REFER TO ATTACHMENT 1, Manual Boration.</p>
<p>EXAMINER: The following actions are taken from AOI-16, "Loss of Normal Feedwater," Attachment 1, "Manual Boration," 1.2, "Normal Manual Boration."</p>		

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Event Description: Standby Main Feedwater Pump trips due to instantaneous overcurrent. Requires a load reduction using AOI-16, "Loss of Normal Feedwater," Subsection 3.7, "Standby MFWP TRIP."

Time	Position	Applicant's Actions or Behavior
	RO	<p>A. INITIATE normal boration to change CB as necessary: RO determines the recommended boration flow rate to be 40 gpm and the volume to add to be 300 gallons of boron.</p> <ol style="list-style-type: none"> PLACE BA flow controller 1-FC-62-139, to desired flow rate. RO adjusts 1-FC-62-139 to the value corresponding to the flow rate for the selected load reduction rate. ADJUST BA batch counter 1-FQ-62-139 to ensure boration continues. RO adjusts 1-FQ-62-139 BA BATCH COUNTER as follows: <ol style="list-style-type: none"> Depresses and holds the black pushbutton. While holding the pushbutton, the applicant raises the red translucent cover. While still holding the pushbutton, the applicant enters "000369" in the display. While still holding the pushbutton, the applicant lowers the red translucent cover, and then releases the pushbutton. PLACE mode selector 1-HS-62-140B to BOR. RO rotates 1-HS-62-140B VCT MAKEUP MODE from AUTO to the right to BOR position. PLACE VCT makeup control 1-HS-62-140A to START. RO rotates 1-HS-62-140A, VCT MAKEUP CONTROL to the right to the START position. VERIFY boric acid flow indicated on 1-FI-62-139. RO observes the appropriate flow rate on 1-FI-62-139, BA TO BLENDER FLOW. WHEN adequate amount of boric acid injected, THEN CONTINUE with this instruction. PLACE 1-H-62-140A, VCT Makeup Control to STOP. VERIFY 1-FI-62-139 Boric Acid to Blender, indicating ZERO. ENSURE 1-FC-62-142, PW to Blender on 35% (70gpm), and Manual-Auto toggle in AUTO. ADJUST 1-FC-62-139, BA to Blender, to new RCS CB. PLACE 1-HS-62-140B, VCT MAKEUP MODE, in AUTO. TURN 1-HS-62-140A, VCT MAKEUP CONTROL, to START, and VERIFY red light lit.
EXAMINER: The following actions are taken from AOI-16, "Loss of Normal Feedwater," Section 3.4, "TDMFWP Trip OR Loss of Flow," beginning at Step 10.		

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Event Description: Standby Main Feedwater Pump trips due to instantaneous overcurrent. Requires a load reduction using AOI-16, "Loss of Normal Feedwater," Subsection 3.7, "Standby MFWP TRIP."

Time	Position	Applicant's Actions or Behavior
	BOP	10. ENSURE tripped MFWP turbine condenser valves CLOSED: <ul style="list-style-type: none"> • Pump A, 1-FCV-2-205 and 210 OR <ul style="list-style-type: none"> • Pump B, 1-FCV-2-211 and 216 <i>BOP states that 1-FCV-2-211 and 1-FCV-2-216 were closed previously.</i>
	BOP	11. MONITOR reg valves controlling S/G levels on program. <i>BOP determines that MFW reg valves are returning SG levels to program</i>
	BOP	12. LOCALLY MAINTAIN oil temp between 110 to 130°F on running Standby MFP using 1-THV-24-948.
	BOP	13. ENSURE reset of C-7: a. CHECK C-7 LOSS OF LOAD STM DUMP INTERLOCK annunciator LIT. [66-E]
	BOP	13.a. RESPONSE NOT OBTAINED: GO TO Step 14
	SRO	14. ENSURE Condensate System Pumps in service as necessary: <ul style="list-style-type: none"> • REFER TO GO-4, Normal Power Operation.
	SRO	15. IF reactor power dropped by greater than or equal to 15% in one hour, THEN NOTIFY Chemistry to initiate power change sampling requirements
	BOP	16. CHECK VALVE POS LIMIT LIT.
	BOP	17. RETURN valve position limiter to normal: a. ENSURE TURBINE in IMP OUT. b. (p) 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	18. INITIATE repairs on failed pump. <i>When the SRO contacts Work Control, the Console Operator will repeat back request to prepare a troubleshooting and repair package for the SBMFP.</i>
	SRO	19. RETURN TO Instruction in effect.
EXAMINER: The crew briefing is optional. The next event may be entered prior to the brief.		
	SRO	Crew Brief would typically be conducted for this event as time allows prior to the next event.

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Event Description: Standby Main Feedwater Pump trips due to instantaneous overcurrent. Requires a load reduction using AOI-16, "Loss of Normal Feedwater," Subsection 3.7, "Standby MFWP TRIP."

Time	Position	Applicant's Actions or Behavior
	SRO	<p>Notifications should be addressed as applicable if not specifically addressed by the procedure or in the crew brief.</p> <p><u>Operations Management</u> - Typically Shift Manager.</p> <p><u>Maintenance Personnel</u> – Typically Work Control Center (WCC).</p> <p>(Note: Maintenance notification may be delegated to the Shift Manager).</p>
Cue Console Operator to enter Event 7.		

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>7, 8, 9 and 10</u>	Page	<u>27</u>	of	<u>39</u>
Event Description: 7) Loop 2 RCP shaft shears, causing the seal package to fail. Automatic reactor trip fails to occur, 1-RT-1 REACTOR TRIP switch fails to operate, 1-RT-2 REACTOR TRIP switch causes the reactor to trip. 8) 1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips. 9) 1B-B Safety Injection pump fails to automatically start on the safety injection signal. Requires manual start by BOP. 10) Loss of Seal injection flow and loss of charging flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA. Requires entry into E-1, "Loss of Reactor or Secondary Coolant," and transition to ES-1.2, "Post-LOCA Cooldown and Depressurization."									
Time	Position	Applicant's Actions or Behavior							

Indications: 78-D ONE LOOP FLOW LO 76-C OVERTEMP ΔT 123-C OVERTEMP ΔT TRIP ALERT 123-D OVERTEMP ΔT TURB RUNBACK & C-3 ROD BLOCK		
	RO	Performs IMMEDIATE ACTIONS of E-0, "Reactor Trip or Safety Injection," and trips the reactor by placing 1-RT-2 REACTOR TRIP in the TRIP position.
E-0		The following actions are taken from E-0, "Reactor Trip or Safety Injection."
NOTE <ul style="list-style-type: none"> Steps 1 thru 4 are IMMEDIATE ACTION STEPS. Status Trees / SPDS should be monitored when transitioned to another instruction. 		
	RO	1. ENSURE reactor trip: <ul style="list-style-type: none"> Reactor trip and bypass breakers OPEN. RO checks 1-52RTB, RX TRIP BKR A GREEN indicating light LIT on panel 1-M-4. RO checks 1-52RTB, RC TRIP BKR B GREEN indicating light LIT on panel 1-M-4 RO checks 1-52BYA, BYPASS BKR A lights DARK RO checks 1-52BYB, BYPASS BKR B lights dark <ul style="list-style-type: none"> RPis at bottom of scale. RO observes 1-MON 85 5000/1 CERPI Monitor 1 and 1-MON-85 5000/2 CERPI MONITOR 2 for indication that all SHUTDOWN and CONTROL bank rods are inserted. <ul style="list-style-type: none"> Neutron flux DROPPING. RO observes neutron flux trending down on 1-NR-92-145, NEUTRON FLUX LEVEL RECORDER. May also observe levels decreasing on 1-NI-92-135A, CH I NEUTRON MON % PWR, and 1-NI-92-136A, CH II NEUTRON MON % PWR.

Op Test No.: 2 Scenario # 4 Event # 7, 8, 9 and 10 Page 28 of 39

Event Description: 7) Loop 2 RCP shaft shears, causing the seal package to fail. Automatic reactor trip fails to occur, 1-RT-1 REACTOR TRIP switch fails to operate, 1-RT-2 REACTOR TRIP switch causes the reactor to trip. 8) 1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips. 9) 1B-B Safety Injection pump fails to automatically start on the safety injection signal. Requires manual start by BOP. 10) Loss of Seal injection flow and loss of charging flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA. Requires entry into E-1, "Loss of Reactor or Secondary Coolant," and transition to ES-1.2, "Post-LOCA Cooldown and Depressurization."

Time	Position	Applicant's Actions or Behavior
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	RO	<p>2. ENSURE Turbine Trip:</p> <ul style="list-style-type: none"> • All turbine stop valves CLOSED. <p>RO observes that indicating lights on 1-XX-47-1000 EHC CONTROL for individual throttle and governor valves are GREEN.</p>
	RO	<p>3. CHECK 6.9 kV shutdown boards:</p> <p>a. At least one board energized from: CSST (offsite), OR D/G (blackout).</p> <p>At the trip, the 1A-A 6.9 KV Shutdown Board suffers a differential relay operation causing the board to be lost. This results in the loss of BOTH seal injection and thermal barrier heat exchanger flows, resulting in the subsequent failure of all RCP seals and RCS leakage.</p>
	RO	<p>4. CHECK SI actuated:</p> <p>a. Any SI annunciator LIT.</p> <p>b. Both trains SI ACTUATED.</p> <ul style="list-style-type: none"> • 1-XX-55-6C • 1-XX-55-6D
	SRO	<p>4. RESPONSE NOT OBTAINED:</p> <p>DETERMINE if SI required:</p> <p>a. IF ANY of the following exists:</p> <ul style="list-style-type: none"> • S/G press less than 675 psig, <p>OR</p> <ul style="list-style-type: none"> • RCS press less than 1870 psig, <p>OR</p> <ul style="list-style-type: none"> • Cntmt press greater than 1.5 psig <p>THEN ACTUATE SI manually.</p> <p>IF SI NOT required, THEN ** GO TO ES-0.1, Reactor Trip Response.</p>

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Event Description: 7) Loop 2 RCP shaft shears, causing the seal package to fail. Automatic reactor trip fails to occur, 1-RT-1 REACTOR TRIP switch fails to operate, 1-RT-2 REACTOR TRIP switch causes the reactor to trip. 8) 1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips. 9) 1B-B Safety Injection pump fails to automatically start on the safety injection signal. Requires manual start by BOP. 10) Loss of Seal injection flow and loss of charging flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA. Requires entry into E-1, "Loss of Reactor or Secondary Coolant," and transition to ES-1.2, "Post-LOCA Cooldown and Depressurization."

Time	Position	Applicant's Actions or Behavior
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ES-0.1

The following actions are taken from ES-0.1, "Reactor Trip Response."

EXAMINER: Approximately 3 minutes after the reactor trip, the seals on RCP 1,3 and 4 will begin to fail making the RCS leak progressively worse. Upon recognition of the degrading plant conditions the applicants will utilize ES-0.1, "Reactor Trip Response" Step 1 to initiate a safety injection signal and will return to E-0, "Reactor Trip or Safety Injection."

The SRO may use ES-0.1 Foldout Page for the initiation of the Safety Injection signal as an alternative to Step 1 "MONITOR SI CRITERIA."

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: 7) Loop 2 RCP shaft shears, causing the seal package to fail. Automatic reactor trip fails to occur, 1-RT-1 REACTOR TRIP switch fails to operate, 1-RT-2 REACTOR TRIP switch causes the reactor to trip. 8) 1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips. 9) 1B-B Safety Injection pump fails to automatically start on the safety injection signal. Requires manual start by BOP. 10) Loss of Seal injection flow and loss of charging flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA. Requires entry into E-1, "Loss of Reactor or Secondary Coolant," and transition to ES-1.2, "Post-LOCA Cooldown and Depressurization."

Time	Position	Applicant's Actions or Behavior
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	RO	<p>3. RESPONSE NOT OBTAINED:</p> <p>IF temperature is less than 557°F, THEN ENSURE steam dumps, S/G PORVs, and blowdown isolation valves CLOSED.</p> <p>IF cooldown continues, THEN ENSURE total feed flow is less than or equal to 500 gpm:</p> <ul style="list-style-type: none"> • 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. <p>IF cooldown continues after AFW flow is controlled, THEN:</p> <ul style="list-style-type: none"> • CLOSE MSIVs. • ENSURE MSIV bypasses CLOSED. • PLACE steam dump controls OFF. <p>IF temperature is less than 547°F after AFW is controlled, THEN INITIATE boration:</p> <ul style="list-style-type: none"> • REFER TO AOI-34, Immediate Boration. <p>IF temperature is greater than 564°F, THEN ENSURE either steam dumps, or S/G PORVs OPEN.</p> <p>WHEN cooldown is controlled, THEN RETURN AFW to AUTO as desired.</p>
	BOP	<p>4. ENSURE AFW operation:</p> <p>a. AFW established:</p> <ul style="list-style-type: none"> • Both MD AFW pumps RUNNING. • TD AFW pump RUNNING. • LCVs in AUTO or controlled in MANUAL. <p>b. Heat sink available:</p> <ul style="list-style-type: none"> • Total feed flow greater than 410 gpm, OR • At least one S/G NR level greater than 29%.

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Event Description: 7) Loop 2 RCP shaft shears, causing the seal package to fail. Automatic reactor trip fails to occur, 1-RT-1 REACTOR TRIP switch fails to operate, 1-RT-2 REACTOR TRIP switch causes the reactor to trip. 8) 1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips. 9) 1B-B Safety Injection pump fails to automatically start on the safety injection signal. Requires manual start by BOP. 10) Loss of Seal injection flow and loss of charging flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA. Requires entry into E-1, "Loss of Reactor or Secondary Coolant," and transition to ES-1.2, "Post-LOCA Cooledown and Depressurization."

Time	Position	Applicant's Actions or Behavior
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	BOP	<p>5. CHECK MFW status:</p> <p>a. CHECK RCS T-avg less than 564°F.</p> <p>b. ENSURE MFW isolation:</p> <ul style="list-style-type: none"> • 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. • #3 HDT Pumps TRIPPED. • #7 HDT Pumps TRIPPED.
	RO	<p>6. ENSURE all control and shutdown rods fully inserted:</p> <ul style="list-style-type: none"> • RPIs at bottom scale.
	BOP	7. ANNOUNCE reactor trip over PA system.
	BOP	<p>8. MONITOR S/G levels:</p> <p>a. At least one S/G NR level greater than 29%.</p> <p>b. S/G NR levels less than 50% and controlled.</p>
	BOP	9. CONTROL S/G NR levels between 29% and 50%.
	BOP	<p>10. INITIATE BOP realignment:</p> <ul style="list-style-type: none"> • REFER TO AOI-17, Turbine Trip
	RO	<p>11. MONITOR pZR pressure:</p> <p>a. PZR pressure greater than 1870 psig.</p> <p>b. PZR pressure trending to 2235 psig.</p>
	RO	12. CHECK charging in-service.

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Event Description: 7) Loop 2 RCP shaft shears, causing the seal package to fail. Automatic reactor trip fails to occur, 1-RT-1 REACTOR TRIP switch fails to operate, 1-RT-2 REACTOR TRIP switch causes the reactor to trip. 8) 1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips. 9) 1B-B Safety Injection pump fails to automatically start on the safety injection signal. Requires manual start by BOP. 10) Loss of Seal injection flow and loss of charging flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA. Requires entry into E-1, "Loss of Reactor or Secondary Coolant," and transition to ES-1.2, "Post-LOCA Cooldown and Depressurization."

Time	Position	Applicant's Actions or Behavior
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E-0

The following actions are taken from E-0, "Reactor Trip or Safety Injection."

EXAMINER: Upon return to E-0 from ES-0.1, the HIGH LEVEL ACTIONS of Steps 1-4 will be reconfirmed.

NOTE

- Steps 1 thru 4 are **IMMEDIATE ACTION STEPS**.
- Status Trees / SPDS should be monitored when transitioned to another instruction.

	RO	1. ENSURE reactor trip:
	RO	2. ENSURE Turbine Trip:
	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: E-0, "Reactor Trip or Safety Injection," Appendix A and B, and Attachments 1 through 5 are contained as Attachment 2.

	BOP	5. PERFORM Appendixes A and B, E-0, pages 16-30. <i>BOP is assigned to perform actions contained in the Appendixes. A separate copy of the Appendixes is contained in this package for Examiner use.</i>
	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: 7) Loop 2 RCP shaft shears, causing the seal package to fail. Automatic reactor trip fails to occur, 1-RT-1 REACTOR TRIP switch fails to operate, 1-RT-2 REACTOR TRIP switch causes the reactor to trip. 8) 1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips. 9) 1B-B Safety Injection pump fails to automatically start on the safety injection signal. Requires manual start by BOP. 10) Loss of Seal injection flow and loss of charging flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA. Requires entry into E-1, "Loss of Reactor or Secondary Coolant," and transition to ES-1.2, "Post-LOCA Cooldown and Depressurization."

Time	Position	Applicant's Actions or Behavior
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	RO	<p>8. MONITOR RCS temperature stable at or trending to 557°F using:</p> <ul style="list-style-type: none"> • RCS Loop T-avg with any RCP running, <p>OR</p> <ul style="list-style-type: none"> • RCS Loop T-cold with RCPs out-of-service.
	BOP	<p>8. RESPONSE NOT OBTAINED</p> <p>IF temp less than 557°F, THEN ENSURE steam dumps and S/G PORVs CLOSED.</p> <p>IF cooldown continues, THEN CONTROL total AFW flow to maintain greater than 410 gpm UNTIL NR level in at least one S/G greater than 29% [39% ADV].</p> <p>BOP takes manual control of AFW LCV's and reduces AFW flow.</p> <p>IF cooldown continues after AFW flow is controlled, THEN</p> <ul style="list-style-type: none"> • PLACE steam dump controls OFF. <p>BOP rotates 1-HS-1-103A, STEAM DUMP FSV A, and 1-HS-103B STEAM DUMP FSV B to the left to the "OFF RESET" position.</p> <ul style="list-style-type: none"> • CLOSE MSIVs. • ENSURE MSIV bypasses CLOSED. <p>IF RCS temp greater than 564°F, THEN ENSURE either steam dumps or S/G PORVs OPEN.</p>
	RO	<p>9. ENSURE excess letdown valves CLOSED:</p> <ul style="list-style-type: none"> • 1-FCV-62-54 • 1-FCV-62-55 <p>RO observes GREEN indicating lights LIT on handswitches 1-HS-62-54A, EXCESS LTDN ISOL, and 1-HS-62-55A, EXCESS LTDN.</p>

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Event Description: 7) Loop 2 RCP shaft shears, causing the seal package to fail. Automatic reactor trip fails to occur, 1-RT-1 REACTOR TRIP switch fails to operate, 1-RT-2 REACTOR TRIP switch causes the reactor to trip. 8) 1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips. 9) 1B-B Safety Injection pump fails to automatically start on the safety injection signal. Requires manual start by BOP. 10) Loss of Seal injection flow and loss of charging flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA. Requires entry into E-1, "Loss of Reactor or Secondary Coolant," and transition to ES-1.2, "Post-LOCA Cooldown and Depressurization."

Time	Position	Applicant's Actions or Behavior
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	RO	<p>10. CHECK pzs PORVs and block valves:</p> <p>a. Pzs PORVs CLOSED.</p> <p>b. At least one block valve OPEN.</p> <p>RO observes 1-HS-68-340AA, PZR PORV 340A, CLOSED, GREEN indicating light is LIT, RED indicating light is DARK.</p> <p>RO observes 1-HS-68-334A, PZR PORV 334, CLOSED, GREEN indicating light is LIT, RED indicating light is DARK.</p> <p>RO observes 1-HS-68-333A, BLOCK VLV FOR PORV 340A, OPEN, GREEN indicating light is DARK, RED indicating light is LIT.</p> <p>RO observes 1-HS-68-332A, BLOCK VLV FOR PORV 334, OPEN, GREEN indicating light is DARK, RED indicating light is LIT.</p>
	RO	<p>11. CHECK pzs safety valves CLOSED:</p> <ul style="list-style-type: none"> EVALUATE tailpipe temperatures and acoustic monitors. <p>RO observes response of 1-TI-68-330, SAFETY 68-563 TAILPIPE TEMP, 1-TI-68-329, SAFETY 68-564 TAILPIPE TEMP, and 1-TI-68-328, SAFETY 68-565, stable at approximately 110 °F.</p> <p>BOP may observe 1-XI-68-363, PZR VALVES ACOUSTIC MONITOR indicating lights are DARK for 1-XI-68-363 (68-563), 1-XI-68-364 (68-564) and 1-XI-68-365 (68-565)</p>
	RO	<p>12. CHECK pzs sprays CLOSED.</p> <p>RO observes the pzs spray valves closed by GREEN indicating lights LIT for 1-XI-68-340B, PZR SPRAY LOOP 2 and 1-XI-68-340D, PZR SPRAY LOOP 1.</p>
<p style="text-align: center;">NOTE</p> <p>Seal injection flow should be maintained to all RCPs.</p>		
	RO	<p>13. CHECK if RCPs should remain in service:</p> <p>a. Phase B signals DARK [MISSP].</p> <p>b. RCS pressure greater than 1500 psig.</p>

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Event Description: 7) Loop 2 RCP shaft shears, causing the seal package to fail. Automatic reactor trip fails to occur, 1-RT-1 REACTOR TRIP switch fails to operate, 1-RT-2 REACTOR TRIP switch causes the reactor to trip. 8) 1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips. 9) 1B-B Safety Injection pump fails to automatically start on the safety injection signal. Requires manual start by BOP. 10) Loss of Seal injection flow and loss of charging flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA. Requires entry into E-1, "Loss of Reactor or Secondary Coolant," and transition to ES-1.2, "Post-LOCA Cooldown and Depressurization."

Time	Position	Applicant's Actions or Behavior
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	RO	<p>14. CHECK S/G pressures:</p> <ul style="list-style-type: none"> • All S/G pressures controlled or rising. <p>RO observes PAM pressure instruments on SG 1 through 4 (black labels) and determines that pressures are controlled. May also observe trends on 1-PR-1-2, SG 1 & 2 PRESS PSIG, and 1-PR-1-23, SG 3 & 4 PRESS PSIG to assess this step.</p> <ul style="list-style-type: none"> • All S/G pressures greater than 120 psig. <p>RO observes PAM pressure instruments on SG 1 through 4 (black labels) and determines that pressures are greater than 120 psig.</p>
	BOP	<p>15. CHECK for RUPTURED S/G</p> <ul style="list-style-type: none"> • All S/Gs narrow range levels CONTROLLED or DROPPING. • Secondary side radiation NORMAL from Appendix A.
	RO/BOP	<p>16. CHECK cntmt conditions:</p> <ul style="list-style-type: none"> • Cntmt pressure NORMAL. • Radiation NORMAL from Appendix A. • Cntmt sump level NORMAL. • Cntmt temp ann window DARK [104-B].
	SRO	<p>16. RESPONSE NOT OBTAINED</p> <p>GO TO E-1, Loss of Reactor or Secondary Coolant.</p>

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Event Description: 7) Loop 2 RCP shaft shears, causing the seal package to fail. Automatic reactor trip fails to occur, 1-RT-1 REACTOR TRIP switch fails to operate, 1-RT-2 REACTOR TRIP switch causes the reactor to trip. 8) 1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips. 9) 1B-B Safety Injection pump fails to automatically start on the safety injection signal. Requires manual start by BOP. 10) Loss of Seal injection flow and loss of charging flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA. Requires entry into E-1, "Loss of Reactor or Secondary Coolant," and transition to ES-1.2, "Post-LOCA Cooldown and Depressurization."

Time	Position	Applicant's Actions or Behavior
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E-1

The following actions are taken from E-0, "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. <i>When SRO contacts the Shift Manager, the Console Operator will repeat back information and need to refer to EPIP-1, "Emergency Plan Classification Flowchart."</i>
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.
	BOP	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].
	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.

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Event Description: 7) Loop 2 RCP shaft shears, causing the seal package to fail. Automatic reactor trip fails to occur, 1-RT-1 REACTOR TRIP switch fails to operate, 1-RT-2 REACTOR TRIP switch causes the reactor to trip. 8) 1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips. 9) 1B-B Safety Injection pump fails to automatically start on the safety injection signal. Requires manual start by BOP. 10) Loss of Seal injection flow and loss of charging flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA. Requires entry into E-1, "Loss of Reactor or Secondary Coolant," and transition to ES-1.2, "Post-LOCA Cooldown and Depressurization."

Time	Position	Applicant's Actions or Behavior
	BOP	<p>7. ENSURE cntmt hydrogen analyzers in service:</p> <ul style="list-style-type: none"> • 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 AND RESET local alarm panel. [North wall of Train A 480V SD Bd rm].
	RO	<p>8. MONITOR pzz PORVs and block valves:</p> <ul style="list-style-type: none"> a. Pzz PORVs CLOSED. b. At least one block valve OPEN.
	RO	<p>9. DETERMINE if cntmt spray should be stopped:</p> <ul style="list-style-type: none"> 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.
	BOP	<p>10. ENSURE both pocket sump pumps STOPPED [M-15]:</p> <ul style="list-style-type: none"> • 1-HS-77-410. • 1-HS-77-411.
	RO	<p>11. CHECK SI termination criteria:</p> <ul style="list-style-type: none"> a. CHECK RCS subcooling greater than 65°F [85°F ADV]. b. CHECK secondary heat sink available with either: <ul style="list-style-type: none"> • 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.
	SRO	<p>11.c RESPONSE NOT OBTAINED: GO TO Caution prior to Step 12.</p>
<p style="text-align: center;">CAUTION</p> <p>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.</p>		

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>7, 8, 9 and 10</u>	Page	<u>38</u>	of	<u>39</u>
<p>Event Description: 7) Loop 2 RCP shaft shears, causing the seal package to fail. Automatic reactor trip fails to occur, 1-RT-1 REACTOR TRIP switch fails to operate, 1-RT-2 REACTOR TRIP switch causes the reactor to trip. 8) 1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips. 9) 1B-B Safety Injection pump fails to automatically start on the safety injection signal. Requires manual start by BOP. 10) Loss of Seal injection flow and loss of charging flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA. Requires entry into E-1, "Loss of Reactor or Secondary Coolant," and transition to ES-1.2, "Post-LOCA Cooldown and Depressurization."</p>									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>12. RESET SI AND CHECK the following:</p> <ul style="list-style-type: none"> • SI ACTUATED permissive DARK. • AUTO SI BLOCKED permissive LIT.
	RO	<p>13. DETERMINE if RHR pumps should be stopped:</p> <ul style="list-style-type: none"> a. CHECK RCS pressure greater than 150 psig. b. CHECK RHR suction aligned from RWST. c. CHECK RCS pressure stable or rising.
	BOP	<p>13.c RESPONSE NOT OBTAINED:</p> <p>ENSURE CCS from RHR heat exchanger 1-FCV-70-153 and 1-FCV-70-156 OPEN.</p> <p>CLOSE SFP heat exchanger A CCS supply 0-FCV-70-197.</p> <p>** GO TO Step 14.</p>
	BOP	14. CHECK pressure in all S/Gs controlled or rising.
	RO	15. CHECK RCS pressure stable or dropping.
	BOP	<p>16. MONITOR electrical board status:</p> <ul style="list-style-type: none"> a. CHECK offsite power available. b. CHECK all shutdown boards ENERGIZED by offsite power. c. PLACE any unloaded D/G in standby USING SOI-82 Diesel Generators.
<p>EXAMINER: AOI-43.01, "Loss of Unit 1 Train A Shutdown Boards," is contained as Attachment 3.</p>		
		<p>16.b. RESPONSE NOT OBTAINED:</p> <p>ENERGIZE shutdown boards USING:</p> <ul style="list-style-type: none"> • SOI-211 Shutdown Boards <p>OR</p> <ul style="list-style-type: none"> • AOI-43 Loss of Shutdown Boards <p>OR</p> <ul style="list-style-type: none"> • SOI-82 Diesel Generators
<p>EXAMINER: AOI-17, "Turbine Trip," Section 3.3, "BOP Realignment," is contained as Attachment 4.</p>		
	BOP	<p>17. INITIATE BOP realignment:</p> <ul style="list-style-type: none"> • REFER TO AOI-17, Turbine Trip.

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Event Description: 7) Loop 2 RCP shaft shears, causing the seal package to fail. Automatic reactor trip fails to occur, 1-RT-1 REACTOR TRIP switch fails to operate, 1-RT-2 REACTOR TRIP switch causes the reactor to trip. 8) 1A-A 6.9 KV Shutdown Board trips on differential relay operation when the reactor trips. 9) 1B-B Safety Injection pump fails to automatically start on the safety injection signal. Requires manual start by BOP. 10) Loss of Seal injection flow and loss of charging flow results in the failure the RCP seals on all RCPs. Seal failures result in a small break LOCA. Requires entry into E-1, "Loss of Reactor or Secondary Coolant," and transition to ES-1.2, "Post-LOCA Cooldown and Depressurization."

Time	Position	Applicant's Actions or Behavior
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EXAMINER: E-1, "Loss of Reactor or Secondary Coolant." Appendix A through D are contained in Attachment 5.

	RO	<p>18. INITIATE 480V board room breaker alignments USING the following:</p> <ul style="list-style-type: none"> • Appendix A (E-1), CLA Breaker Operation. • Appendix B (E-1), 1-FCV-63-1 Breaker Operation. • Appendix C (E-1), 1-FCV-63-22 Breaker Operation. <p><i>When contacted, the Console Operator will repeat back request to perform Appendices A, B and C of E-1.</i></p>
	RO	<p>19. ENSURE RHR available for cntmt sump recirculation:</p> <ul style="list-style-type: none"> • 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.
	BOP	<p>20. EVALUATE plant equipment status:</p> <ul style="list-style-type: none"> • REFER TO Appendix D (E-1), Equipment Evaluation.
	BOP	<p>21. CHECK Aux Bldg radiation for loss of RCS inventory outside cntmt:</p> <ul style="list-style-type: none"> 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	22. NOTIFY Chemistry of event status and plant conditions.
	SRO	<p>23. DETERMINE if RCS cooldown and depressurization is required:</p> <ul style="list-style-type: none"> a. CHECK RCS pressure greater than 150 psig. b. GO TO ES-1.2, Post LOCA Cooldown and Depressurization.

EXAMINER: When the SRO makes the transition to ES-1.2, state, "another crew will continue from this point." Cue the Console Operator to FREEZE the simulator

END OF SCENARIO

SHIFT TURNOVER CHECKLIST

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SHIFT TURNOVER CHECKLIST			
Page <u>1</u> of <u>1</u>			
<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	SM US/MCR UO AUO STA (STA Function)	Unit Unit Station _____	_____ _____ _____ _____
			Off-going - Name On-coming - Name
Part 1 - Completed by off-going shift / Reviewed by on-coming shift:			
RCS Cb = 1114 ppm			
<ul style="list-style-type: none"> • Abnormal equipment lineup / conditions: 1B-B CCP is out-of-service for repairs to the electrical connections to the motor. Protected equipment signs have been posted for 1A-A CCP. LCO 3.5.2 and TR 3.1.4 were entered 16 hours ago. Repairs are expected to be completed in 4 hours. Repairs are being made to the 1B MFP control oil system are in progress. • SI/Test in progress/planned: (including need for conduct of evolution briefings) • Major Activities/Procedures in progress/planned: Train B/Channel II Work Week. Repairs have been completed on the 1C 6.9 KV Unit Board Normal Feeder Breaker 1122 and transfer from Alternate to Normal is to be performed as soon as practical after assuming the shift. Power is to be maintained at its current value until repairs are completed to the 1B MFP. 82% Reactor Power, BOL conditions. RCS boron concentration is 1114 ppm. Control Bank D is at 190 steps. • Radiological changes in plant during shift: 			
Part 2 - Completed by on-coming shift prior to assuming duties			
<input type="checkbox"/> Review station rounds / Abnormal reading (AUOs only) <input type="checkbox"/> Review Narrative Logs (previous day and carry-over items) <input type="checkbox"/> Current qualification status <input type="checkbox"/> Review the current controlling Reactivity Management Plans (N/A for AUOs) <input type="checkbox"/> Review current TS/TRM/ODCM/FPR Required Actions (N/A for AUOs) <input type="checkbox"/> Walkdown MCR Control Boards with off-going Operator (N/A for AUOs, as applicable for SM/STAs) <input type="checkbox"/> SR/PER reviews complete for previous shift (SM/US/STA) Relief Time: _____ Relief Date: _____			
Part 3 - Completed by on-coming shift. These items may be reviewed after assuming duties:			
<input type="checkbox"/> Review Operator Workarounds, Burdens and Challenges (applicable Unit/Station) <input type="checkbox"/> Review applicable ODMI actions (first shift of shift week) <input type="checkbox"/> Review changes in Standing / Shift Orders (since last shift worked) <input type="checkbox"/> Review changes to TACFs issued (since last shift worked) (N/A for AUOs) <input type="checkbox"/> Review Control Room Deficiencies (first shift of shift week) (N/A for AUOs) <input type="checkbox"/> Review Component Deviation Log (N/A for AUOs)			

SHIFT TURNOVER CHECKLIST

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SHIFT TURNOVER CHECKLIST			
Page <u>1</u> of <u>1</u>			
<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	SM US/MCR UO AUO STA (STA Function)	Unit Unit Station Station	<div style="text-align: center;"> <u>1</u> _____ _____ _____ </div> <div style="text-align: right; padding-top: 10px;"> <u>Off-going - Name</u> _____ <u>On-coming - Name</u> _____ </div>
Part 1 - Completed by off-going shift / Reviewed by on-coming shift: RCS Cb = 1114 ppm			
<ul style="list-style-type: none"> • Abnormal equipment lineup / conditions: 1B-B CCP is out-of-service for repairs to the electrical connections to the motor. Protected equipment signs have been posted for 1A-A CCP. LCO 3.5.2 and TR 3.1.4 were entered 16 hours ago. Repairs are expected to be completed in 4 hours. Repairs are being made to the 1B MFP control oil system are in progress. _____ _____ • SI/Test in progress/planned: (including need for conduct of evolution briefings) _____ _____ _____ _____ • Major Activities/Procedures in progress/planned: Train B/Channel II Work Week. Repairs have been completed on the 1C 6.9 KV Unit Board Normal Feeder Breaker 1122 and transfer from Alternate to Normal is to be performed as soon as practical after assuming the shift. Power is to be maintained at its current value until repairs are completed to the 1B MFP. 82% Reactor Power, BOL conditions. RCS boron concentration is 1114 ppm. Control Bank D is at 190 steps. _____ _____ • Radiological changes in plant during shift: _____ _____ _____ 			
Part 2 - Completed by on-coming shift prior to assuming duties			
<div style="display: flex; align-items: flex-start;"> <div style="width: 10%; padding-right: 10px;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div> Review station rounds / Abnormal reading (AUOs only) Review Narrative Logs (previous day and carry-over items) Current qualification status Review the current controlling Reactivity Management Plans (N/A for AUOs) Review current TS/TRM/ODCM/FPR Required Actions (N/A for AUOs) Walkdown MCR Control Boards with off-going Operator (N/A for AUOs, as applicable for SM/STAs) SR/PER reviews complete for previous shift (SM/US/STA) Relief Time: _____ Relief Date: _____ </div> </div>			
Part 3 - Completed by on-coming shift. These items may be reviewed after assuming duties:			
<div style="display: flex; align-items: flex-start;"> <div style="width: 10%; padding-right: 10px;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div> Review Operator Workarounds, Burdens and Challenges (applicable Unit/Station) Review applicable ODMI actions (first shift of shift week) Review changes in Standing / Shift Orders (since last shift worked) Review changes to TACFs issued (since last shift worked) (N/A for AUOs) Review Control Room Deficiencies (first shift of shift week) (N/A for AUOs) Review Component Deviation Log (N/A for AUOs) </div> </div>			

Scenario 4
Attachment 1

**AOI-2, "MALFUNCTION OF
REACTOR CONTROL
SYSTEM."**

Attachment 1

WBN	MALFUNCTION OF REACTOR CONTROL SYSTEM	AOI-2 Revision 37 Page 51 of 51
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ATTACHMENT 1

Page 1 of 1

REACTOR POWER VS TAVG/TREF TEMPERATURE AND PZR LEVEL

(Tavg-Tref values rounded to one tenth of a degree)

RX POWER	TAVG- TREF	PZR LEVEL
2%	557.6 °F	25.7 %
4%	558.2 °F	26.4 %
6%	558.8 °F	27.1 %
8%	559.3 °F	27.8 %
10%	559.9 °F	28.5 %
12%	560.5 °F	29.2 %
14%	561.1 °F	29.9 %
16%	561.7 °F	30.6 %
18%	562.3 °F	31.3 %
20%	562.8 °F	32.0 %
22%	563.4 °F	32.7 %
24%	564.0 °F	33.4 %
26%	564.6 °F	34.1 %
28%	565.2 °F	34.8 %
30%	565.8 °F	35.5 %
32%	566.3 °F	36.2 %
34%	566.9 °F	36.9 %
36%	567.5 °F	37.6 %
38%	568.1 °F	38.3 %
40%	568.7 °F	39.0 %
42%	569.3 °F	39.7 %
44%	569.8 °F	40.4 %
46%	570.4 °F	41.1 %
48%	571.0 °F	41.8 %
50%	571.6 °F	42.5 %

RX POWER	TAVE- TREF	PZR LEVEL
52%	572.2 °F	43.2 %
54%	572.8 °F	43.9 %
56%	573.4 °F	44.6 %
58%	573.9 °F	45.3 %
60%	574.5 °F	46.0 %
62%	575.1 °F	46.7 %
64%	575.7 °F	47.4 %
66%	576.3 °F	48.1 %
68%	576.9 °F	48.8 %
70%	577.4 °F	49.5 %
72%	578.0 °F	50.2 %
74%	578.6 °F	50.9 %
76%	579.2 °F	51.6 %
78%	579.8 °F	52.3 %
80%	580.4 °F	53.0 %
82%	580.9 °F	53.7 %
84%	581.5 °F	54.4 %
86%	582.1 °F	55.1 %
88%	582.7 °F	55.8 %
90%	583.3 °F	56.5 %
92%	583.9 °F	57.2 %
94%	584.4 °F	57.9 %
96%	585.0 °F	58.6 %
98%	585.6 °F	59.3 %
100%	586.2 °F	60.0 %

Scenario 4 Attachment 2

E-0, “Reactor Trip or Safety
Injection”

Appendix A and B
Attachments 1 through 5

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix A
(Page 1 of 9)**

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
1.	ENSURE PCBs OPEN: <ul style="list-style-type: none"> • PCB 5084. • PCB 5088. 	OPEN manually.
2.	ENSURE AFW pump operation: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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. • #3 HDT Pumps TRIPPED. • #7 HDT Pumps TRIPPED. 	Manually CLOSE valves AND STOP pumps, as necessary. IF any valves can NOT be closed, THEN CLOSE #1 heater outlet valves.

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix A
(Page 2 of 9)**

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
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4. **MONITOR** ECCS operation:

- | | |
|---|---|
| a. Charging pumps RUNNING. | a. Manually START charging pumps. |
| b. Charging pump alignment: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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 Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix A
(Page 3 of 9)**

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
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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 Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix A
(Page 4 of 9)**

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
6.	<p>CHECK cntmt pressure:</p> <ul style="list-style-type: none"> • Phase B DARK [MISSP]. • Cntmt Spray DARK [MISSP]. • Cntmt press less than 2.8 psig. 	<p>PERFORM the following:</p> <ol style="list-style-type: none"> 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: <ul style="list-style-type: none"> • 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.
7.	<p>DISPATCH AUO to perform Attachment 1 (E-0), Ice Condenser AHU Breaker Operation.</p>	

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix A
(Page 5 of 9)**

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
8.	<p>CHECK plant radiation NORMAL:</p> <ul style="list-style-type: none"> 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.
9.	ENSURE all D/Gs RUNNING.	EMERGENCY START D/Gs
10.	<p>ENSURE ABGTS operation:</p> <p>a. ABGTS fans RUNNING.</p> <p>b. ABGTS dampers OPEN:</p> <ul style="list-style-type: none"> FCO-30-146A. FCO-30-146B. FCO-30-157A. FCO-30-157B. 	<p>a. Manually START fans.</p> <p>b. Locally OPEN dampers.</p>

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix A
(Page 6 of 9)**

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
11.	ENSURE at least four ERCW pumps RUNNING, one on each shutdown board preferred.	Manually START pumps as necessary.
12.	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.
13.	ENSURE 0-FCV-67-152, CCS HX C ALT DISCH TO HDR B, is open to position A.	Manually OPEN 0-FCV-67-152 to position A.
14.	CLOSE 0-FCV-67-144, CCS HX C DISCH TO HDR A.	
15.	MONITOR EGTS operation: <ul style="list-style-type: none"> EGTS fans RUNNING. ENSURE dampers OPEN VERIFY filter bank dp between 5 and 9 inches of water. 	Manually START fans AND OPEN dampers.
16.	ENSURE CCS pumps RUNNING: <ul style="list-style-type: none"> 1A-A CCS pump. 1B-B CCS pump. C-S or 2B-B CCS pump. 	Manually START pumps as necessary.
17.	DISPATCH AUO to shutdown Upper and Lower CNTMT rad monitors USING SOI-90.02.Gaseous Process Radiation Monitors	

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix A
(Page 7 of 9)**

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
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18. **WHEN** Attachment 1 is complete (Ice Condenser AHU Breakers OPEN),
THEN

ENERGIZE hydrogen igniters
[1-M-10]:

- 1-HS-268-73 ON.
- 1-HS-268-74 ON.

NOTE The following equipment is located on 1-M-9.

- | | | |
|-----|--|--|
| 19. | CHECK CNTMT PURGE fans STOPPED. | STOP fans AND

PLACE handswitch in PULL-TO-LOCK. |
| 20. | CHECK FUEL HANDLING EXH fans STOPPED, Fuel and Cask loading dampers CLOSED: | STOP fans AND

PLACE handswitch in PULL-TO-LOCK,
THEN

Manually CLOSE dampers. |
| 21. | 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.

- | | | |
|-----|--|--------------------------------|
| 22. | ENSURE AB GEN SUP & EXH dampers CLOSED. | Manually CLOSE dampers. |
|-----|--|--------------------------------|

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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Appendix A
(Page 9 of 9)

Equipment Verification

Step	Action/Expected Response	Response Not Obtained
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- | | | |
|-----|--|---|
| 26. | <p>ENSURE Control Building fans STOPPED and dampers CLOSED:</p> <ul style="list-style-type: none"> • SPREADING ROOM SUPPLY and EXH FANS AND dampers. • TOILET & LKR RM EXHAUST FAN AND dampers. | <p>Manually STOP fans AND</p> <p>NOTIFY TSC if any damper NOT CLOSED.</p> |
| 27. | <p>INITIATE Appendix B (E-0), Phase B Pipe Break Contingencies.</p> | |

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Appendix B
(Page 1 of 1)**

Phase B Pipe Break Contingencies

Step	Action/Expected Response	Response Not Obtained
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 2 (E-0).
3.	ENSURE 1-FCV-67-107 CLOSED. [CISP - 1-XX-55-6E] (A -train, window 43)	DISPATCH AUO to perform Attachment 3 (E-0).
4.	ENSURE 1-FCV-70-92 CLOSED. [CISP - 1-XX-55-6E] (A -train, window 73)	DISPATCH AUO to perform Attachment 4 (E-0).
5.	ENSURE 1-FCV-70-140 CLOSED. [CISP - 1-XX-55-6F] (B -train, window 74)	DISPATCH AUO to perform Attachment 5 (E-0).

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Attachment 1
(Page 1 of 1)**

Ice Condenser AHU Breaker Operation

OPEN the following to remove power from ice condenser air handling units AND
REPORT completion to UO:

BOARD	COMPT	NOMENCLATURE
480 V Reactor Vent Board 1A-A	13D	1-BKR-232-A000/13D ICE COND 1-AHU-61-1/4/8/12/16/20/24/28
480 V Reactor Vent Board 1A-A	14D	1-BKR-232-A000/14D ICE COND 1-AHU-61-3/7/11/15/19/23/27
480 V Reactor Vent Board 1B-B	13D	1-BKR-232-B000/13D ICE COND 1-AHU-61-2/6/10/14/18/22/26/30
480 V Reactor Vent Board 1B-B	14D	1-BKR-232-B000/14D ICE COND 1-AHU-61-5/9/13/17/21/25/29

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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Attachment 2
(Page 1 of 1)
Control Air Isolation

A. **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).

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

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

1. 0-BKR-32-25 [480V SD BD 1A2-A, C/3D]
2. 0-BKR-32-26 [480V SD BD 1B1-B, C/3D]
3. 0-BKR-32-27 [480V AUX BLDG COM BD, C/6C]
4. 0-BKR-32-4900A [480V TURB BLDG COM BD, C/6C]

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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Attachment 3
(Page 1 of 1)
ERCW Isolation

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 Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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Attachment 4
(Page 1 of 1)
CCS Return Isolation

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)

WBN Unit 1	Reactor Trip or Safety Injection	E-0 Rev. 0030
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**Attachment 5
(Page 1 of 1)
CCS Supply Isolation**

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

Scenario 4

Attachment 3

AOI-43.01,
“Loss of Unit 1 Train A
Shutdown Boards.”

Section 3.1, “Initial Actions.”

Section 3.4, “Compensatory
Actions for Loss of 6.9kVSD
BD 1A-A.”



Watts Bar Nuclear Plant

Unit 1

Abnormal Operating Instruction

AOI-43.01

Loss of Unit 1 Train A Shutdown Boards

Revision 0009

Quality Related

Level of Use: Continuous Use

Effective Date: 01-24-2011

Responsible Organization: OPS, Operations

Prepared By: Nicholas Armour

Approved By: Brian McIlhenny

WBN Unit 1	Loss of Unit 1 Train A Shutdown Boards	AOI-43.01 Rev. 0009
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Revision Log

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
3	03/15/04	2, 7	Non-intent. Reversed steps previous steps 12 & 13 (now steps 13 & 14). No requirement to staff TSC if no protective relays actuated. Added requirement to realign BAT A on loss of board. Operator feedback.
4	02/27/07	24	Deleted reference to 0-PMP-90-212B, which was deleted by DCN 51786.
5	10/04/07	2, 7, 28	Non-intent. Changed 1-HIC-62-81A required position from 25% open to 40-50% open to be consistent with SOI-62.01. Clarified step 14 to indicated manning is for additional manpower, not do to REP classification. Operator feedback.
6	12/03/07	2, 16	Added clarification for primary water system when in bypass mode. Operator feedback.
7	02/04/10	2, 8, 12	Non-intent change. Converted procedure from word 95 to word XP using Rev 6. Corrected minor editorial errors in Section 3.0. (PER 210582, PCR 4263)
8	07/13/10	ALL	General revision to incorporate corrective actions for PER 176605. Procedure rewritten to provide clarity and logical flow. Section 3 (Operator Actions) divided into subsections for Initial Actions, Energizing 6.9kV Shutdown Board, Restoration of 6.9kV SD BD after Energization, Compensatory Actions for Loss of 6.9kV SD BD. Added section to address loss of 480V SD BDs 1A1-A or 1A2-A. Added Appendix for list of equipment affected by loss of A-Train SD BDs. Increased level of detail through-out procedure. Added steps for resetting Black-Out Relays in Section 3.3.
9	01/24/11	2, 39, 53	Added Spare Charger 8-S (DCN 53437).

WBN Unit 1	Loss of Unit 1 Train A Shutdown Boards	AOI-43.01 Rev. 0009
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1.0 PURPOSE

This Instruction provides operator actions for:

- A loss of 6.9kV Shutdown Board 1A-A OR
- A loss of either 480V Shutdown Board 1A1-A or 1A2-A, without a loss of 6.9kV SD BD 1A-A

2.0 SYMPTOMS

2.1 Alarms

- A. PNL 1-M-7 BREAKER TRIP [15-E].
- B. 6.9 SD BD 1A-A UV/OV/CONTROL PWR FAILURE [12-B, 201-C].
- C. 480 SD BD 1A1-A/1A2-A FAILURE/ABN [10-D, 200-D].
- D. RX MOV VENT BD TRAIN A UNDERVOLTAGE [141-D].
- E. C & A VENT BD 1A1-A/1A2-A UNDERVOLTAGE [141-E].
- F. DG AUX BD 1A1-A/1A2-A UNDERVOLTAGE [200-E].

2.2 Indications

- A. Low voltage on any Unit 1 Train A 6.9KV or 480V Shutdown Board.
- B. Zero amps indicated on CSST to Shutdown Board indication.
- C. Open breaker indications.
- D. Failure of Shutdown Board supplied loads.

2.3 Automatic Actions

- A. Diesel Generator 1A-A starts upon loss of voltage to 6.9KV SD BD 1A-A.
- B. Designated loads are auto stripped from 6.9kV SD BD 1A-A, 480V SD BDs 1A1-A and 1A2-A.
- C. Designated loads auto sequence on when voltage is restored to 6.9kV SD BD 1A-A and the Diesel Generator feeder breaker is closed.
- D. Auto start for shed loads is blocked (except for SI auto start).

WBN Unit 1	Loss of Unit 1 Train A Shutdown Boards	AOI-43.01 Rev. 0009
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Step	Action/Expected Response	Response Not Obtained
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3.0 OPERATOR ACTIONS

NOTES

- The loss of all onsite and offsite power is covered in ECA-0.0 and AOI-40.
- A complete or partial loss of 161kV offsite power is addressed in AOI-35.

DIAGNOSTICS	
CONDITION	APPLICABLE PROCEDURE SECTION
6.9kV SD BD 1A-A energized from DG 1A-A following blackout.	**GO TO Section 3.3 Restoration After Energizing 6.9kV SD BD 1A-A
Loss of Power to 6.9kV SD BD 1A-A	** GO TO Section 3.1, Initial Actions
Loss of Power to 480V SD BD 1A1-A without Loss of 6.9kV SD BD 1A-A	** GO TO Section 3.5.1, Energize 480V SD BD 1A1-A
Loss of Power to 480V SD BD 1A2-A without Loss of 6.9kV SD BD 1A-A	** GO TO Section 3.5.2, Energize 480V SD BD 1A2-A

End of Section

WBN Unit 1	Loss of Unit 1 Train A Shutdown Boards	AOI-43.01 Rev. 0009
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Step	Action/Expected Response	Response Not Obtained
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3.1 Initial Actions

1. **MONITOR B TRAIN 6.9KV SD BD
1B-B ENERGIZED.**

EMERGENCY START DGs:

- 1-HS-82-15 [1-M-1].
- 2-HS-82-15 [2-M-1].

IF BOTH Unit 1 6.9KV SD BDs still de-energized, **AND**

- a. **IF** Unit in MODE 1, 2, 3, or 4,
THEN:

****GO TO ECA-0.0, Loss of Shutdown Power.**

- b. **IF** Unit in MODE 5, or 6, **THEN:**

- 1) **TRIP** RCPs
- 2) **PERFORM** AOI-14, Loss of RHR SD Cooling, **WHILE** continuing this procedure

WBN Unit 1	Loss of Unit 1 Train A Shutdown Boards	AOI-43.01 Rev. 0009
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Step	Action/Expected Response	Response Not Obtained
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3.1 Initial Actions (continued)

2. **ENSURE** Diesel Generators running:

- DG 1A-A
- DG 1B-B
- DG 2A-A
- DG 2B-B

EMERGENCY START Diesel Generators:

- 1-HS-82-15 [1-M-1].
- 2-HS-82-15 [2-M-1].

IF any D/G is NOT RUNNING,
THEN

EVALUATE RESETTING
EMERGENCY STOP:

IF RESET and START of a DG is
desired,
THEN:

a. **PRESS** and **RELEASE** DG AUTO SAFETY SHUTDOWN RELAY-RESET [0-M-26]:

- 1-HS-82-20 [1A-A].
- 1-HS-82-50 [1B-B].
- 2-HS-82-80 [2A-A].
- 2-HS-82-110 [2B-B].

b. **EMERGENCY START** Diesel Generator [0-M-26]:

- 1-HS-82-16A [1A-A].
- 1-HS-82-46A [1B-B].
- 2-HS-82-76A [2A-A].
- 2-HS-82-106A [2B-B].

WBN Unit 1	Loss of Unit 1 Train A Shutdown Boards	AOI-43.01 Rev. 0009
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Step	Action/Expected Response	Response Not Obtained
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3.1 Initial Actions (continued)

NOTES

- Appendix A provides a list of affected equipment
- RCPs can be operated for up to 10 minutes after a loss of CCS flow.

3. **MONITOR** RCP seal cooling available:

- Seal injection flow
OR
- CCS flow through Thermal Barrier Heat Exchangers

MANUALLY START

- CCP 1B-B
- CCS Pump 1B-B.

IF seal cooling not restored,

THEN

MONITOR RCP trip criteria (reference AOI-24).

4. **EVALUATE** ERCW supply on A Train headers:

- ENSURE** at least one A Train ERCW Pump In-service:
 - ERCW Pump C-A
 - ERCW Pump D-A
- START** second pump as needed.

IF any A Train Diesel Generator running with NO ERCW cooling, **THEN**

- 1) **EMERGENCY STOP** A Train DGs
- 2) **OPEN** 1-FCV-67-68, DG 1A-A ERCW SUP from Hdr. 2B, [DG RM 1A-A]
- 3) **OPEN** 2-FCV-67-68, DG 2A-A ERCW SUP from Hdr. 2B, [DG RM 2A-A]
- 4) **RESET** and **EMERGENCY START** A Train Diesel Generators Stopped due to lack of ERCW Cooling.

WBN Unit 1	Loss of Unit 1 Train A Shutdown Boards	AOI-43.01 Rev. 0009
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Step	Action/Expected Response	Response Not Obtained
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3.1 Initial Actions (continued)

CAUTION Further damage may occur if 86 LOCKOUT relay(s) are reset before status of board is evaluated and understood.

5. **DISPATCH** personnel to inspect the following equipment for damage, protective relay operation, and determine reason for BO:
 - 6.9kV SD BD 1A-A
 - DG 1A-A
 - 480V SD BD 1A1-A
 - 480V SD BD 1A2-A
 - 480V SD Xfmrs
6. **NOTIFY** Work Control for support and evaluation of BD.
7. **ENSURE** Unit 1 INSTRUMENT POWER A RACK selected to ENERGIZED feeder (amber light ON).
[1-M-7]
AND
RESET Radiation Monitor modules and alarms on 0-M-12.
8. **MONITOR** containment temperatures within limits:

<ul style="list-style-type: none"> • S/R 3.6.5.1, Computer Point U9019 • S/R 3.6.5.2, Computer Point U9020 	START containment fans as needed <ul style="list-style-type: none"> • CRD Mech Cooler Fans • Lower Compartment Cooler Fans • Upper Compartment Cooler Fans
--	--
9. **ENSURE** 1B Primary Water Pump in-service.

WBN Unit 1	Loss of Unit 1 Train A Shutdown Boards	AOI-43.01 Rev. 0009
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Step	Action/Expected Response	Response Not Obtained
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3.1 Initial Actions (continued)

NOTE Operability verification of remaining AC power sources is required to be completed within one hour per LCO 3.8.1. S/R 3.8.1.1 (0-SI-82-2)

10. **NOTIFY** Shift Manager to evaluate staffing the TSC/OSC for support.

11. **EVALUATE** Relay Operation and Damage reports, **THEN**

DETERMINE if safe to energize 6.9kV SD BD 1A-A.

**** GO TO** Section 3.4 Compensatory Actions for Loss of 6.9kV SD BD 1A-A **WHILE** continuing to Evaluate Energizing 1A-A 6.9kV SD BD.

12. **** GO TO** Section 3.2

End of Section

WBN Unit 1	Loss of Unit 1 Train A Shutdown Boards	AOI-43.01 Rev. 0009
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Step	Action/Expected Response	Response Not Obtained
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3.4 Compensatory Actions for Loss of 6.9kVSD BD 1A-A

NOTES Appendix A provides list of Unavailable Equipment resulting from a loss of 6.9kV SD BD 1A-A.

1. **MONITOR** condition of 6.9kV SD BD 1A-A and supply sources,

WHEN ready to energize Board from available power supply,

THEN

**** GO TO** Section 3.2.1, Step 1.

2. **DISPATCH** AUO to D/G Bldg to monitor D/Gs conditions USING SOI-82 series, Appendix A, for operating parameters.

3. **CHECK** any charging pump RUNNING.

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 APPENDIX D ALIGNMENT OF CHARGING AND LETDOWN.

WBN Unit 1	Loss of Unit 1 Train A Shutdown Boards	AOI-43.01 Rev. 0009
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Step	Action/Expected Response	Response Not Obtained
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3.4 Compensatory Actions for Loss of 6.9kVSD BD 1A-A (continued)

- | | | |
|----|--|--|
| 4. | CHECK A Train CCS flow adequate. | START 1B-B CCS Pump.
ENSURE one of the following CLOSED to avoid excessive flow <ul style="list-style-type: none"> • RHR HTX A , 1-FCV-70-156 OR <ul style="list-style-type: none"> • SFP HTX A, 0-FCV-70-197 <p>IF A Train CCS is lost, THEN</p> <p>REFER TO AOI-15, Loss of Component Cooling Water (CCS) FOR LOSS OF CCS FLOW.</p> |
| 5. | ENSURE Thermal Barrier Booster Pump 1B-B in-service (SOI-70.01). | REFER TO AOI-15, Loss of Component Cooling Water (CCS) FOR LOSS OF CCS FLOW. |
| 6. | ALIGN BAT A for operation via BA Pump 1B
REFER TO SOI-62.05. | |
| 7. | EVALUATE transferring one of the following to preserve Vital Battery life: <ul style="list-style-type: none"> • 480V AC Vital Transfer Switch I to Alternate power supply (SOI-235.01). OR <ul style="list-style-type: none"> • 125V Vital Batt BD I to Battery Charger 6-S or 8-S on B Train feed. (SOI-236.01) | |
| 8. | EVALUATE transferring 24V CAP Battery Charger 1 from Normal to Alternate (SOI-252). | |

WBN Unit 1	Loss of Unit 1 Train A Shutdown Boards	AOI-43.01 Rev. 0009
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Step	Action/Expected Response	Response Not Obtained
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3.4 Compensatory Actions for Loss of 6.9kVSD BD 1A-A (continued)

9. **ENSURE** Aux Bldg General Supply and Exhaust Fans in-service as required to maintain ventilation and pressure (SOI-30.05).
10. **ENSURE** EBR Air Conditioning Unit B-B and MCR Air Conditioning Unit B-B in-service (SOI-31.01).
11. **ENSURE** 1B Annulus Vacuum Fan in-service (SOI-65.01).
12. **ENSURE** A Train or B Train 480V Shutdown Board Room Ventilation in-service (SOI-30.07).

NOTE 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.

13. **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 Sys-Operating.
 - 3.8.10, Distribution Sys-SD.
14. **REFER TO** EPIP-1, Emergency Plan Classification Flowchart.

WBN Unit 1	Loss of Unit 1 Train A Shutdown Boards	AOI-43.01 Rev. 0009
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Step	Action/Expected Response	Response Not Obtained
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3.4 Compensatory Actions for Loss of 6.9kVSD BD 1A-A (continued)

15. **EVALUATE** transferring 0-DPL-13-1,
Fire Protection Power Distribution
Panel to Alternate. (SOI-13.01)

16. **CONTINUE MONITORING** 6.9Kv SD
BD 1A-A supply sources using
1-EI-82-6A [0-M-26]

WHEN Power supply AVAILABLE,
THEN

****GO TO** Section 3.2.1 Step 1.

End of Section

Scenario 4 Attachment 4

AOI-17, “Turbine Trip.”

**Section 3.3, “BOP
Realignment.”**

WBN Unit 1	Turbine Trip	AOI-17 Rev. 0047
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Step	Action/Expected Response	Response Not Obtained
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3.3 BOP Realignment

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

- NOTES**
- Control room operators may initiate shutdown of pumps and equipment from the bench board immediately after a trip. Performance of this instruction will subsequently verify proper secondary equipment alignment.
 - Steps in this section and items in Attachment 1 may be performed out of sequence.
 - Attachment 1 may be initiated as soon as Turbine has tripped while MCR completes Section 3.2. Initiation of Attachment 1 may be part of briefing for preplanned Turbine trip with performance to begin when NAUO is notified of Turbine trip by UO.

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. **OPEN** exciter field breaker.
 - c. **PLACE** exciter regulator control to OFF.

WBN Unit 1	Turbine Trip	AOI-17 Rev. 0047
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Step	Action/Expected Response	Response Not Obtained
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3.3 BOP Realignment (continued)

4. **MONITOR** main turbine:

- | | |
|--|---|
| <ul style="list-style-type: none"> a. VERIFY seal oil backup pump running. b. ENSURE turning gear oil pump RUNNING. c. WHEN less than 600 rpm,
THEN
ENSURE bearing lift oil pump RUNNING. d. WHEN turbine is at ZERO RPM,
THEN
ENSURE turbine on turning gear. e. MAINTAIN MTOT lube oil temp between 95°F° and 100°F (may require RCW isolation if TCV has excessive leakage). f. MAINTAIN GENERATOR H2 (Cold Gas) temp 95°F (may require RCW isolation if TCV has excessive leakage). g. ENSURE Gland Steam Spillover Bypass valve is CLOSED using 1-HS-47-191A. | <ul style="list-style-type: none"> a. ENSURE seal oil backup pump 1-HS-47-61D in NORMAL (T7J/729 behind MTOT) |
|--|---|

5. **ALIGN** MSR:

- 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.

WBN Unit 1	Turbine Trip	AOI-17 Rev. 0047
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Step	Action/Expected Response	Response Not Obtained
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3.3 BOP Realignment (continued)

6. **CHECK** MSIVs OPEN. **IF** vacuum is to be maintained,
THEN
ENSURE auxiliary boiler is aligned for
steam seals.

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.

WBN Unit 1	Turbine Trip	AOI-17 Rev. 0047
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Step	Action/Expected Response	Response Not Obtained
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3.3 BOP Realignment (continued)

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.

14. **IF** EGTS started, **THEN** **SHUTDOWN** one train after 1 to 2 hours and place in P-AUTO:
 - **REFER TO** SOI-65.02, Emergency Gas Treatment System, section on Auto EGTS Actuation.

WBN Unit 1	Turbine Trip	AOI-17 Rev. 0047
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Step	Action/Expected Response	Response Not Obtained
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3.3 BOP Realignment (continued)

15. IF ABGTS started,
THEN
SHUTDOWN one train after 1 to 2
hours 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.

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

Scenario 4

Attachment 5

E-1, "Loss of Reactor or
Secondary Coolant."

Appendix A through D

WBN Unit 1	Loss of Reactor or Secondary Coolant	E-1 Rev. 0016
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**Appendix A
(Page 1 of 1)
CLA Breaker Operation**

CLOSE the following to restore power to cold leg accumulator isolation valves:

BOARD	COMPT	NOMENCLATURE
480 V Reactor MOV Board 1A1-A	3F2	1-BKR-63-118A SIS CL ACCUM 1 OUT ISOL (1-FCV-63-118)
480 V Reactor MOV Board 1A1-A	17F2	1-BKR-63-80A SIS CL ACCUM 3 OUT ISOL (1-FCV-63-80)
480 V Reactor MOV Board 1B1-B	3F2	1-BKR-63-98A SIS CL ACCUM 2 OUT ISOL (1-FCV-63-98)
480 V Reactor MOV Board 1B1-B	16F2	1-BKR-63-67A SIS CL ACCUM 4 OUT ISOL (1-FCV-63-67)

WBN Unit 1	Loss of Reactor or Secondary Coolant	E-1 Rev. 0016
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**Appendix B
(Page 1 of 1)**

1-FCV-63-1 Breaker Operation

CLOSE the following to restore power to 1-FCV-63-1:

BOARD	COMPT	NOMENCLATURE
480 V Reactor MOV Board 1A1-A	2E1	1-BKR-63-1A RWST TO RHR SUCT (1-FCV-63-1)

WBN Unit 1	Loss of Reactor or Secondary Coolant	E-1 Rev. 0016
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**Appendix C
(Page 1 of 1)**

1-FCV-63-22 Breaker Operation

CLOSE the following to restore power to 1-FCV-63-22:

BOARD	COMPT	NOMENCLATURE
480 V Reactor MOV Board 1B1-B	2F2	1-BKR-63-22A SIP COLD LEG INJECTION (1-FCV-63-22) SHUNT TRIP BREAKER

WBN Unit 1	Loss of Reactor or Secondary Coolant	E-1 Rev. 0016
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**Appendix D
(Page 1 of 1)**

Equipment Evaluation

- A. **EVALUATE** plant equipment and systems needed to support long term cooling and recovery actions, as time and personnel availability permits:
1. Cntmt Isolation Status.
 2. Emergency Gas Treatment System: One train in operation, **REFER TO SOI-65.02.**
 3. Auxiliary Building Gas Treatment: One train in operation, **REFER TO SOI-30.06.**
 4. Auxiliary Building Isolation alignment: **REFER TO SOI-30.06.**
 5. Main Control Room Isolation alignment: **REFER TO SOI-31.01.**
 6. ERCW System: Both trains in operation.
 7. Component Cooling Water System: Both trains in operation.
 8. Ice Condenser System: AHUs energized after cntmt hydrogen concentration verified (if applicable). **REFER TO SOI-61.01.**
 9. Permanent Hydrogen Mitigation System: Igniters de-energized when no longer needed. **REFER TO SOI-268.01.**

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

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

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

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

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

Title of Reactivity Control Plan: Power Ascension from 82% to 100% BOL

Assumptions:

1. Calculated volumes below assume Tave maintained on Tref.
2. Reactor is stable at 82% RTP.
3. Conditioned power level is assumed to be ~96.2% Fuel will continue to decondition at a rate of 2%RTP/day. See TI-45 for further guidance.

Major Steps:

1. Ramp up to CPL (~96% RTP) at 10%/hr.
2. Ramp up to 100% RTP at 3%/hr per TI-45.
3. Maintain reactor at 100% RTP.

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 Up to CPL (~96%RTP, per the schedule):

1. DILUTE ~1300 gal of PW.
2. WITHDRAW CBD to ~204 steps to control AFD on target.

Ramp Up to 100%:

1. BORATE ~50 gal of BA.
2. WITHDRAW CBD at ~211 steps to control AFD on target.

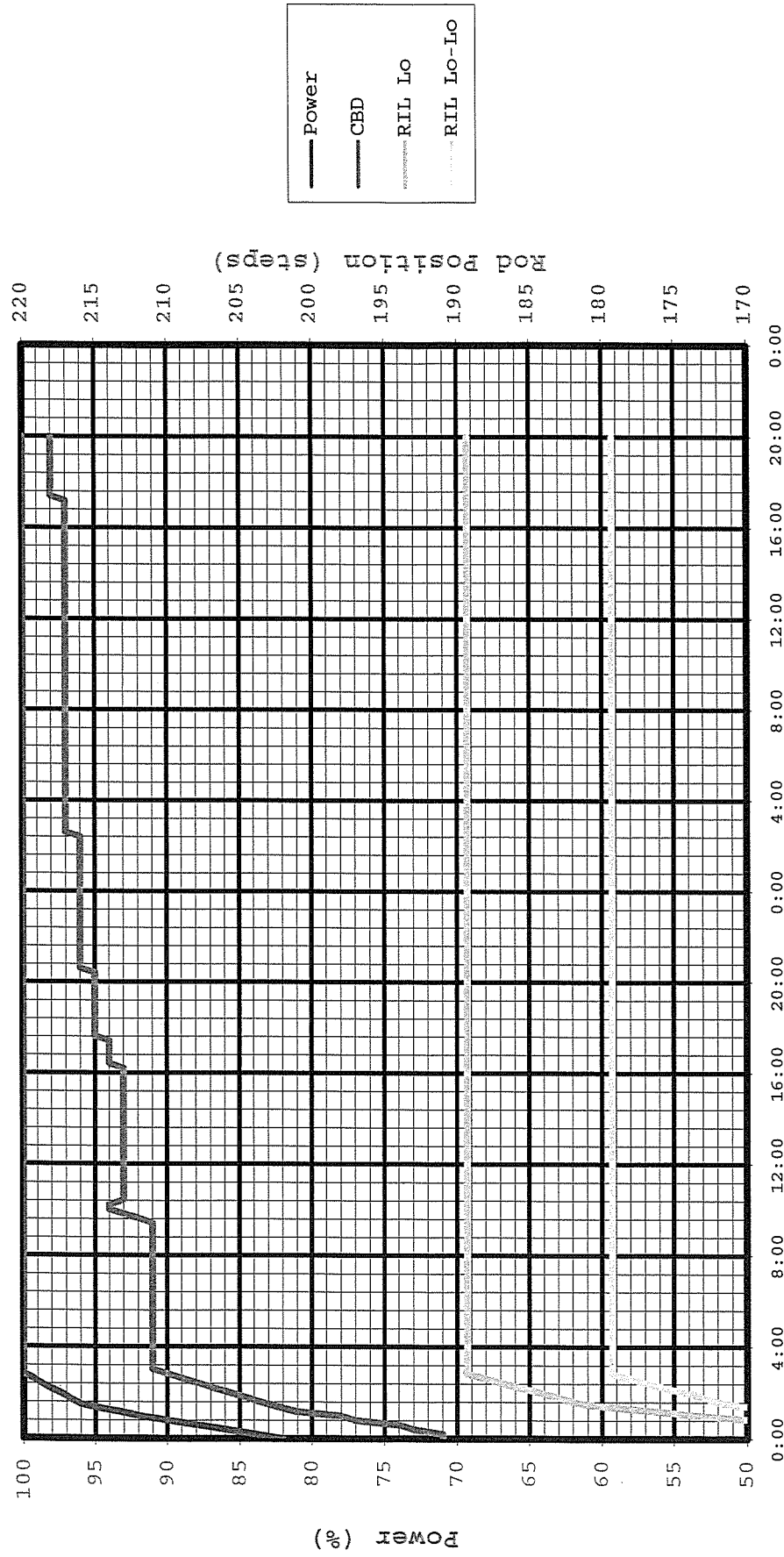
Maintain Power at 100%:

1. BORATE ~13 gal of BA for Xenon decay.
2. DILUTE ~150 gal/hr for Xenon build-in.
3. WITHDRAW CBD to 220 steps as conditions allow.

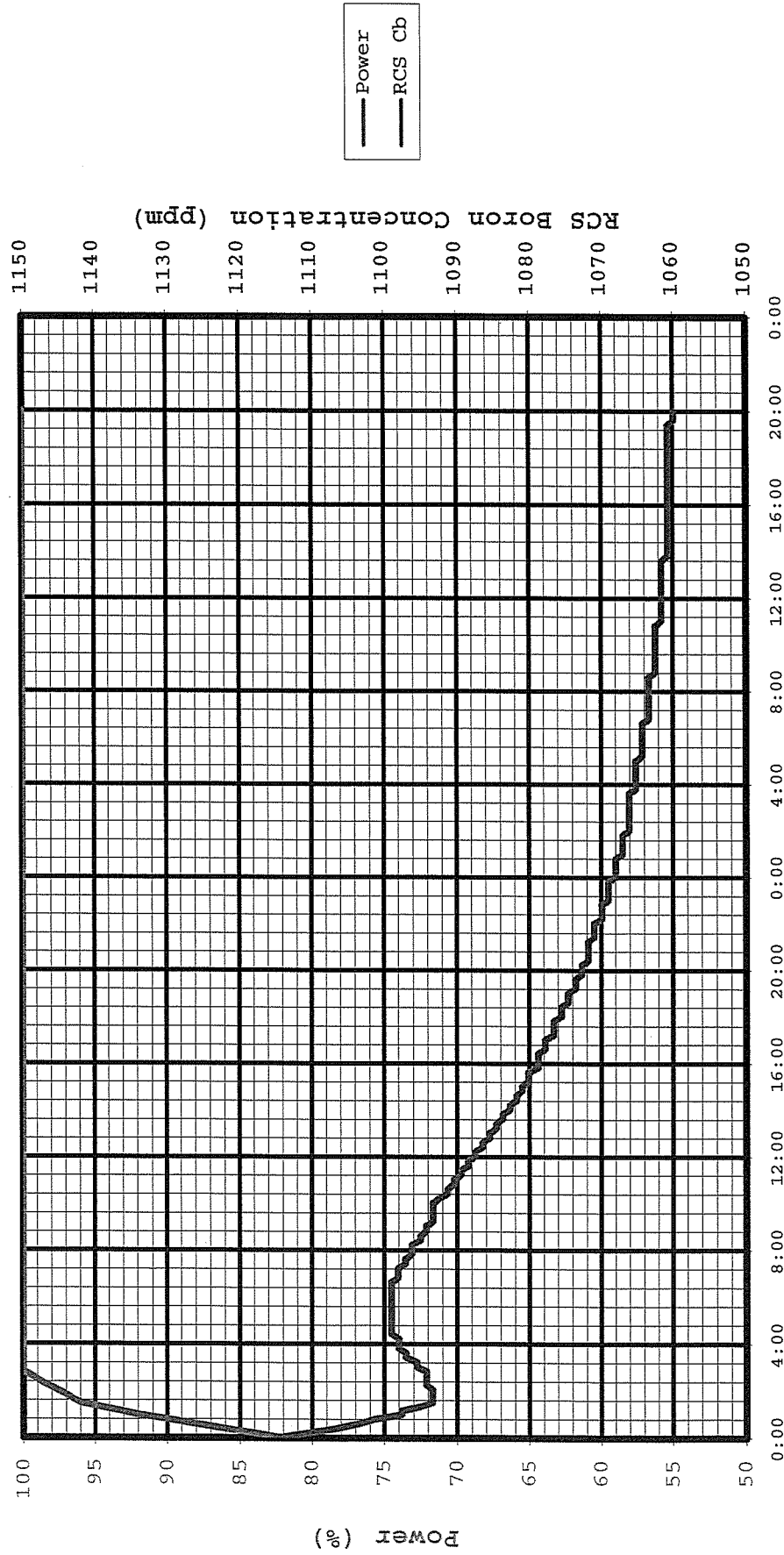
Critical Parameter	Limit	Required Action
Control Rod Height	> RIL Lo	If rods < RIL Lo, then ENSURE RCS borated amount specified in Step 1 and WITHDRAW rods.

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

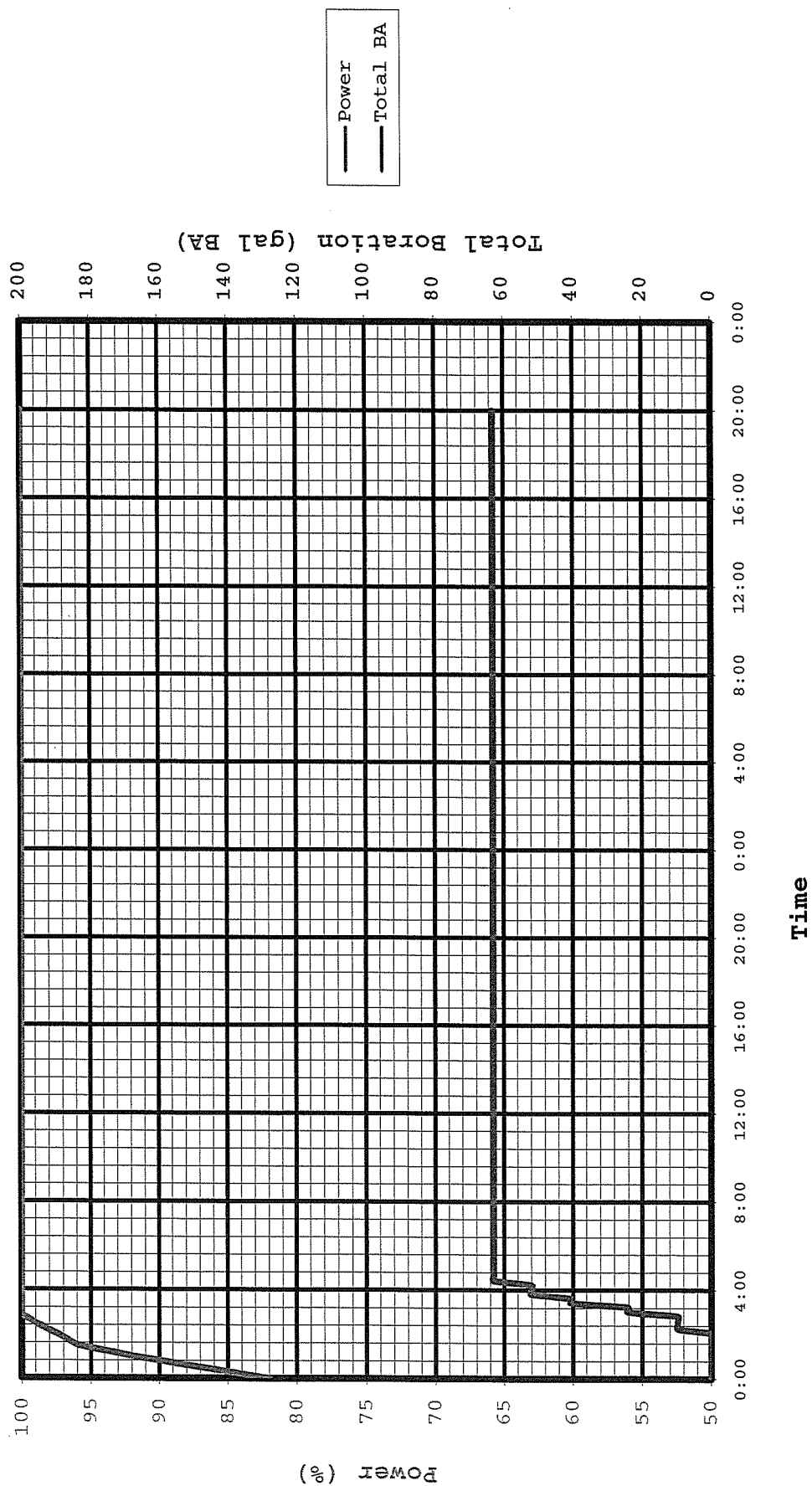
Power Ascension from 82% to 100% (BOL)



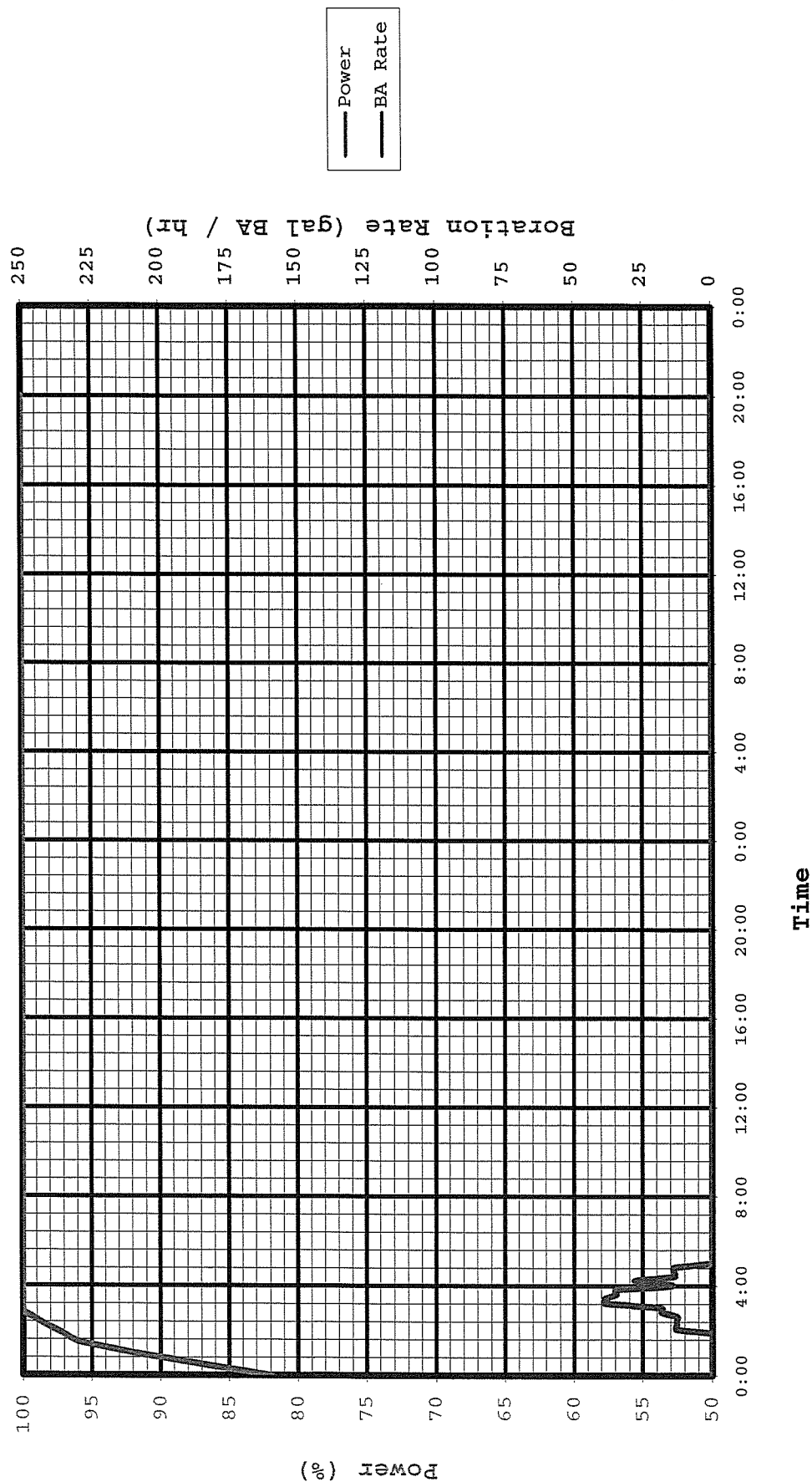
Power Ascension from 82% to 100% (BOL)



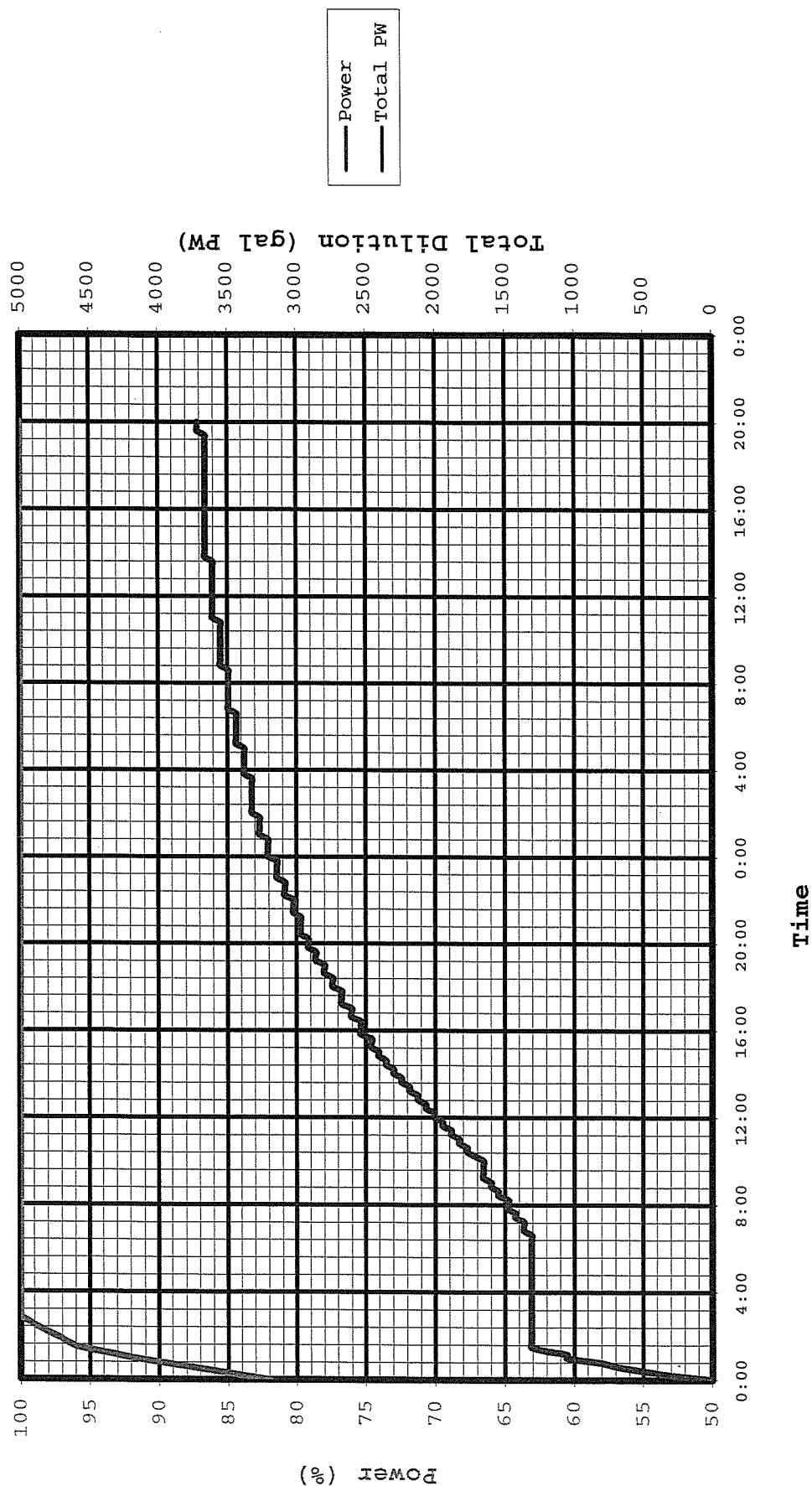
Power Ascension from 82% to 100% (BOL)



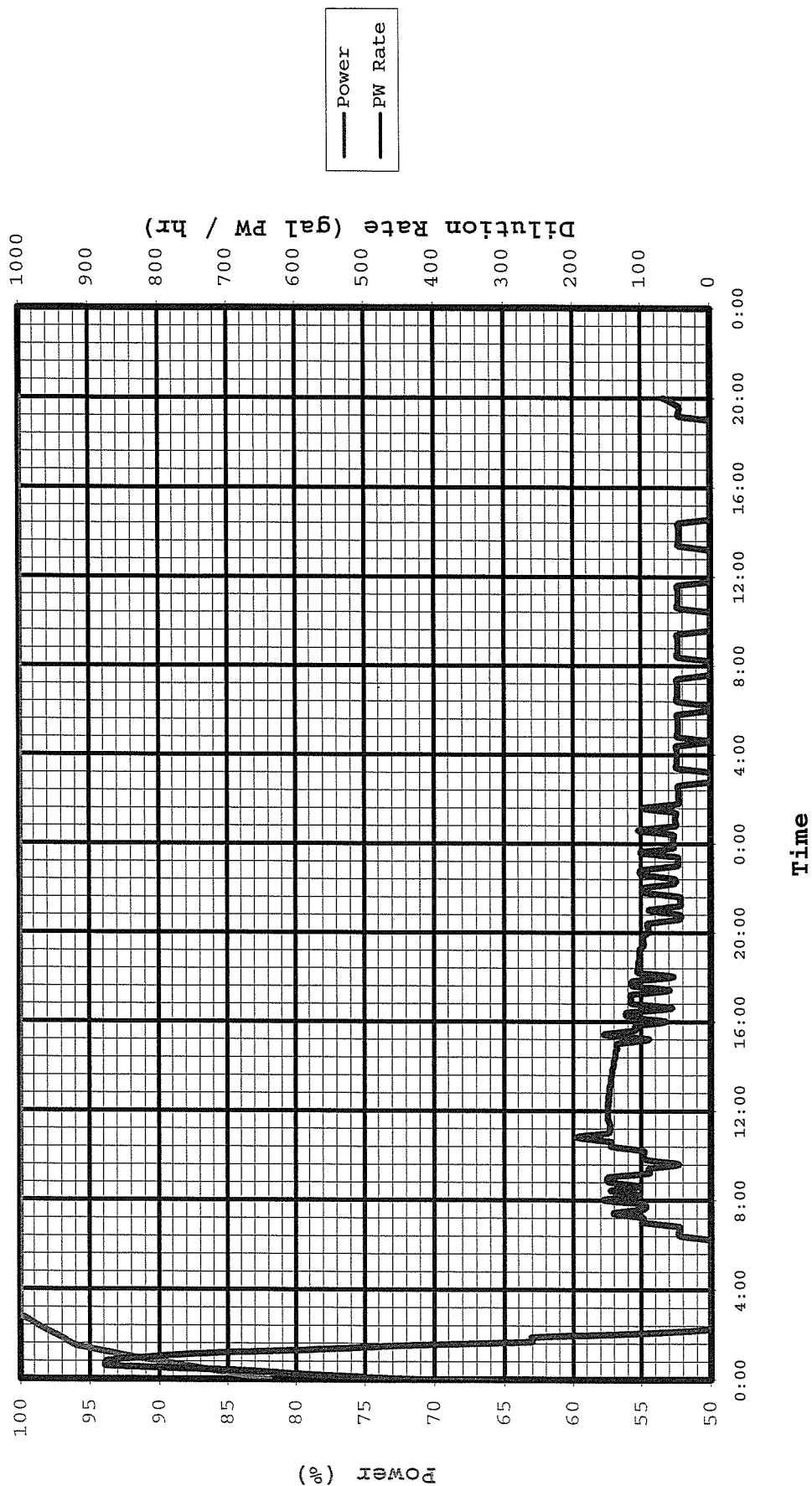
Power Ascension from 82% to 100% (BOL)



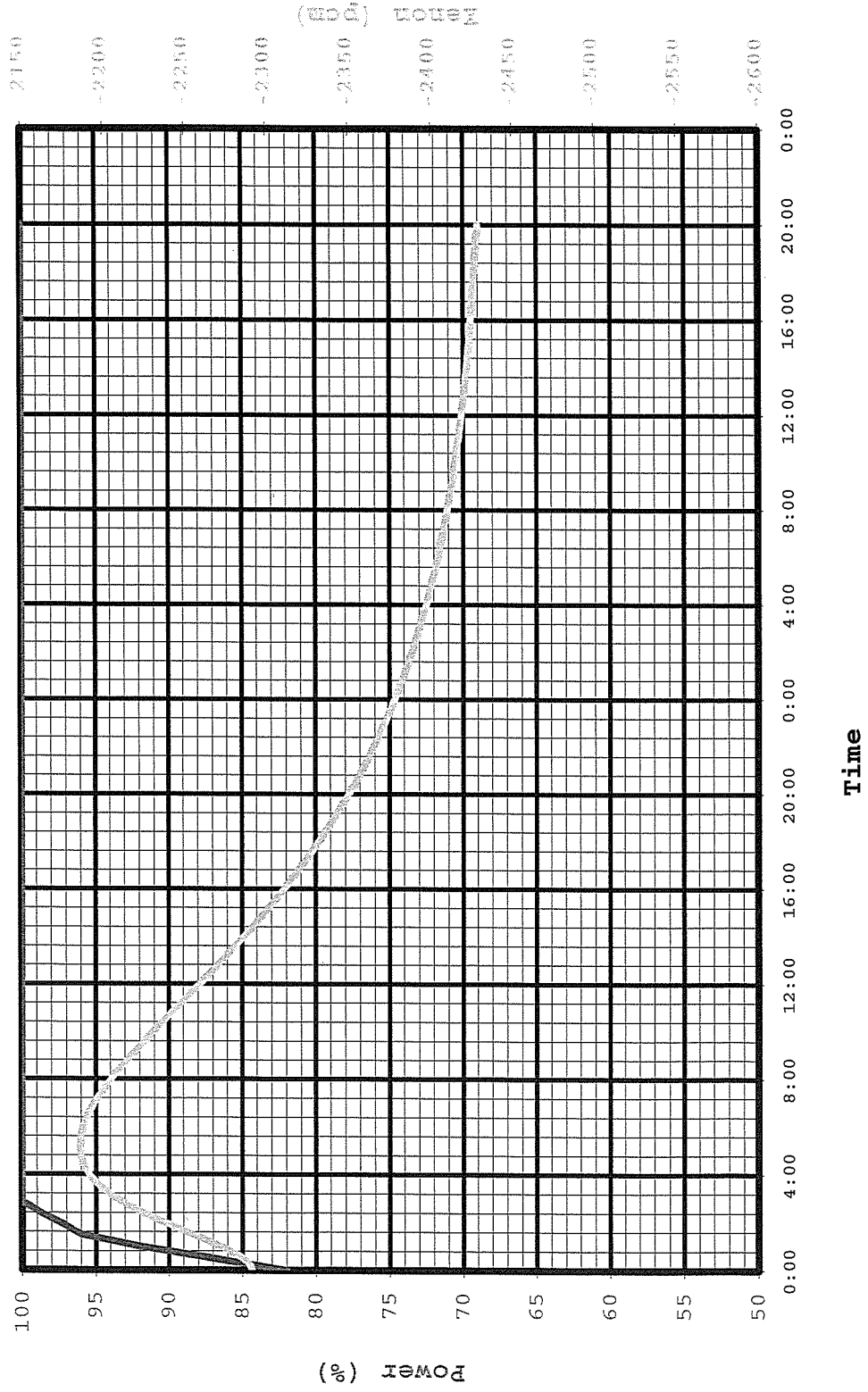
Power Ascension from 82% to 100% (BOL)



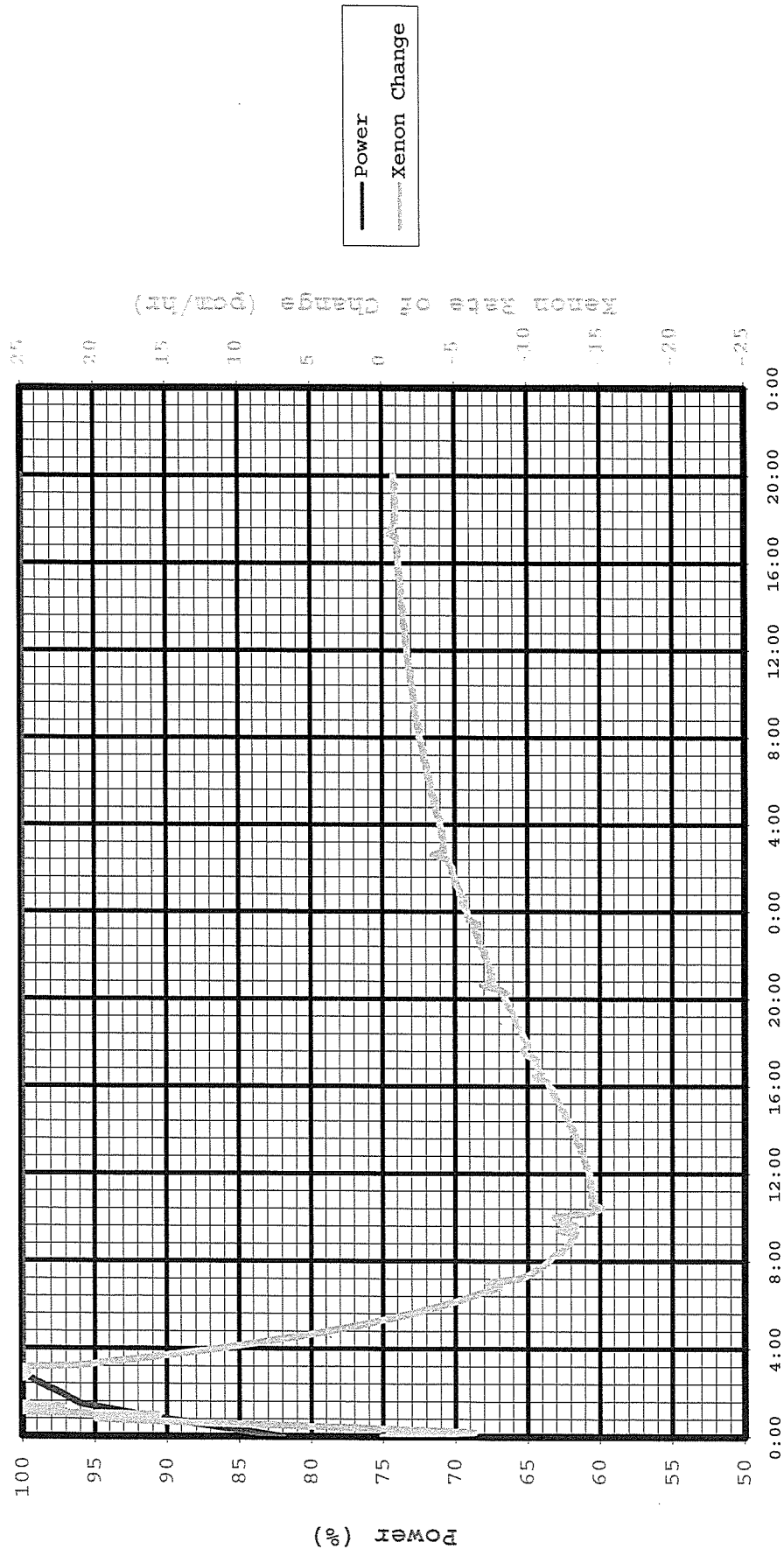
Power Ascension from 82% to 100% (BOL)



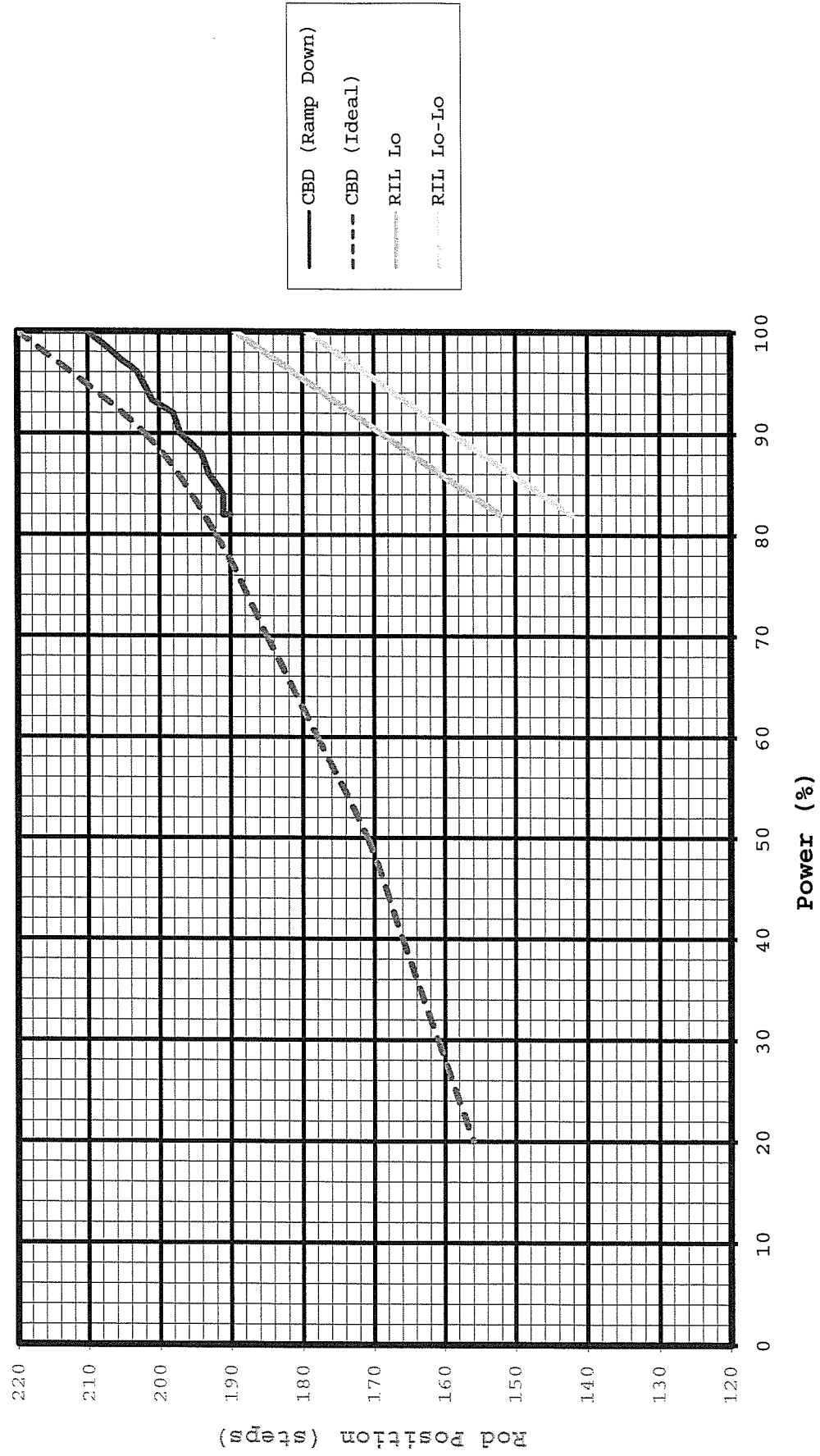
Power Ascension from 82% to 100% (BOL)



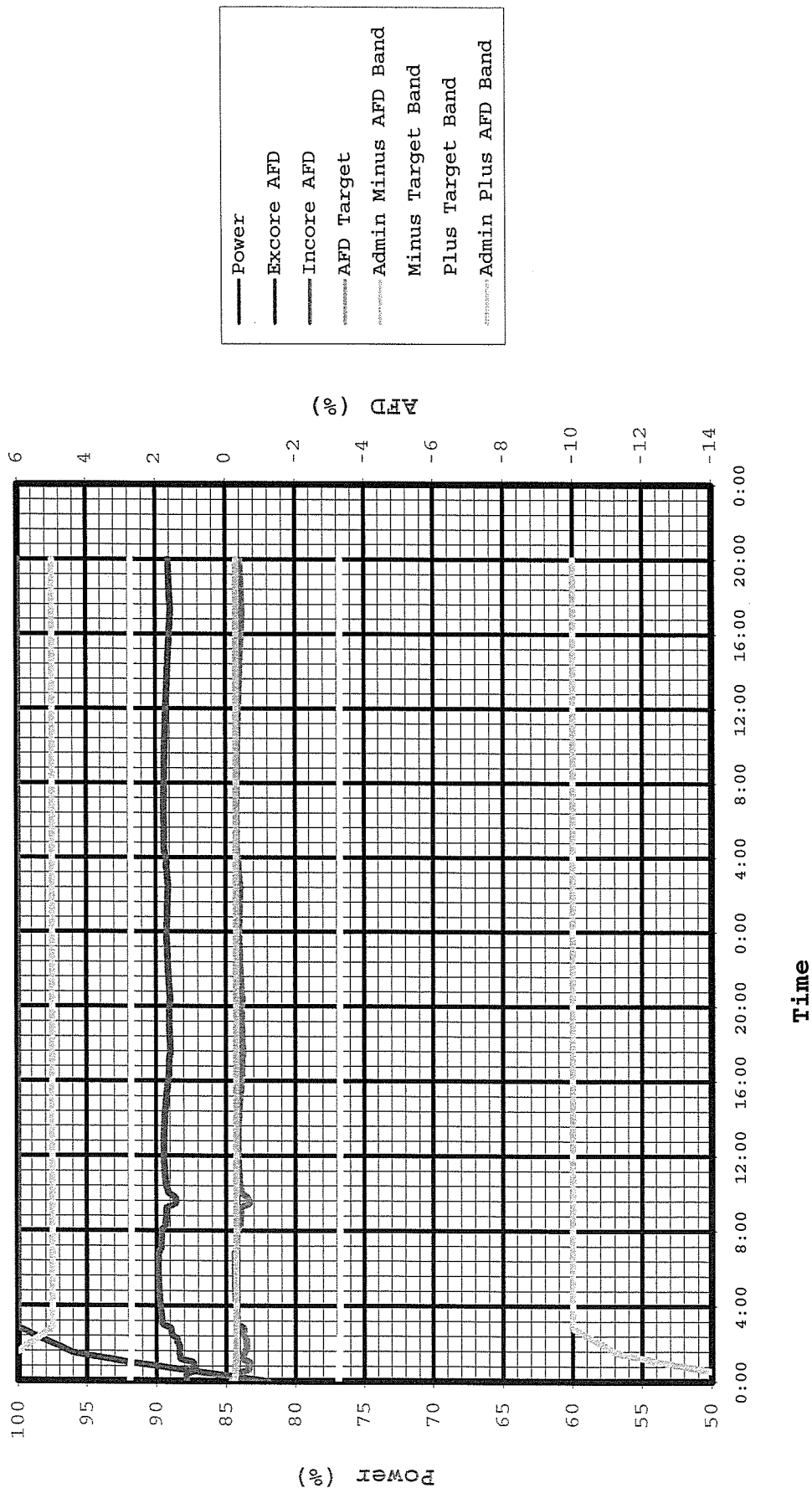
Power Ascension from 82% to 100% (BOL)



Power Ascension from 82% to 100% (BOL)



Power Ascension from 82% to 100% (BOL)





Watts Bar Nuclear Plant

Unit 1

Periodic Instruction

1-PI-OPS-1-MCR

Main Control Room

Revision 0055

Quality Related

Level of Use: Reference Use

Effective Date: 05-10-2011

Responsible Organization: OPS, Operations

Prepared By: John Lovell

Approved By: Brian McInay

WBN Unit 1	Main Control Room	1-PI-OPS-1-MCR Rev. 0055 Page 2 of 23
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Revision Log

Rev or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
48	12/03/09	2, 14, 22	Changed the point monitored to 10 min average (U2118RA) from 5 min average (U211805) and enhanced action to take if power approaches or exceeds the Thermal Power Limit.
49	02/09/10	2, 7, 18, 20	Administrative change to update CSST tap changer alternate alignments IAW EDC 54778-A and to update section 6.1 step E to account for DCN 52019 (PCR 4031)
50	04/12/10	2, 14, 22	Administrative change to change control to the one hour average from the 10 minute average. Added descriptive usage of the 10 minute average.
51	04/16/10	2, 18	Administrative change to add requirement to maintain B phase of main generator 525±5KV.
52	07/07/10	2, 7, 10, 12, 13, 20, 19, 25	Added clarifying note to Section 5.3 and added 15E500-3 to the Developmental References (PER 226140). Deleted Section 5.1.2 Subsection 3 (PER 232132/PCR 4093). Deleted requirement for having SQN #2 Line in service and added new incoming Mvars limit while WBN-SQN #2 and WBN-Roane lines are out of service, in Section 5.4. Added TRO-TO-SOP-10.130 to Developmental References. Reformatted source notes and deleted source notes 2-4.
53	09/10/10	2, 24	Added date block to Appendix A. [PER 239770]
54	11/12/10	2, 8, 10, 16-19	Minor/editorial revision: Updated references of NEAD to Load Dispatcher (PCR 4556). Updated WO to SR.
55	05/10/11	2, 8, 17, 18	Removed references to no longer used, "Base Adjust" to implement DCN 52769, which replaced the Westinghouse generator voltage regulator with the digital dual channel Unitrol 5000 Excitation Control System.

WBN Unit 1	Main Control Room	1-PI-OPS-1-MCR Rev. 0055 Page 3 of 23
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WBN Unit 1	Main Control Room	1-PI-OPS-1-MCR Rev. 0055 Page 5 of 23
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1.0 INTRODUCTION

1.1 Purpose

This Instruction details selected MCR responsibilities for licensed operators.

1.2 Scope

This Instruction includes guidance to Unit Operators (UOs) for the proper method of performing Main Control Room (MCR) walk down/inspections. This Instruction also includes guidance for responding to selected off normal events identified during MCR monitoring of plant status.

1.3 Applicability

This Instruction is applicable in all Modes. Portions of this Instruction, which are only applicable in Modes 1 through 4, are specifically identified.

1.4 Background - Leading Edge Flow Monitor (LEFM)

NOTE

LEFM and venturi-based ICS Points are listed in Table 1-1.

The LEFM uses ultrasonic transducers placed in a section of Main Feedwater piping and measures transient time of ultrasonic sound waves. It is very accurate and substantially lowers the uncertainty associated with using venturi-based flow measurement in the secondary side power calorimetrics to determine thermal output of the core. The U1118 Series ICS Points measuring system consists of nozzle venturis placed in the feedwater lines to the individual steam generators. Using the venturi-based flow measurement accuracies associated with reactor power measurement have a 2% uncertainty. A revision to NRC rules provides for a core power (Rated Thermal Power) rise to 3459 MWT when LEFM Calorimetric is used because its uncertainty is 0.6%.

The core power calculation, as determined by secondary side calorimetrics, will be made using the LEFM inputs of feedwater mass flow and temperature. Control of feedwater flow will be by the existing controls from the nozzle venturis. The LEFM is backed up by the venturi-based flow monitoring system. Loss of LEFM results in reverting to the venturi-based monitoring system. Plant equipment is operated in the same manner at the 3459 MWT power level as it is at the 3411 MWT level. If the LEFM becomes unavailable for a duration that exceeds the conditions of the Tech Requirements Manual, the secondary side calorimetrics, is performed with inputs from the nozzle venturis and requires a core power adjustment toward a lower core power based on the 2% uncertainty associated with the nozzle inaccuracies.

WBN Unit 1	Main Control Room	1-PI-OPS-1-MCR Rev. 0055 Page 6 of 23
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1.4 Background - Leading Edge Flow Monitor (LEFM) (continued)

The LEFM System includes a fault indication alarm that is provided as part of the plant computer software. This alarm is an audible and visual alarm through the ICS. This alarm is provided as a new stand-alone screen through ICS and indicates NORMAL, ALERT, or FAIL. Operations is alerted to this by the ICS LEFM points which will turn blue when it is in an abnormal condition.

The venturi-based measurement's alarms are suppressed by the LEFM System as long as the system is **NOT** failed. The alarms become active when the LEFM system is failed. The U1127 Series ICS Points display LEFM, but "toggle" and display venturi-based measurement upon LEFM failure. For example, should the LEFM system fail and the venturi-based measurement indicates a core power above the 3411 MWT, computer alarms will be enabled and displayed on the alarm display.

TABLE 1-1		
ICS POINT	UNITS	DESCRIPTION
U1118	MWT	REACTOR TOTAL THERMAL Q
U111805	MWT	REACTOR TOTAL THERMAL 5 MIN AVG
U1118RA	MWT	10 MINUTE AVERAGE OF U1118
U1125	MWT	REACTOR TOTAL THERMAL Q 1 HR AVG
U1126	MWT	REACTOR TOTAL THERMAL Q 8 HR AVG
U1127*	%	PERCENT CORE THERMAL POWER
U1127H*	%	1 HR AVG REACTOR THERMAL Q
U1127H24*	MW	CORE THERMAL POWER 24 HR AVG
U1127H8*	%	8 HR AVG REACTOR THERMAL Q
U1127MWT*	MW	CORE THERMAL POWER
U1127TM*	%	10 MIN AVG REACTOR THERMAL Q
U1254	%	10 MIN AVG % PWR BASED ON 3411 MWT
U2118	MWT	LEFM REACTOR TOTAL THERMAL Q
U2125	MWT	LEFM RX TOTAL THERMAL Q 1 HR AVG
U2126	MWT	LEFM RX TOTAL THERMAL Q 8 HR AVG

* U1127 Series ICS computer points toggle between LEFM calorimetric, venturi-based calorimetric, and delta temperature % power based on plant conditions and the new RTP of 3459 MWT.

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2.0 REFERENCES

2.1 Performance References

- A. Good Practice OP-206, INPO 84-030, Rev 1, Generic Round Sheets and Shift Operating Practices.
- B. SPP-3.5, Regulatory Reporting Requirements.
- C. OPDP-1, Conduct of Operations.
- D. OPDP-8, Limiting Conditions For Operation Tracking

2.2 Developmental References

- A. 1-SI-0-2 Series, Shift and Daily Surveillance Log.
- B. Drawings:
47E235-42, -45
15E500-3
- C. WBN Grid Voltage Study, dated 4/9/01 (E32 010409 601)
- D. TI-12.15, 161 kV Offsite Power Requirements
- E. Standard VAR-002-1 - Generator Operation for Maintaining Network Voltage Schedule.
- F. NRC Discussion of "Licensed Power Level" (AITS F14580H2) Dated August 22, 1980
- G. NEI Position Statement on Licensed Power Limit, Project Number 689, Dated June 23, 2008.
- H. NRC Regulatory Issue Summary 2007-21, Rev 1, Adherence to Licensed Power Limits. Dated February 9, 2009
- I. Watts Bar Nuclear Plant, Unit 1 Facility Operating License NPF-90, Docket NO 50-390. Amendment No. 81
- J. DCN 52019 - Provide a robust flash storage drive for Thermowestronic recorders
- K. TRO-TO-SOP-10.130, WBN Grid Operating Guide

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3.0 PRECAUTIONS AND LIMITATIONS

- A. This Instruction does **NOT** supersede or replace other documents necessary for safe operation of the plant.
- B. 1-SI-0-2 Series and other similar Surveillance Instructions will have precedence over this Instruction.
- C. The Load Dispatcher is to be notified within 30 minutes when the Main Generator Voltage Regulator is **NOT** in automatic.

4.0 PREREQUISITE ACTIONS

None

4.1 Preliminary Actions

None

4.2 Field Preparations

None

4.3 Approvals and Notifications

None

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5.0 GENERAL

5.1 General Duties

5.1.1 Unit Operator Duties

NOTE

Steps in this Instruction may be performed in any sequence.

[1] WHEN assigned, THEN

- [1.1] **PERFORM** assigned duties and inspections, including a joint walk down of at least one Board section (This is in addition to the OPDP-1 requirements). [C.1]
- [1.2] **NOTIFY** US of difficulties in performing assigned tasks.
- [1.3] **VERIFY** the following:
 - A. Equipment labels are **NOT** unreadable due to Caution Tags or Hold Orders.
 - B. Indicating lights are energized as required.
 - C. Recorders are operating properly.
 - D. Alarm panels in Main Control Room test satisfactorily.
 - E. Computer is operable.
 - F. Floor space open, allowing access to all panels.
 - G. Gauges are in expected range and operating properly (i.e., no stuck indicators, no unexpected swings, no off scale high or low).
 - H. US/SM has performed the shiftly PER operability review.
- [1.4] **PERFORM** handswitch alignment check (e.g., CS, AFW, EGTS, Rad Monitor Block Switch). [C.1]
- [1.5] **ENSURE** alarms that are LIT are fully understood and expected or a corrective action is in progress.

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5.1.1 Unit Operator Duties (continued)

- [2] **WHEN** problems arise, **THEN**:
 - [2.1] **NOTIFY** US of abnormal conditions.
 - [2.2] **TROUBLESHOOT** problems, **AND**
DETERMINE corrective action(s).
 - [2.3] **INITIATE** Service Request as required.
 - [2.4] **ASSIST** maintenance personnel as required.

5.1.2 Unit Supervisor Duties

NOTES

- 1) LCO Tracking Only entries are defined in OPDP-8, Limiting Conditions for Operation Tracking.
- 2) The following duties can be performed by the Unit Supervisor or his designee.

- [1] **REVIEW** the following:
 - [1.1] ICS computer points out of scan
 - [1.2] Substituted value logs
 - [1.3] Alarms suppressed logs
- [2] US/STA **ENSURES** MCR UNIT SUPV operator rounds are completed daily by day shift (0700-1900).

5.2 Reactor Thermal Power

SEC. 5.2.1 AND SEC. 5.2.2 APPLIES AT ALL TIMES. SECTIONS 5.2.3, AND 5.2.4 SHALL BE USED, AS APPROPRIATE, TO ENSURE COMPLIANCE: [C.5]

Watts Bar is authorized to operate at a Licensed Power Limit (LPL) not to exceed 3459 megawatts thermal as measured by the eight hour average. The one hour core thermal power average over eight hours shall be monitored to ensure Reactor Thermal Power is maintained at or below the LPL as measured by the eight hour average.

Reactor power limits and any required actions are also contained in Attachment 1. This attachment may be laminated and made available for the OAC to use as a reference during operations.

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5.2.1 Specific Guidance for Controlling Thermal Power

A. Steady State

The term "steady state" implies that temperatures, pressures, and flows are stable such that the nominal value of reactor power remains stable, subject to statistical uncertainties and normal fluctuations (e.g., feedwater oscillations).

Normal fluctuations (i.e., automatic control system response), random processes (i.e., feedwater temperature changes), and instrument uncertainties (i.e., flow meter measurement uncertainties) may slightly affect core thermal power indications, but these affects do not result in a violation of the licensed power limit license condition when operating at steady state conditions.

B. Pre-Planned Evolutions

If an evolution is expected to cause core thermal power to exceed 3459 MWT, then action should be taken to reduce power, (prior to the evolution) in order to maintain sufficient margin from the limit.

C. Compliance

No actions are allowed that would intentionally raise core thermal power above the Licensed Power Limit (LPL) of 3459 MWT for any period of time. Operators may not intentionally operate or authorize operation above 3459 MWT. Small, short-term fluctuations in power that are not under the direct control of a license reactor operator (e.g., fluctuations caused by secondary-side control valve oscillations) are not considered intentional.

Prompt action is to be taken to ensure reactor thermal power is maintained within stated limits following any un-planned event.

Closely monitor thermal power during steady state power operation with the goal of maintaining the one-hour thermal power average at or below the LPL. If the core thermal power average for a one-hour period is found to exceed the LPL, take prompt action specified in Section 5.2.2 to ensure that thermal power is less than or equal to LPL.

The eight hour average is not to exceed LPL.

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5.2.1 Specific Guidance for Controlling Thermal Power (continued)

NOTES

- 1) The 5 and 10-minute average (U211805 and U2118RA) can be of particular value to the operating crew when conducting operations with particular sensitivity to affecting core thermal power. The 5 and 10-minute average are used for trending purposes to allow anticipatory response to changing plant conditions. This can be used as a leading indicator in making decisions for taking prompt action to mitigate rising power conditions.
- 2) The licensed thermal power limit is **NOT** considered to be exceeded when short duration peaks are normal fluctuations inherent in the design of the controlling system as long as the one-hour average (U2125) is at or below the licensed thermal power limit.

- D. **IF** core thermal power one-hour average (U2125) exceeds 3459 MWt or an increasing power trend which will exceed 3459 MWt is observed,
THEN

ENSURE immediate action is taken to decrease reactor power as necessary.

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5.2.2 Reactor Power Limits

NOTE

Due to the calculation method used for U2125 and U2126, the one and eight-hour averages may occasionally change by large amounts. The Operator is responsible for being aware of the entire previous period's trend.

- E. REACTOR THERMAL POWER AVERAGED OVER EIGHT HOURS (U2126) SHALL BE MAINTAINED BELOW 3459 MWT AT ALL TIMES. Routine monitoring of power indications should be used to maintain indicated power at or below 3459 MWT (U2126, NIS Power Indication).
- F. If U2126 exceeds 3459 MWT the Unit SRO shall be notified, Reactor Thermal Power must be reduced below 3459 MWT and the requirements of SPP-3.5, Regulatory Reporting Requirements met.

NOTE

3457 MWT is a value based on steady state plant conditions, trended experience, and equipment operating properly. If equipment conditions change, such that "normal fluctuations change in magnitude or frequency, a new target value should be discussed by shift management, (in consultation with Operations department management). Any new target will be set to ensure sufficient Operating Margin is maintained.

- G. Reactor Thermal Power averaged over one hour (U2125) should be maintained at a target of 3457 MWT.
- H. The Unit SRO shall be notified when Reactor Thermal Power is above 3459 MWT on one-hour average (U2125). Action shall be initiated promptly to ensure power trends to less than or equal to 3459 MWT (U2125).
- I. The Operations Manager should be notified immediately if the one-hour average of core thermal power (U2125) exceeds 3475 MWT.
- J. An SR shall be initiated on any unplanned transient that results in an adverse trend in thermal power. (heater string isolation, MSR isolation, FW reg valve transient, etc)

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5.2.3 Monitoring ICS Instantaneous Reactor Power

NOTE

The input to U1127 automatically toggles between U2118, U1118, and UO484, as conditions warrant.

- A. The ICS Points U2118 series, U2125, U2126 and U1127 series are available for monitoring trends or to alert operators to transient conditions.
- B. When U2118 is identified as being unreliable other available ICS indications and NIS power indications must be used to monitor Reactor Power for compliance with Section 5.2.2. **REFER TO** Section 5.2.4 for the Determination of Reactor Power.
- C. If the LEFM calorimetric is or has been unreliable:
 1. Power operation may continue per Sections 5.2.2, at 100% RTP (3459 MWT) until the next scheduled performance of SR 3.3.1.2. **REFER TO** TRM 3.3.7.
 2. The most limiting of the indications provided in Section 5.2.4 shall be used to determine Reactor Power as applicable to this Section and Section 5.2.2.
 3. Monitoring using U1127 will toggle between LEFM and venturi-based calculations, if available.
 4. Monitoring using U1118 series points, U1125 and U1126 may be available or may become available.

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5.2.4 Determination of Reactor Power

The following should be used on an as needed basis to compensate for a lack of reliable computer data, or as necessary to ensure compliance with Section 5.2.2:

NOTES

- 1) Items A and B are to be used following LEFM failure until the next performance of SR 3.3.1.2.
- 2) Item C may be used for trending when LEFM is failed but the venturi-based calorimetric is good. U1125, U1126 and U1127 series trends will trend down over time following power reduction to ≤ 3411 MWT.

A. For reactor power at or above 50% AND T_{avg} within 0.5°F of T_{ref} , the average NIS Power Range drawer meter readings [1-M-13] (if calibrated per SR 3.3.1.6) shall be used. Do not exceed 102% on valid indicated power.

B. For reactor power below 50% OR T_{avg} **NOT** within 0.5°F of T_{ref} , the higher reading of the following shall be used:

1. The average NIS Power Range drawer meter readings [1-M-13] (if calibrated per SR 3.3.1.6).

OR

2. The average ΔT power readings [1-M-5].

NOTE

U1127 series points should be maintained reliable as they toggle between their applicable inputs U2118 and U1118, however, the LEFM data will be included in the trends.

- C. Following performance of 1-SI-92-1 (SR 3.3.1.2), the trends for U1118, U1125, and U1126 may be available for use to maintain core power at or below 3411 MWT. U1127 series trends may also be used following LEFM data removal from the averages. (e.g. U1127TM may be used 10 minutes after LEFM failure when U1118 calculation is still available.)

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5.3 Voltage Control Monitoring

NOTES

- 1) Bus 1 'B' Phase is the point used to determine WBN 500KV switchyard voltage. This may be monitored using ICS point LG1-1219.
- 2) Transmission Voltage Schedule is to be maintained 525+/-5Kv.

[1] **WHEN** CSST tap changer(s) are in OFF (Pushed In), **OR**

Voltage Schedule can NOT be maintained, **THEN**

[1.1] **RECORD** generator and 500Kv voltage readings on Appendix A.

[1.2] **TRANSMIT** Appendix A to Management Services when completed.

[2] **IF** 500Kv voltage is outside the Transmission Voltage Schedule and cannot be returned to the required voltage, **THEN**

PERFORM the following:

A. **NOTIFY** the Transmission Operator within 30 minutes.

B. **DOCUMENT** the notification in the narrative log.

NOTE

VARs are to be maintained in accordance with section 5.4.

C. **IF** 500Kv voltage is high, **THEN**

ENSURE Main Generator VARs are incoming.

D. **IF** 500Kv voltage is low, **THEN**

ENSURE Main Generator VARs are outgoing.

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5.3 Voltage Control Monitoring (continued)

NOTE

Tap Changers are normally operated in auto but can be operated in manual at SRO discretion. Operation in manual is considered an alternate alignment with respect to the operating requirements and limitations imposed by the WBN grid operating guide. Technical Specification operability is maintained in alternate alignment configuration for CSST Load Tap Changers by ensuring transmission alignments (TRO-TO-SOP-10.130 "WBN Grid Operating Guide") are adequate to ensure minimum voltage requirements are met. The Load Dispatcher shall be notified when the alternate alignments are planned, entered, and exited.

- [3] **WHEN** CSST tap changer(s) have been placed in any of the following alternative alignments:
- 6.9kV Common Board A or B Loads on Alternate Feeders
 - 480V Turbine Building Common Board A or B on Alternate Feeder
 - Common Station Service Transformer C or D Controls on Alternate Feeder
 - Common Station Service Transformer C or D Load Tap Changer Loss of Power or De-energized
 - Common Station Service Transformer C or D Load Tap Changer in OFF or in Manual During Modes 1 - 4

THEN,

NOTIFY Load Dispatcher of the alternative alignment.

- [4] **NOTIFY** Load Dispatcher within 30 minutes when Main Generator Voltage Regulator is **NOT** in automatic.

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5.4 Monitoring Generator Loading

NOTE

If operating the generator with incoming Mvars, ICS alarm(s) should actuate at -90 (LO) and -100 Mvars (LO-LO).

- [1] **ADJUST** 1-HS-57-22, EXCITER VOLTAGE ADJUSTER [1-M-1], to maintain 500kV bus voltage within Load Dispatcher Voltage Schedule.

- [1.1] **IF** the generator is to be operated with incoming Mvars, **THEN**

ENSURE the following parameters are maintained:

- Generator voltage between 22,800 and 24,400 volts.
- Mvar loading no more negative than -100 Mvars by observing 1-EI-57-8, MEGAVARS [1-M-1] or ICS point Q2823A.
- With WBN-SQN #2 and WBN-Roane Lines out of service maximum incoming Mvar limit is -50 Mvars.

- [1.2] **IF** the generator is to be operated with zero or outgoing Mvars, **THEN**

ENSURE the following parameters are maintained:

- Generator voltage between 22,800 and 24,400 volts
- Mvar loading within limits specified by the Generator Capability Curve (See SOI-47.02, Appendix E)

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6.0 PERFORMANCE

6.1 Unit Operator

A minimum of one Control Board (e.g., 1-M-1, 1-M-6, 1-M-26) will be walked down by UO and SRO (US, STA, or SM) each shift (this is in addition to the OPDP-1 requirements).

- A. If any Technical Specification or Technical Requirement parameter is out of limits, then US must be notified immediately.
- B. Tours will be conducted using electronic data recorder at the frequency directed by the Operations Superintendent and when the site network is available. The data recorders contain logic to detect noted and out of limit data, and indicate audibly and visually on the data recorder when data is entered. When the data is transferred to the network database, the abnormal and out of limit data indicate visually when viewed or printed. Noted and out of limit data shall be reviewed by the Unit Supervisor and corrective action taken when required.
- C. When electronic data recording is unavailable, tours will be conducted at the frequency directed by the Operations Superintendent using a printout of the tour as a guideline. The Unit Supervisor will discuss equipment status with the performer and corrective actions taken when required. When electronic recording becomes available, the data should be entered in the database, and the printout discarded.
- D. Service Requests will be written as appropriate.
- E. **IF** a video graphic recorder has not been changed to wrap mode IAW reference J, **THEN**

REMOVE AND REPLACE with a new card when the video graphic recorder's flash card is 90% full and alarms (indicated by a flashing red box on the toolbar at the bottom of the recorder's display screen). The full card will be transmitted to Document Control in accordance with SPP-2.4, "Records Management."

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7.0 RECORDS

7.1 QA Records

Appendix A, 500KV and Generator Voltage Schedule

7.2 Non-QA Records

None

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Attachment 1
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REACTOR THERMAL POWER (RTP) LIMITS AND ACTIONS

LIMIT	VALUE	SOURCE	ACTION
Eight-hour average Reactor Power	3459 MWT (100%)	U2126, NIS Power Indication	RTP shall be maintained at or below 3459 MWT (100% NIS) for any eight-hour period. Notify the SRO if U2126 is greater than 3459 AND reduce RTP below 3459 MWT.
One-hour RTP average	3459 MWT	U2125	If U2125 rises above 3459 MWT. Notify Unit SRO and immediately initiate actions to ensure RTP trends to less than or equal to 3459 MWT.

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**Appendix A
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500Kv And Generator Voltage Schedule

Date _____

NOTE

Readings are to be taken every two hours whenever CSST tap changer hand switches are OFF, or when Voltage Schedule can **NOT** be maintained. For voltage schedule go to the following web site: <http://troweb.cha.tva.gov/VoltageSchedule/>.
The four CSST C & D tap changer hand switches for X and Y windings are located on ECBs 2 and 3 and are normally aligned to PULL-FOR-AUTO.

	500 kV BUS VOLTAGE		GENERATOR UNIT 1 0-EI-245-CB-63B	
TIME	BUS 1 VOLTS (B PHASE)	BUS 2 SECTION 3 VOLTS (B PHASE)	MW (0-ECB-6)	MVAR (0-ECB-6)

DAY SHIFT

0800 ET				
0700 CT				
1000 ET				
0900 CT				
1200 ET				
1100 CT				
1400 ET				
1300 CT				
1600 ET				
1500 CT				
1800 ET				
1700 CT				

NIGHT SHIFT

2000 ET				
1900 CT				
2200 ET				
2100 CT				
0000 ET				
2300 CT				
0200 ET				
0100 CT				
0400 ET				
0300 CT				
0600 ET				
0500 CT				

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**Source Notes
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Requirements Statement	Source Document	Implementing Statement
Both EGTS Δ P controllers were found in A-Auto Standby position.	WBPER960189 (LER 50-390/96010)	C.1
	DELETED	C.2
	DELETED	C.3
	DELETED	C.4
Revise GOs to provide guidance to prevent exceeding (power) limits. Specify instruments to be monitored.	WBPER960260	C.5