

Facility:	Watts Bar December 2011	Scenario No. 1	Op Test No.: 2	
Examiners:	_____	Operators:	_____	SRO
	_____		_____	RO
	_____		_____	BOP
Run Time:	98 minutes			
Initial Conditions:	100% power, BOL. RCS boron is 1031 ppm. Control Bank D is at 220 steps.			
FINAL SUBMITTAL				
Turnover: Train A/Channel I Work Week. 1A-A RHR Pump is out-of-service for motor winding inspection. LCO 3.5.2 and 3.6.6 were entered 10 hours ago. 1A-A RHR pump is expected to be returned to service in 6 hours. Protected equipment signs have been posted for 1B-B RHR pump.				

Event No.	Malf. No.	Event Type*	Event Description
1	rx26g	C- BOP TS-SRO	1-PT-1-27A, SG 4 STM PRESS fails low.
2	rx07a	I-RO TS-SRO	1-PT-68-340A, PZR PRESS fails high.
3	cv09	C-RO	1-LT-62-130 VCT LEVEL fails high.
4	rx24	I-BOP	1-PT-3-1 #1 HTR INLET PRESS fails low.
5	fw16b fw67b	C- BOP	Intermediate Feedwater Heater B-4 develops a leak, causing the heater string to isolate.
		R-RO	RO takes actions to support the rapid load reduction.
		N-BOP/SRO	BOP manipulates Turbine controls in support of the rapid plant shutdown.
6	fw23d	M-ALL	Feedwater line break inside containment on #4 SG fails to 100%.
	rp02b	C-RO	Automatic safety injection fails to actuate.
	ed01 eg02a si08j	C-RO	After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start.
	ms06a 100 ms06b 100 ms06c 100 ms06d 100	M-ALL	MSIVs fail in the open position. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

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

NOTE: DO NOT RUN WITH SCENARIO 2

Scenario 1 - Summary

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

Turnover Train A/Channel I Work Week. 1A-A RHR Pump is out-of-service for motor winding inspection. LCO 3.5.2 and 3.6.6 were entered 10 hours ago. 1A-A RHR pump is expected to be returned to service in 6 hours. Protected equipment signs have been posted for 1B-B RHR pump.

- Event 1** 1-PT-1-27A, SG 4 STM PRESS fails low over 10 seconds. Requires manual control of SG 4 main feedwater regulating valve. Requires entry into AOI-16, "Loss of Normal Feedwater," Section 3.5, "Main FW Reg or Bypass Reg Valve Control Failure." Requires Tech Spec evaluation and entry into LCO 3.3.2 and 3.3.3.
- Event 2** 1-PT-68-340A, PZR PRESS fails high. Requires the RO to take IMMEDIATE OPERATOR ACTION to place 1-PIC-68-340A, PZR PRESS MASTER CONTROL in MANUAL and restore pressure to normal. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," Section 3.1, "Pressure Transient Due to Instrument or Controller Malfunction." Requires a Tech Spec evaluation and entry into LCO 3.3.1, 3.3.2 for multiple Actions.
- Event 3** 1-LT-62-130 VCT LEVEL fails high. Requires entry into ARI 109-A, VCT LEVEL HI/LO. Requires the RO to place 1-LCV-62-118, LETDOWN DIVERT TO HUT in the "VC TK" position. RO uses ICS terminal to assist in the diagnosis of the VCT level transmitter failure.
- Event 4** 1-PT-3-1 #1 HTR INLET PRESS fails low. Requires the BOP to place 1-PC-46-20, MFPT A&B MASTER SPEED CONTROL in MANUAL to restore MFP ΔP to program. Requires entry into AOI-16, "Loss of Normal Feedwater," Section 3.6, "Failure Of MFW Pump Control." Requires manual operation for the duration of the scenario.
- Event 5** Intermediate Feedwater Heater B-4 develops a leak, causing the heater string to isolate. Requires entry into AOI-47, "Heater Drains Malfunction." Requires a rapid load reduction using AOI-47 steps. RO conducts boration to support the load reduction. BOP manipulates Turbine controls in support of the rapid plant shutdown.
- Event 6** Feedwater line break inside containment on #4 SG fails to 100%, causing a reactor trip to occur and an automatic safety injection signal to be generated.
- Automatic safety injection fails to actuate. RO must manually actuate using 1-HS-63-133B SI ACTUATE TR A & B on panel 1-M-4 or 1-HS-63-133A SI ACTUATE TR A & B on panel 1-M-6.
- After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS.
- MSIVs fail in the open position. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

Scenario 1 - Critical Task Summary

Critical Task 1 Energize at least one AC emergency bus before placing safeguards equipment handswitches in the stop, pull-to-lock position.

Critical Task 2 Manually actuate at least one train of safety injection before transition from E-0, "Reactor Trip or Safety Injection."

Watts Bar Nuclear Plant
2011-12 NRC Examination Scenario 1
Simulator Console Operators Instructions

SIMULATOR SETUP INFORMATION

1. ENSURE Examination Security has been established.
2. RESET to Initial Condition 300 by performing the following actions:
 - a. Select ICManger on the THUNDERBAR menu (right hand side of Instructor Console Screen).
 - b. Locate IC# 300.
 - c. Right "click" on IC# 300.
 - d. Select Reset on the drop down menu.
 - e. Right "click" on RESET.
 - f. Enter the password for IC# 300.
 - 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
rh12	fail cnt sump to rhr pmp a fcv-63-72 to any position	M		00:00:00	00:00:00	00:00:00		0	0
rh01a	rhr pump a trip	M		00:00:00	00:00:00	00:00:00		Active	Active
rp02b	auto si initiation signal failure	M		00:00:00	00:00:00	00:00:00		Active	Active
hs-74-10a	hs-74-10a rhr pump a-a motor sw	O		00:00:00	00:00:00	00:00:00		ptlock	ptlock
hs-63-72a-1	01170 rhr pmp aa suct fr cnt smp(green)	O		00:00:00	00:00:00	00:00:00		Off	Off
hs-74-10a-1	01230 hr pump a-a motor switch(green)	O		00:00:00	00:00:00	00:00:00		Off	Off
hs-74-03a-1	01110 hr pump a-a suction(green)	O		00:00:00	00:00:00	00:00:00		Off	Off
hs-74-03a	hs-74-03a rhr pump a-a suction sw	O		00:00:00	00:00:00	00:00:00		close	close

Watts Bar Nuclear Plant
2011-12 NRC Examination Scenario 1
Simulator Console Operators Instructions

SIMULATOR SETUP INFORMATION

Key	Description	Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
ms06a	msiv fails to close fcv-1-4	M		00:00:00	00:00:00	00:00:00		Active	Active
ms06b	msiv fails to close fcv-1-11	M		00:00:00	00:00:00	00:00:00		Active	Active
ms06c	msiv fails to close fcv-1-29	M		00:00:00	00:00:00	00:00:00		Active	Active
ms06d	msiv fails to close fcv-1-22	M		00:00:00	00:00:00	00:00:00		Active	Active
eg02a	diesel generator trip dg 1a-a	M		00:00:00	00:00:00	00:00:00		Active	Active
si08j	failure of auto si and blackout signals dg 1b-b	M		00:00:00	00:00:00	00:00:00		Active	Active
rx26g	stm gen pres transmitter failure, chnl i pt-1-27a	M	1	00:00:00		00:00:10		0	77.6592
ed01	total loss of offsite power	M	19	00:00:00		00:00:00		Active	InActive
rx07a	p2r pressure transmitter fails to position chnl 1 68-340	M	2	00:00:00		00:00:00		100	66.8742
cv09	vcl level transmitter fails to position; 130-a	M	3	00:00:00		00:00:00		100	31.0205
rx24	feed water header pressure transmitter pt-3-1 fail to position	M	4	00:00:00		00:00:00		0	75.539
fw16b	intermediate pressure heater tube failure b-4	M	5	00:00:00		00:00:00		100	0
fw67b	fw htr isolation on htr b2 hi lvl switch 1-ls-6-43d failure	M	5	00:00:00		00:00:00		100	0
fw23d	main feed water break inside containment sg-4	M	6	00:00:00		00:00:00		100	0

5. Place simulator in RUN and acknowledge any alarms.

6. ENSURE 1-HS-74-74-10A RHR PMP A (ECCS) is in the STOP, PULL-TO-LOCK position with a RED Hold Order tag. RED Hold order tags are placed on 1-HS-74-3A, RHR PMP A SUCTION and 1-HS-63-72A, CNTMT SUMP TO RHR PMP A SUCT. A Pink PROTECTED EQUIPMENT TAG is hung on the 1B RHR pump handswitch.

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 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
2011-12 NRC Examination Scenario 1
Simulator Console Operators Instructions

Exam Event No.	Simulator Event No.	Description/Role Play
1	1	1-PT-1-27A, SG 4 STM PRESS fails low. ROLE PLAY: When contacted as Work Control, the Console Operator will acknowledge the request for a repair package for 1-PT-1-27A, SG 4 STM PRESS.
2	2	1-PT-68-340A, PZR PRESS fails high. ROLE PLAY: When contacted as Work Control, repeat back request for removing 1-PT-68-340A, PZR PRESS channel from service. ROLE PLAY: When contacted as Work Control, repeat back request for troubleshooting and repair package for 1-PT-68-340A, PZR PRESS.
3	3	1-LT-62-130 VCT LEVEL fails high. ROLE PLAY: When dispatched to observe level on local 1-LT-62-130 VCT LEVEL, state that level is off-scale high. ROLE PLAY: If/when dispatched to observe level in the Auxiliary Control Room go to THUNDERVIEW cv1 screen and report VCT level. ROLE PLAY: When contacted as Work Control, the Console Operator will acknowledge the request for a repair package for 1-LT-62-130, VCT LEVEL. ROLE PLAY: When dispatched to observe RCP Filter ΔP , wait 5 minutes and report that ΔP is indicating normally at 5 psid.
4	4	1-PT-3-1 #1 HTR INLET PRESS fails low. ROLE PLAY: When contacted as Work Control, acknowledge the request for a repair package for 1-PT-3-1, #1 HTR INLET PRESS. ROLE PLAY: If/when dispatched as the TB AUO, repeat back request to inspect 1-PT-3-1 for leaks. Report back that there are no leaks visible.

Watts Bar Nuclear Plant
2011-12 NRC Examination Scenario 1
Simulator Console Operators Instructions

Exam Event No.	Simulator Event No.	Description/Role Play
5	5	<p>Intermediate Feedwater Heater B-4 develops a leak, causing the heater string to isolate.</p> <p>ROLE PLAY: When dispatched to monitor heater levels, ensure that <i>INSIGHT</i> "heater levels" is OPEN to monitor levels in the feedwater heaters. Report heater levels as displayed.</p> <p>ROLE PLAY: When contacted as Chemistry, repeat back request to perform power change sampling.</p> <p>ROLE PLAY: When contacted as the Load Coordinator, repeat back the information provided.</p> <p>ROLE PLAY: When contacted as the AUO to open 1-IBV-5-501 HTR B4 EXTR STM INLET 1-FCV-5-62, the Console Operator will repeat back the request.</p> <p>ROLE PLAY: When contacted as Work Control to request a troubleshooting and repair package for the intermediate feedwater heaters, repeat back the information.</p>
6	n/a	<p>Feedwater line break inside containment on #4 SG, and MSIVs fail to close</p> <p>ROLE PLAY: When contacted as an AUO to place the MSIV handswitches in the AUX position in the Aux Control Room, the console operator will enter remote function msr26. These actions are contained in E-2, Attachment 1.</p> <p>ROLE PLAY: ECA-2.1 Appendix A will be requested later which contains the same actions. After entering msr26, contact the BOP and state that the switches have been transferred. The BOP may then request that fuses for the MSIVs be pulled. Repeat back request to pull fuses, wait 2 minutes and report back that fuses have been pulled.</p> <p>ROLE PLAY: If AUO dispatch to close #1 FW Htr outlet valves, Console operator will acknowledge the request.</p>
		<p>ROLE PLAY: When contacted as an AUO 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.</p> <p>ROLE PLAY: When contacted as an AUO 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.</p>

Watts Bar Nuclear Plant
2011-12 NRC Examination Scenario 1
Simulator Console Operators Instructions

Exam Event No.	Simulator Event No.	Description/Role Play
		<i>ROLE PLAY: If contacted as an AUO to perform Attachment 4 of E-0, wait 10 minutes and report back that Attachment 4 is complete.</i>
		<i>ROLE PLAY: When contacted as the Shift Manager to evaluate EPIP-1, repeat back the information.</i>
		<i>ROLE PLAY: If contacted as Chemistry, repeat back the request to sample SGs for activity. Wait 10 minutes, then report back that activity is normal.</i>
		<i>ROLE PLAY: If contacted as Rad Protection, repeat back the request to perform surveys of the secondary plant. Wait 10 minutes and report back that there are no indications of abnormal radiation levels.</i>
		<i>ROLE PLAY: When dispatched as an AUO to perform Appendix B of ECA-2.1, CLA Breaker Operation, input remote sir01 and report back that Appendix B of ECA-2.1 is complete.</i>
		<i>ROLE PLAY: When contacted as an AUO, repeat back request to inspect the 1A DG since it failed to start. Report back that the 1A DG (generator) has been damaged. There is smoke in the building, but no fire.</i>

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Event Description: 1-PT-1-27A, SG 4 STM PRESS fails low over 10 seconds. Requires manual control of 1-FCV-3-103 SG 4 MFW REG VLV. Requires entry into AOI-16, "Loss of Normal Feedwater," Section 3.5, "Main FW Reg or Bypass Reg Valve Control Failure." Requires Tech Spec evaluation.

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
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EXAMINER: The Chief Examiner cues the Console Operator to enter Event 1.

Indications:

58-B SG FEEDWATER FLOW HI

63-C SG 4 STM-FW FLOW MISMATCH

63-F SG LEVEL DEVIATION

123-A SG 4 PRESS NEG RATE

119-A SG PRESS LO

1-FCV-3-103 SG 4 - MFW REG VLV indicates valve is closing

	BOP	Diagnoses and announces the failure of 1-PT-1-27A, SG 4 STM PRESS low.
	BOP	May place 1-FIC-3-103 SG 4 - MFW REG VLV in MANUAL to stabilize SG level.
	BOP	May place 1-PC-46-20, MFPT A & B MASTER SPEED CONTROL in MANUAL to stabilize MFW pump speed.
	SRO	Enters and directs actions of AOI-16, "Loss of Normal Feedwater," Section 3.5, "Main FW Reg or Bypass Reg Valve Control Failure."
AOI-16		The following actions are taken from AOI-16, "Loss of Normal Feedwater," Section 3.5, "Main FW Reg or Bypass Reg Valve Control Failure."
	BOP	<p>1. CONTROL failed MFW reg or bypass reg valve in MANUAL to maintain S/G level.</p> <p>BOP places 1-FIC-3-103 SG 4 - MFW REG VLV in MANUAL by lifting the toggle switch up from the AUTO position to the MANUAL position.</p> <p>BOP matches steam and feedwater flow to SG 4 by moving the toggle switch to the right.</p>

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Event Description: 1-PT-1-27A, SG 4 STM PRESS fails low over 10 seconds. Requires manual control of 1-FCV-3-103 SG 4 MFW REG VLV. Requires entry into AOI-16, "Loss of Normal Feedwater," Section 3.5, "Main FW Reg or Bypass Reg Valve Control Failure." Requires Tech Spec evaluation.

**FINAL
SUBMITTAL**

Time	Position	Applicant's Actions or Behavior
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	SRO	2. EVALUATE placing control rods in MANUAL. <i>SRO may direct RO to place 1-RBSS ROD BANK SELECT in MANUAL.</i>
	BOP	3. CHECK MFW pumps recirc valves CLOSED. <i>BOP checks 1-FIC-3-70 MFWP A RECIRC CONTROL and 1-FIC-3-84 MFWP B RECIRC CONTROL CLOSED by observing valve position demand indications on 1-M-3.</i>
<p style="text-align: center;">NOTES</p> <ul style="list-style-type: none"> • Bypass reg. valve may be manually positioned up to 0.85 x 106 lb/hr flow to dampen oscillations in feedwater flow in loop of affected main reg valve. • A power tilt in the affected core quadrant may occur due to arise in bypass flow. Flows above 84,500 lbm/hr in the bypass line will invalidate the value of computer point U1118. 		
	BOP	4. CHECK SG levels on bypass reg valve control. ** GO TO Step 6. <i>BOP determines that the bypass valves are in MANUAL and that this step is N/A.</i>
	BOP	6. CHECK S/G levels returning to PROGRAM. <i>BOP determines that SG levels are returning to program by observing trend on 1-FR-3-103, SG 4.</i>
	BOP	7. MONITOR TDMFW Pump speed normal for current power level.
	BOP	7. RESPONSE NOT OBTAINED: PLACE TDMFW Pump Master Speed Control to MANUAL, THEN ADJUST speed as necessary. <i>BOP places 1-PC-46-20, MFPT A & B MASTER SPEED CONTROL in MANUAL by lifting the toggle switch from the "AUTO" position, and then moving to the right to raise MFP 1A and 1B speed.</i>

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Event Description: 1-PT-1-27A, SG 4 STM PRESS fails low over 10 seconds. Requires manual control of 1-FCV-3-103 SG 4 MFW REG VLV. Requires entry into AOI-16, "Loss of Normal Feedwater," Section 3.5, "Main FW Reg or Bypass Reg Valve Control Failure." Requires Tech Spec evaluation.

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
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NOTE

A LO FW FLOW WTR HAMMER annunciation [59-C] will be received when any main feedwater flow drops to less than 0.75×10^6 lb/hr.

BOP

8. **CHECK** ALL S/G MFW flows greater than 0.55×10^6 lb/hr.

CAUTION

Power range N41 controls S/G 1 and S/G 4 MFW reg valves. Power range N42 controls S/G 2 and S/G 3 MFW reg valves.

NOTE

All power range monitors input to auctioneered high anticipatory circuit for bypass FW reg valves.

RO

9. **CHECK** power range N41 through N44 NORMAL.
RO observes NIS Power Range channels on panel 1-M-4 and determines from 1-NI-41B, PR FLUX % POWER, 1-NI-42B, PR FLUX % POWER, 1-NI-43B, PR FLUX % POWER, 1-NI-44B, PR FLUX % POWER that NIS power range all indicate the same power and are normal.

NOTE

Steps 10 & 11 should end up having the same channel (A or B) selected for steam flow and feed flow on each S/G to ensure a loss of voltage to any one channel will have minimal effect on the affected S/G level.

BOP

10. **CHECK** controlling steam flow Channels NORMAL.
BOP observes that 1-FI-1-28A SG 4 STEAM FLOW is indicating off-scale low.

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Event Description: 1-PT-1-27A, SG 4 STM PRESS fails low over 10 seconds. Requires manual control of 1-FCV-3-103 SG 4 MFW REG VLV. Requires entry into AOI-16, "Loss of Normal Feedwater," Section 3.5, "Main FW Reg or Bypass Reg Valve Control Failure." Requires Tech Spec evaluation.

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
	BOP	<p>10. RESPONSE NOT OBTAINED:</p> <p>a. SELECT operable channel.</p> <p><i>BOP rotates 1-XS-1-28D, SG 4 STM FLOW CONTROL CHANNEL SELECT from FI-1-28A position to the right to the 1-FI-1-28B position.</i></p> <p>b. EVALUATE effect of the failed channel on the MFPs Speed Control and ADJUST in MANUAL as necessary while continuing this section.</p> <p><i>BOP determines a steam flow input to the MFP speed control circuit is failed and that both MFPs are reducing speed. The BOP may have already placed the 1-PC-46-20, TDMFW Pump Master Speed Controller in MANUAL and may make adjustments to raise speed.</i></p>
	BOP	<p>11. CHECK controlling FW flow channels NORMAL.</p> <p><i>BOP observes that FW flow channels are normal.</i></p>
	BOP	<p>12. CHECK press compensation channel(s) NORMAL.</p> <p><i>BOP observes that 1-PI-1-27A SG 4 PRESS is indicating off-scale low.</i></p>

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Event Description: 1-PT-1-27A, SG 4 STM PRESS fails low over 10 seconds. Requires manual control of 1-FCV-3-103 SG 4 MFW REG VLV. Requires entry into AOI-16, "Loss of Normal Feedwater," Section 3.5, "Main FW Reg or Bypass Reg Valve Control Failure." Requires Tech Spec evaluation.

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
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	SRO	<p>12. RESPONSE NOT OBTAINED:</p> <p>REFER TO Tech Specs:</p> <ul style="list-style-type: none"> • 3.3.2, Engineered Safety Feature Actuation System (ESFAS) Instrumentation. <p>Function 1.e, Safety Injection Steam Line Pressure - Low, Condition D, With one channel inoperable, place the channel in trip within 72 hours OR be in Mode 3 within 78 hours AND be in Mode 4 in 84 hours.</p> <p>Function 4.d.1, Steamline Isolation, Condition D, With one channel inoperable, place the channel in trip within 72 hours OR be in Mode 3 within 78 hours AND be in Mode 4 in 84 hours.</p> <ul style="list-style-type: none"> • 3.3.3, Post Accident Monitoring (PAM) Instrumentation. <p>Function 24, SG Pressure, Condition A. With one or more Functions with one required channel inoperable, restore the required channel to OPERABLE status within 30 days.</p> <ul style="list-style-type: none"> • 3.3.4, Remote Shutdown System. Not applicable.
	BOP	<p>13. ENSURE same channel (A or B) selected for steam flow and feed flow on each S/G.</p> <p>BOP ensures that the "B" channel for steam flow and feedwater flow inputs to the SGWLC circuits are selected.</p>
	BOP	<p>14. IF affected S/G controlling channel and level NORMAL, THEN</p> <p>a. RETURN MFW reg valve to AUTO.</p> <p>Returns 1-FIC-3-103, SG 4- REG VLV to AUTO after balancing input signals. Automatic is selected by lowering the toggle switch from the MANUAL position to the AUTO position.</p> <p>b. RETURN TDMFWP Speed Control to AUTO (if in MANUAL).</p> <p>If placed in MANUAL, the BOP returns 1-PC-46-20, TDMFW Pump Master Speed Controller to AUTO after balancing input signals. Automatic is selected by lowering the toggle switch from the MANUAL position to the AUTO position.</p>

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Event Description: 1-PT-1-27A, SG 4 STM PRESS fails low over 10 seconds. Requires manual control of 1-FCV-3-103 SG 4 MFW REG VLV. Requires entry into AOI-16, "Loss of Normal Feedwater," Section 3.5, "Main FW Reg or Bypass Reg Valve Control Failure." Requires Tech Spec evaluation.

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
	SRO	<p>15. WHEN conditions allow auto rod control, THEN</p> <p>a. (p) ENSURE T-avg and T-ref within 1°F.</p> <p>b. ENSURE zero demand on control rod position indication [1-M-4].</p> <p>c. PLACE rods in AUTO.</p> <p><i>After adjusting control rods to match Tavg and Tref within 1°F, RO places 1-RBSS ROD BANK SELECT in AUTO.</i></p>
	SRO	<p>16. INITIATE repairs to failed equipment.</p> <p><i>When contacted as Work Control, the Console Operator will acknowledge the request for a repair package for 1-PT-1-27A, SG 4 STM PRESS.</i></p>
	SRO	17. RETURN TO Instruction in effect.
<p>EXAMINER: ENTER EVENT 2 AFTER FEEDWATER CONTROLS (MFP AND MFW REG VALVES) HAVE BEEN RETURNED TO AUTOMATIC.</p> <p>Chief Examiner will cue the Console Operator to enter Event 2.</p>		
<p>EXAMINER: The crew briefing is optional. The next event, Event 2, may be entered prior to the brief at the discretion of the Chief Examiner.</p>		
	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>

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Event Description: 1-PT-1-27A, SG 4 STM PRESS fails low over 10 seconds. Requires manual control of 1-FCV-3-103 SG 4 MFW REG VLV. Requires entry into AOI-16, "Loss of Normal Feedwater," Section 3.5, "Main FW Reg or Bypass Reg Valve Control Failure." Requires Tech Spec evaluation.

**FINAL
SUBMITTAL**

Time

Position

Applicant's Actions or Behavior

If not already cued, Console Operator will check with the Chief Examiner prior to inserting Event 2.

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Event Description: 1-PT-68-340A, PZR PRESS fails high. Requires the RO to take IMMEDIATE OPERATOR ACTION to place 1-PIC-68-340A, PZR PRESS MASTER CONTROL in MANUAL and restore pressure to normal. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," Sub section 3.1, "Pressure Transient Due to Instrument or Controller Malfunction." Requires a Tech Spec evaluation.

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
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Indications:

90-A, PZR PRESS HI

124-B PZR PRESS HI

	RO	Will perform IMMEDIATE ACTION step of AOI-18, "Malfunction of Pressurizer Pressure Control System," Section 3.1, "Pressure transient due to Instrument or Controller Malfunction." to PLACE PZR master controller 1-PIC-68-340A in MANUAL and RESTORE press to normal.
	SRO	Enters and direct actions of AOI-18, "Malfunction of Pressurizer Pressure Control System," Section 3.1, "Pressure transient due to Instrument or Controller Malfunction."
AOI-18		The following actions are taken from AOI-18, "Malfunction of Pressurizer Pressure Control System," Section 3.1, "Pressure transient due to Instrument or Controller Malfunction."
NOTE		
Step 1 is an IMMEDIATE ACTION step.		
	RO	1. CHECK PZR pressure STABLE or TRENDING to desired pressure: <i>1-PI-68-340A pressure indicator will be indicating 2500 psig, and the remaining pressure indicators will indicate pressure dropping.</i>

Op Test No.: 2 Scenario # 1 Event # 2 Page 9 of 43

Event Description: 1-PT-68-340A, PZR PRESS fails high. Requires the RO to take IMMEDIATE OPERATOR ACTION to place 1-PIC-68-340A, PZR PRESS MASTER CONTROL in MANUAL and restore pressure to normal. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," Sub section 3.1, "Pressure Transient Due to Instrument or Controller Malfunction." Requires a Tech Spec evaluation.

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
	RO	<p>1. RESPONSE NOT OBTAINED:</p> <p>PLACE PZR master controller 1-PIC-68-340A in MANUAL and RESTORE press to normal.</p> <p><i>These actions may have already been taken by the RO to stabilize PZR pressure.</i></p> <p><i>Places 1-PIC-68-340A, PZR PRESS MASTER CONTROL in MANUAL by lifting the toggle switch up from the AUTO position to the MANUAL position.</i></p> <p><i>Since the failure caused the controller output to lower in AUTO, the output must be raised by moving the toggle switch to the left and observing pressure response.</i></p> <p>IF PZR pressure drop due failed PORV/Safety or Spray valve, THEN **GO TO Section 3.2.</p>
	RO	<p>2. ENSURE 1-XS-68-340D selected to OPERABLE channels for control and backup:</p> <ul style="list-style-type: none"> • PT-68-340 & 334 <p>OR</p> <ul style="list-style-type: none"> • PT-68-334 & 323 <p>OR</p> <ul style="list-style-type: none"> • PT-68-340 & 322 <p><i>RO determines that 1-XS-68-340D is selected to the PT-68-340 & 334 position, and that 1-PT-68-340 has failed.</i></p> <p><i>RO selects PT-68-334 B323 position on 1-XS-68-340D, PZR PRESS CONTROL CHANNEL SELECT.</i></p>
	RO	<p>3. CHECK PZR press STABLE or RISING.</p> <p><i>RO checks PZR press STABLE or RISING.</i></p>

Op Test No.: 2 Scenario # 1 Event # 2 Page 10 of 43

Event Description: 1-PT-68-340A, PZR PRESS fails high. Requires the RO to take IMMEDIATE OPERATOR ACTION to place 1-PIC-68-340A, PZR PRESS MASTER CONTROL in MANUAL and restore pressure to normal. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," Sub section 3.1, "Pressure Transient Due to Instrument or Controller Malfunction." Requires a Tech Spec evaluation.

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
	RO	4. DETERMINE if PZR heaters and sprays are operating properly: a. CHECK master control controlling sprays and heaters. b. CHECK PZR press greater than 2250 psig.
	RO	4.b. RESPONSE NOT OBTAINED: WHEN PZR press is greater than 2250 psig, THEN PERFORM Step 4.c.
	RO	c. ENSURE all PZR heaters OFF d. ENSURE PZR sprays maintain RCS press on program. <i>RO verifies PZR heaters and sprays responding properly to manual control of PZR press master controller.</i>
	RO	5. ENSURE operable channel selected for recording with 1-XS-68-340B. <i>Selector switch 1-XS-68-340B does not have to be repositioned.</i>
	RO	6. ENSURE TR-68-2A placed to operable channel using 1-XS-68-2B, ΔT RCDR TR-68-2A LOOP SELECT [1-M-5]. <i>Selector switch 1-XS-68-2B must be moved from the Loop 1 position to any other Loop position.</i>
	RO	7. CHECK PZR level at or trending to PROGRAM. <i>RO CHECKS PZR level is on program.</i>
	SRO	8. NOTIFY Work Control to remove any failed channel from service and repair any failed controllers. <i>SRO contacts Work Control and Console Operator repeats back request for removing 1-PT-68-340A, PZR PRESS channel from service.</i>

Op Test No.: 2 Scenario # 1 Event # 2 Page 11 of 43

Event Description: 1-PT-68-340A, PZR PRESS fails high. Requires the RO to take IMMEDIATE OPERATOR ACTION to place 1-PIC-68-340A, PZR PRESS MASTER CONTROL in MANUAL and restore pressure to normal. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," Sub section 3.1, "Pressure Transient Due to Instrument or Controller Malfunction." Requires a Tech Spec evaluation.

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
	RO	<p>9. WHEN pressurizer pressure stable and equipment status supports returned to normal, THEN ENSURE the following in AUTO:</p> <ul style="list-style-type: none"> • PZR Master controller • PZR spray controllers • All heater groups <p>RO will stabilize RCS pressure, then request permission to return 1-PIC-68-340A to AUTO.</p> <p>Returns 1-PIC-68-340A, PZR PRESS MASTER CONTROL to AUTO. Automatic is selected by lowering the toggle switch from the MANUAL position to the AUTO position.</p>
	SRO	<p>10. REFER TO the following Tech Specs:</p> <p>a. 3.3.1, RTS Instrumentation.</p> <p>Function 6, OTΔT, Condition W, With one channel inoperable, place the channel in trip within 72 hours OR be in Mode 3 within 78 hours.</p> <p>Function 8.a, Low Pressure, Condition X, With one channel inoperable, place the channel in trip within 72 hours OR reduce THERMAL POWER to <P-7 within 78 hours.</p> <p>Function 8.b, High Pressure, Condition W, With one channel inoperable, place the channel in trip within 72 hours OR be in Mode 3 within 78 hours.</p>

Op Test No.: 2 Scenario # 1 Event # 2 Page 12 of 43

Event Description: 1-PT-68-340A, PZR PRESS fails high. Requires the RO to take IMMEDIATE OPERATOR ACTION to place 1-PIC-68-340A, PZR PRESS MASTER CONTROL in MANUAL and restore pressure to normal. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," Sub section 3.1, "Pressure Transient Due to Instrument or Controller Malfunction." Requires a Tech Spec evaluation.

**FINAL
SUBMITTAL**

Time	Position	Applicant's Actions or Behavior
	SRO	<p>10. REFER TO the following Tech Specs: (Continued.)</p> <p>b. 3.3.2, Engineered Safety Feature Actuation System (ESFAS) Instrumentation.</p> <p>Function 1.d, Pressurizer Pressure - Low, Condition D, With one channel inoperable, place the channel in trip within 72 hours OR be in Mode 3 within 78 hours AND be in Mode 4 in 84 hours.</p> <p>Function 8.b, P-11,</p> <p>(1) Unblock (Auto Reset of SI Block)</p> <p>(2) Enable Manual Block of SI</p> <p>Condition L, With one P-11 interlock channel inoperable, verify the interlock is in required state for existing unit conditions OR be in Mode 3 in 7 hours AND be in Mode 4 in 13 hours.</p> <p>c. 3.3.4, Remote Shutdown System. Not Applicable</p> <p>d. 3.4.1, RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits.</p> <p>Applicable if the initial transient caused a pressure drop to less than 2214 psig.</p> <p>e. 3.4.3, RCS Pressure and Temperature (P/T) Limits. Not Applicable</p> <p>f. 3.4.9, Pressurizer. Not Applicable</p> <p>g. 3.4.10, Pressurizer Safety Valves. Not Applicable</p> <p>h. 3.4.11, Pressurizer Power - Operated Relief Valves. Not Applicable</p>
	SRO	<p>11. INITIATE repairs to failed equipment.</p> <p>When contacted as Work Control, the Console Operator will repeat back request to prepare a package to troubleshoot and repair 1-PT-68-340A.</p>
	SRO	12. RETURN TO Instruction in effect.

Op Test No.: 2 Scenario # 1 Event # 2 Page 13 of 43

Event Description: 1-PT-68-340A, PZR PRESS fails high. Requires the RO to take IMMEDIATE OPERATOR ACTION to place 1-PIC-68-340A, PZR PRESS MASTER CONTROL in MANUAL and restore pressure to normal. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," Sub section 3.1, "Pressure Transient Due to Instrument or Controller Malfunction." Requires a Tech Spec evaluation.

**FINAL
SUBMITTAL**

Time

Position

Applicant's Actions or Behavior

EXAMINER: The crew briefing is optional. The next event, Event 3, may be entered prior to the brief, at the discretion of the Chief Examiner.

SRO

Crew Brief would typically be conducted for this event as time allows prior to the next event.

SRO

Notifications should be addressed as applicable if not specifically addressed by the procedure or in the crew brief.

Operations Management - Typically Shift Manager.

Maintenance Personnel - Typically Work Control Center (WCC).

(**Note:** Maintenance notification may be delegated to the Shift Manager).

If not already cued, Console Operator will check with the Chief Examiner prior to inserting Event 3.

Op Test No.: 2 Scenario # 1 Event # 3 Page 14 of 43

Event Description: 1-LT-62-130 VCT LEVEL fails high. Requires entry into ARI 109-A, VCT LEVEL HI/LO. Requires the RO to place 1-LCV-62-118, LETDOWN DIVERT TO HUT in the "VC TK" position.

**FINAL
SUBMITTAL**

Time	Position	Applicant's Actions or Behavior
<p>Indications:</p> <p>109-A, VCT LEVEL HI/LO</p> <p>1-HS-62-118A, LETDOWN DIVERT TO HUT RED indicating light below the HUT label LIT</p> <p>1-LI-62-129, VCT LEVEL indication slowly dropping.</p>		
	RO	Diagnoses and announces failure of 1-LT-62-130, VCT LEVEL.
	RO	May place 1-HS-62-118A in the "VC TK" position to stop VCT level from dropping.
	RO	Performs actions of ARI 109-A, VCT LEVEL HI/LO.
	SRO	May enter and direct actions of ARI 109-A, VCT LEVEL HI/LO.
ARI 109-A		The following actions are taken from ARI 109-A, VCT LEVEL HI/LO.
CAUTIONS		
<p>1) If either VCT level transmitter fails high, then auto swap over to RWST on low level is disabled.</p> <p>2) 1-LT-62-129A failing high will divert letdown flow but will NOT prevent auto makeup. 1-LI-62-129 will indicate offscale high; however computer point LO112A will indicate actual level.</p> <p>3) 1-LT-62-130A failing high will divert letdown and prevent auto makeup, however, 1-LI-62-129 will indicate actual level.</p>		
	RO	<p>[1] IF high level, THEN:</p> <p>[1.1] ENSURE 1-LCV-62-118 diverted to HUT and OPEN.</p> <p>[1.2] ENSURE NO VCT makeup in progress.</p> <p>RO determines from the RED indicating light for the HUT is LIT on 1-HS-62-118A, LETDOWN DIVERT TO HUT that letdown is diverted to the HUT.</p>

Op Test No.: 2 Scenario # 1 Event # 3 Page 15 of 43

Event Description: 1-LT-62-130 VCT LEVEL fails high. Requires entry into ARI 109-A, VCT LEVEL HI/LO. Requires the RO to place 1-LCV-62-118, LETDOWN DIVERT TO HUT in the "VC TK" position.

**FINAL
SUBMITTAL**

Time	Position	Applicant's Actions or Behavior
	RO	<p>[2] IF low level, THEN:</p> <ul style="list-style-type: none"> • ENSURE 1-LCV-62-118 aligned to VCT. • INITIATE makeup in accordance with SOI-62.02, BORON CONCENTRATION CONTROL. • ENSURE suction to the Centrifugal Charging Pump swaps over to the RWST at 7% VCT level. <p><i>If/When dispatched to observe level on local 1-LT-62-130 VCT LEVEL, state that level is off-scale high.</i></p> <p><i>If/when dispatched to observe level in the Auxiliary Control Room, go to THUNDERVIEW cv1 screen and report VCT level.</i></p>
	RO	<p>[3] VERIFY letdown and charging in service and that Reactor Coolant Filter is NOT clogged.</p>
	RO	<p>[4] IF 1-LCV-62-118 diverted to HUT due to instrument failure, THEN:</p> <p>[4.1] PLACE 1-HS-62-118 in VCT position until repairs complete. <i>RO rotates 1-HS-62-118, LETDOWN DIVERT TO HUT to the left to the VC TK position, and observes the RED indicating light for the VCT is LIT and the RED indicating for the HUT is DARK.</i></p> <p>[4.2] PLACE 1-HS-62-118 in P-AUTO position once repairs completed.</p> <p><i>1-HS-62-118, LETDOWN DIVERT TO HUT will be maintained in the VCT position for the duration of the scenario.</i></p>
	RO	<p>[5] IF RCS leakage is suspected, THEN GO TO AOI-6, SMALL REACTOR COOLANT SYSTEM LEAK.</p> <p><i>Leakage is not indicated, so this step is N/A.</i></p>
	SRO	<p>May contact Work Control to INITIATE repairs to failed equipment.</p> <p><i>When contacted as Work Control, the Console Operator will repeat back request to prepare a package to troubleshoot and repair 1-LT-62-130.</i></p>

Op Test No.: <u>2</u> Scenario # <u>1</u> Event # <u>3</u> Page <u>16</u> of <u>43</u>		
Event Description: 1-LT-62-130 VCT LEVEL fails high. Requires entry into ARI 109-A, VCT LEVEL HI/LO. Requires the RO to place 1-LCV-62-118, LETDOWN DIVERT TO HUT in the "VC TK" position. <div style="text-align: center;">FINAL SUBMITTAL</div>		
Time	Position	Applicant's Actions or Behavior
EXAMINER: The crew briefing is optional. The next event, Event 4, may be entered prior to the brief, at the discretion of the Chief Examiner.		
	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).
If not already cued, Console Operator will check with the Chief Examiner prior to inserting Event 4.		

Op Test No.: 2 Scenario # 1 Event # 4 Page 17 of 43

Event Description: 1-PT-3-1 #1 HTR INLET PRESS fails low. Requires the BOP to place 1-PC-46-20, MFPT A&B MASTER SPEED CONTROL in MANUAL to restore MFP ΔP to program. Requires entry into AOI-16, Requires entry into AOI-16, "Loss of Normal Feedwater," Section 3.6, "MFW pump speed control circuit failure." Requires manual operation for the duration of the scenario

FINAL SUBMITTAL

Position	Applicant's Actions or Behavior
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Indications:

57-B #1 FW HTR INLET SUPPLY PRESS HI

63-F SG LEVEL DEVIATION

1-PI-3-1 #1 HTR INLET PRESS dropping

1-SI-46-20A MFPT A SPEED rising

1-SI-46-20B MFPT B SPEED rising

ALL Main Feedwater Reg valves closing

	BOP	Diagnoses and announces the failure of 1-PT-3-1, #1 HTR INLET PRESS low.
	BOP	BOP may place 1-PC-46-20, MFPT A & B MASTER SPEED CONTROL, in MANUAL and lower MFPT speed.
	SRO	Enters and directs actions of AOI-16, "Loss of Normal Feedwater," Section 3.6, "MFW pump speed control circuit failure."
AOI-16		The following actions are taken from AOI-16, "Loss of Normal Feedwater," Section 3.6, "MFW pump speed control circuit failure."
	BOP	1. CONTROL MFP speed using MANUAL control of master controller or individual controller(s) as required. . BOP places 1-PC-46-20, MFPT A & B MASTER SPEED CONTROL in MANUAL by lifting the toggle switch from the "AUTO" position, and then move to the left to lower MFP 1A and 1B speed
	RO	2. PLACE control rods in MANUAL. SRO directs the RO to place 1-RBSS ROD BANK SELECT in MANUAL.

Op Test No.: 2 Scenario # 1 Event # 4 Page 18 of 43

Event Description: 1-PT-3-1 #1 HTR INLET PRESS fails low. Requires the BOP to place 1-PC-46-20, MFPT A&B MASTER SPEED CONTROL in MANUAL to restore MFP ΔP to program. Requires entry into AOI-16, Requires entry into AOI-16, "Loss of Normal Feedwater," Section 3.6, "MFW pump speed control circuit failure." Requires manual operation for the duration of the scenario

FINAL SUBMITTAL

	Position	Applicant's Actions or Behavior
	BOP	3. CHECK MFW pumps recirc valves CLOSED. <i>BOP checks 1-FIC-3-70 MFWP A RECIRC CONTROL and 1-FIC-3-84 MFWP B RECIRC CONTROL CLOSED by observing valve position demand indications.</i>
	RO	4. (p) ENSURE T-avg and T-ref within 3°. <i>RO observes Tref-Auct Tavg on 1-TR-68-2B and determines that Auct T-avg and T-ref are within 3°F.</i>
	BOP	5. MAINTAIN MFWP discharge press on PROGRAM. <i>BOP may adjust 1-PC-46-20, MFPT A & B MASTER SPEED CONTROL in MANUAL to return MFWP discharge pressure to program (1-FC-46-20 provides program.)</i>
	BOP	6. ENSURE S/G levels return to PROGRAM. <i>BOP observes SG 1 through SG 4 levels on 1-M-4 instruments and determines that levels are returning to normal.</i>
	BOP	7. CHECK steam dump mode in TAVG position. <i>BOP determines that 1-HS-1-103D STEAM DUMP MODE is in the "T AVG" position.</i>
	SRO	8. INITIATE repairs to failed equipment. <i>When contacted as Work Control, the Console Operator will acknowledge the request for a repair package for 1-PT-3-1, #1 HTR INLET PRESS.</i>

Op Test No.: 2 Scenario # 1 Event # 4 Page 19 of 43

Event Description: 1-PT-3-1 #1 HTR INLET PRESS fails low. Requires the BOP to place 1-PC-46-20, MFPT A&B MASTER SPEED CONTROL in MANUAL to restore MFP ΔP to program. Requires entry into AOI-16, Requires entry into AOI-16, "Loss of Normal Feedwater," Section 3.6, "MFW pump speed control circuit failure." Requires manual operation for the duration of the scenario

**FINAL
SUBMITTAL**

	Position	Applicant's Actions or Behavior
	RO	<p>9. WHEN conditions allow auto rod control, THEN</p> <p>a. (p) ENSURE T-avg and T-ref within 1°F.</p> <p><i>RO observes T-avg and T-ref within 1°F on 1-TR-68-2B, TREF & AUCT TAVG - °F.</i></p> <p>b. ENSURE zero demand on control rod position indication [1-M-4].</p> <p><i>RO observes that there is a zero demand indicated on the PASSIVE SUMMER ROD DEMAND on both CERPI displays.</i></p> <p>c. PLACE rods in AUTO.</p> <p><i>RO rotates 1-RBSS from the MANUAL position to the right to the AUTO position.</i></p>
	SRO	<p>10. WHEN MFP pump control repairs completed, THEN PLACE MFP speed control in AUTO.</p> <p><i>SRO determines that 1-PC-46-20, MFPT A & B MASTER SPEED CONTROL must remain in MANUAL.</i></p>
	SRO	<p>11. RETURN TO Instruction in effect.</p> <p><i>SRO determines that the procedure section will remain open until repairs are complete.</i></p>
<p>EXAMINER: The crew briefing is optional. The next event, Event 5, may be entered prior to the brief, at the discretion of the Chief Examiner.</p>		
	SRO	<p>Crew Brief would typically be conducted for this event as time allows prior to the next event.</p>

Op Test No.: 2 Scenario # 1 Event # 4 Page 20 of 43

Event Description: 1-PT-3-1 #1 HTR INLET PRESS fails low. Requires the BOP to place 1-PC-46-20, MFPT A&B MASTER SPEED CONTROL in MANUAL to restore MFP ΔP to program. Requires entry into AOI-16, Requires entry into AOI-16, "Loss of Normal Feedwater," Section 3.6, "MFW pump speed control circuit failure." Requires manual operation for the duration of the scenario

**FINAL
SUBMITTAL**

	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>
If not already cued, Console Operator will check with the Chief Examiner prior to inserting Event 5.		

Op Test No.: 2 Scenario # 1 Event # 5 Page 21 of 43

Event Description: Intermediate Feedwater Heater B4 develops a leak, causing the heater string to isolate. Requires entry into AOI-47, "Heater Drains Malfunction." Requires a rapid load reduction using AOI-47 steps.

**FINAL
SUBMITTAL**

Time	Position	Applicant's Actions or Behavior
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Indications:

36-B HEATER A2 LEVEL HI/LO

37-A HP HEATER B1 LEVEL HI/LO

37-C HEATER B-4 LEVEL HI/LO

38-B HEATER C2 LEVEL HI/LO

63-F SG LEVEL DEVIATION

	BOP	Diagnoses and announces B4 heater level high.
	BOP	Diagnoses and announces the isolation of the "B" string of intermediate pressure heaters.
	BOP	May dispatch AUO to investigate B4 heater level.
	SRO	Enters and directs actions of AOI-47, "Heater Drains Malfunctions," Section 3.2, "Intermediate Heater String Isolation Above 76% Power."

ARI 37-C

The following actions are taken from ARI 37-C HEATER B-4 LEVEL HI/LO.

CAUTION

Intermediate Heater String Isolation above 76% power may result in unit trip if actions of AOI-47 are not performed promptly.

NOTE

Heater B2, B3 and B4 isolation will occur if level reaches 34" above normal for 5 seconds, as seen by 1-LS-6-147D. If this occurs, Condensate inlet to B4 heater and outlet from B2 will close, extraction steam isolation valves to B2, B3 and B4 heaters will close and the extraction steam non-return valve to all #2, all #3 and B4 heaters will unload. Level control valve from B1 heater to B2 will close and #3 heater drain pumps discharge valve to B2 heater will close.

	SRO	[1] IF heater string isolation occurs above 76% power, THEN IMMEDIATELY GO TO AOI-47, Heater Drain Malfunction.
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Op Test No.: 2 Scenario # 1 Event # 5 Page 22 of 43

Event Description: Intermediate Feedwater Heater B4 develops a leak, causing the heater string to isolate. Requires entry into AOI-47, "Heater Drains Malfunction." Requires a rapid load reduction using AOI-47 steps.

**FINAL
SUBMITTAL**

Time	Position	Applicant's Actions or Behavior
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AOI-47

The following actions are taken from AOI-47, "Heater Drains Malfunction," Section 3.2, "Intermediate Heater String Isolation Above 76% Power."

CAUTION

- The Standby Main Feed Pump (SBMFP) should be removed from service as soon as practicable to preclude MFP suction pressure dropping below 250 psig (with no operator action this could occur in as little as 1.5 minutes).
- Unit load should be lowered without delay due to the potential loss of all normal feedwater upon automatic isolation of the remaining heater strings.

	BOP	<p>1. ENSURE affected heater string isolation complete.</p> <ul style="list-style-type: none"> • Condensate inlet isolation valve CLOSED <p>BOP observes that 1-HS-2-130A B4 HEATER INLET is CLOSED by RED indicating light DARK and GREEN indicating light is LIT.</p> <ul style="list-style-type: none"> • Condensate outlet isolation valve CLOSED <p>BOP observes that 1-HS-2-147A B2 HEATER OUTLET is CLOSED by RED indicating light DARK and GREEN indicating light is LIT.</p> <ul style="list-style-type: none"> • Extraction steam isolation valve CLOSED. <p>BOP observes that 1-HS-5-32A HEATER B2 EXTRACTION STM, 1-HS-5-42A B3 HEATER EXTRACTION STM, and 1-HS-5-62A, B4 HEATER EXTRACTION STM, are CLOSED by RED indicating lights DARK and GREEN indicating lights is LIT.</p>
	BOP	<p>2. MONITOR that ONLY ONE heater string isolation, has been initiated.</p> <p>BOP observes that the "A" and "C" intermediate heater strings remain in service.</p>
	BOP	<p>3. CHECK both MFPs in operation.</p> <p>BOP observes that both MFPs are in service.</p>

Op Test No.: <u>2</u> Scenario # <u>1</u> Event # <u>5</u> Page <u>23</u> of <u>43</u>		
Event Description: Intermediate Feedwater Heater B4 develops a leak, causing the heater string to isolate. Requires entry into AOI-47, "Heater Drains Malfunction." Requires a rapid load reduction using AOI-47 steps.		
FINAL SUBMITTAL		
Time	Position	Applicant's Actions or Behavior

	BOP	4. VERIFY SBMFP shutdown. <i>BOP observes that the SBMFP was not in service.</i>
NOTE		
Condenser Backpressure limits may be displayed on ICS, turn-on code AOI11.		
	BOP	5. ESTABLISH a turbine load reduction, to less than or equal to 76% power, at a rate greater than or equal to 2%/min, and less than 5%/min: a. PLACE turbine in IMP IN. <i>BOP depresses the "IMP IN" pushbutton and observes the transfer from "IMP OUT" to "IMP IN" control complete.</i> b. SET a desired load in the SETTER with the REFERENCE CONTROL. <i>BOP depresses the reference control ∇ (down) button to reduce the setter display to less than 76% load as directed by the SRO.</i> c. SET the LOAD RATE at greater than or equal to 2%/min, and less than 5%/min. <i>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.</i> d. DEPRESS GO pushbutton. <i>BOP depresses the REFERENCE CONTROL "GO" button.</i>
EXAMINER: A copy of the Reactivity Briefing Sheet which addresses the boration flow rate and volume is contained in Attachment 1.		

Op Test No.: 2 Scenario # 1 Event # 5 Page 24 of 43

Event Description: Intermediate Feedwater Heater B4 develops a leak, causing the heater string to isolate. Requires entry into AOI-47, "Heater Drains Malfunction." Requires a rapid load reduction using AOI-47 steps.

**FINAL
SUBMITTAL**

Time	Position	Applicant's Actions or Behavior
	RO	<p>6. INITIATE a manual boration:</p> <p>a. DETERMINE recommended boration flow rate and volume from Reactivity Briefing Sheet:</p> <p><i>RO determines the recommended boration flow rate to be 40 gpm and the volume to add to be 369 gallons of boron.</i></p> <p>b. INITIATE normal boration:</p> <p>1) ADJUST BA flow controller, 1-FC-62-139, to desired flow rate.</p> <p><i>RO adjusts 1-FC-62-139 to the value corresponding to the flow rate for the selected load reduction rate.</i></p> <p>2) ADJUST BA batch counter 1-FQ-62-139 to required quantity.</p> <p><i>RO adjusts 1-FQ-62-139 BA BATCH COUNTER as follows:</i></p> <ol style="list-style-type: none"> <i>1. Depresses and holds the black pushbutton.</i> <i>2. While holding the pushbutton, the applicant raises the red translucent cover.</i> <i>3. While still holding the pushbutton, the applicant enters "000369" in the display.</i> <i>4. While still holding the pushbutton, the applicant lowers the red translucent cover, and then releases the pushbutton.</i> <p>3) PLACE mode selector 1-HS-62-140B to BOR.</p> <p><i>RO rotates 1-HS-62-140B VCT MAKEUP MODE from AUTO to the right to BOR position.</i></p> <p>4) (p) PLACE VCT makeup control 1-HS-62-140A, to START.</p> <p><i>RO rotates 1-HS-62-140A, VCT MAKEUP CONTROL to the right to the START position.</i></p> <p>5) VERIFY desired boric acid flow indicated on 1-FI-62-139.</p> <p><i>RO observes the appropriate flow rate on 1-FI-62-139, BA TO BLENDER FLOW.</i></p>

Op Test No.: 2 Scenario # 1 Event # 5 Page 25 of 43

Event Description: Intermediate Feedwater Heater B4 develops a leak, causing the heater string to isolate. Requires entry into AOI-47, "Heater Drains Malfunction." Requires a rapid load reduction using AOI-47 steps.

**FINAL
SUBMITTAL**

Time	Position	Applicant's Actions or Behavior
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	BOP	7. DISPATCH personnel to monitor levels for #1, #2, and #4 FWHTs, and #3 HDT. <i>When the BOP dispatches AUOs to monitor heater and heater drain tank levels, the Console Operator will use INSIGHT file "heaters", and THUNDERVIEW page fw6 to observe levels.</i>
	SRO	8. WHEN reactor power less than or equal to less than or equal to 910 MWe (76%), THEN STOP load reduction.
	SRO	9. WHEN rated thermal power change exceeds 15% in one hour, THEN NOTIFY Chemistry to initiate 1-SI-68-28. <i>When the SRO contacts Chemistry, the Console Operator will repeat back the request.</i>
	SRO	10. NOTIFY the Load Coordinator of the required load reduction and expected ramp rate. <i>When the SRO contacts Load Coordinator, the Console Operator will repeat back the information provided. SRO may contact the Shift Manager to make notifications.</i>
	RO	11. MONITOR rod position: Rods above Lo-Lo insertion limit AFD within Target Band
	RO	12. MONITOR Tavg and Tref: Tavg trending to Tref. Mismatch less than 5°F.
	BOP	13. MAINTAIN SG levels on program or trending toward program levels.

NOTE

The bypass around the extraction steam isolation valve is opened to prevent water hammer caused by condensate accumulating in the line above it. However, it is not opened if the #4 FWHT has a high level.

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Event Description: Intermediate Feedwater Heater B4 develops a leak, causing the heater string to isolate. Requires entry into AOI-47, "Heater Drains Malfunction." Requires a rapid load reduction using AOI-47 steps.

**FINAL
SUBMITTAL**

Time	Position	Applicant's Actions or Behavior
	BOP	<p>14. CHECK affected isolated #4 FWHT level stable or trending to less than 15 inches on local sightgauge.</p> <p><i>When the BOP contacts the AUO for #4 feedwater heater level, the Console Operator will report current level displayed on the INSIGHT file.</i></p>
	BOP	<p>15. LOCALLY OPEN the bypass around the extraction isolation valve for the affected isolated #4 FWHT:</p> <ul style="list-style-type: none"> • 1-IBV-5-500, CNDS HTR A4 EXTR STM INLET 1-FCV-5-54 BYP [T1F/729] • 1-IBV-5-501, CNDS HTR B4 EXTR STM INLET 1-FCV-5-62 BYP [T2G/729] • 1-IBV-5-502, CNDS HTR C4 EXTR STM INLET 1-FCV-5-70 BYP [T2F/729] <p><i>When the BOP contacts the AUO to locally open 1-IBV-5-501, HTR B4 EXTR STM INLET 1-FCV-5-62, the Console Operator will repeat back the request.</i></p>
	BOP	<p>16. EVALUATE use of normal level control valves' bypass valves (X) operation to assist in maintaining #2 FWHT levels (refer to SOI-5&6.01 as necessary).</p>
	SRO	<p>17. IF SBMFP was stopped in this AOI, THEN PERFORM applicable section and steps SOI-2&3.01, to ensure SBMFP is returned to standby.</p> <p><i>Since the SBMFP was not stopped, the SRO determines the step is not applicable and continues.</i></p>
	SRO	<p>18. INITIATE repairs.</p> <p><i>When the SRO contacts Work Control to request a troubleshooting and repair package for the intermediate feedwater heaters, the Console Operator will repeat back the information.</i></p>

Op Test No.: <u>2</u> Scenario # <u>1</u> Event # <u>5</u> Page <u>27</u> of <u>43</u>		
Event Description: Intermediate Feedwater Heater B4 develops a leak, causing the heater string to isolate. Requires entry into AOI-47, "Heater Drains Malfunction." Requires a rapid load reduction using AOI-47 steps. <div style="text-align: center;">FINAL SUBMITTAL</div>		
Time	Position	Applicant's Actions or Behavior

	SRO	19. PERFORM either: <ul style="list-style-type: none"> • Applicable steps of SOI-5&6.01, section for Removing Intermediate Pressure Heater String from Service at Power, for the affected string. OR <ul style="list-style-type: none"> • SOI-5.01, Returning Intermediate String Feedwater Heaters to Service Following High Level Isolation.
	SRO	20. RETURN TO Instruction in effect.
Inform the Chief Examiner when 76% power has been reached.		
EXAMINER: The Chief Examiner will cue Console Operator to enter Event 6 after the power reduction.		

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Event Description: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

FINAL SUBMITTAL

Time

Position

Applicant's Actions or Behavior

Indications:

95-F RCS LOOSE PARTS ALARM

144-A ICE COND INLET DOOR OPEN

58-B SG FEEDWATER FLOW HI

BOP

Diagnoses and announces the feedwater line break inside containment.

SRO

May direct the RO to perform a manual reactor trip and safety injection.

SRO

Enters and directs the actions of E-0, "Reactor Trip or Safety Injection."

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

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

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Event Description: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

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Time	Position	Applicant's Actions or Behavior
	RO	<p>1. ENSURE reactor trip:</p> <ul style="list-style-type: none"> Reactor trip and bypass breakers OPEN. <p>RO checks 1-52RTB, RX TRIP BKR A GREEN indicating light LIT on panel 1-M-4.</p> <p>RO checks 1-52RTB, RC TRIP BKR B GREEN indicating light LIT on panel 1-M-4</p> <p>RO checks 1-52BYA, BYPASS BKR A lights DARK</p> <p>RO checks 1-52BYB, BYPASS BKR B lights DARK</p> <ul style="list-style-type: none"> RPIs at bottom of scale. <p>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.</p> <ul style="list-style-type: none"> Neutron flux DROPPING. <p>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.</p>
	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:</p> <p>CSST (offsite),</p> <p>OR</p> <p>D/G (blackout).</p>

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Event Description: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

**FINAL
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Time	Position	Applicant's Actions or Behavior
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Critical Task 1

Energize at least one AC emergency bus before placing safeguards equipment handswitches in the stop, pull-to-lock position.

<i>Critical Task 1</i>	RO	<p>3. <u>RESPONSE NOT OBTAINED:</u></p> <p>RESTORE power to at least one train of shutdown boards:</p> <p>1) EMERGENCY START D/G [1-M-1].</p> <p><i>RO or BOP rotates 1-HS-82-15, DG EMERG START 1A-A 2A-A 1B-B 2B-B to the right to the EMER START position OR depresses 1-HS-82-46A, EMERGENCY START pushbutton at Panel 0-M-26.</i></p> <p>2) IF both trains shutdown boards remain de-energized, THEN PLACE 6.9kV SD Bd transfer switch in MAN [1-M-1], and CLOSE supply breaker from energized source. IF power can NOT be restored to at least one train of shutdown boards, THEN ** GO TO ECA-0.0, Loss of Shutdown Power.</p> <p><i>After the 1A-A DG is started, the SRO determines that a transition to ECA-0.0 is not warranted.</i></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

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Event Description: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
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Critical Task 2

Manually actuate at least one train of safety injection before transition from E-0, "Reactor Trip or Safety Injection."

Critical Task 2	RO	<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"> • Contmt press greater than 1.5 psig <p>THEN ACTUATE SI manually.</p> <p>RO rotates 1-HS-63-133B SI ACTUATE TR A&B (1-M-4) or 1-HS-63-133a SI ACTUATE TR A&B (1-M-6) to the right to the "ACTUATE" position.</p>
<p>EXAMINER: E-0, "Reactor Trip or Safety Injection," Appendixes A and B are included as Attachment 2.</p>		
	BOP	<p>5. PERFORM Appendixes A and B, E-0, pages 16-30.</p> <p>BOP is assigned to perform actions contained in the Appendices. A separate copy of the Appendices is contained in this package for Examiner use.</p>
	SRO	<p>6. ANNOUNCE reactor trip and safety injection over PA system.</p>

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Event Description: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
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	RO	<p>7. ENSURE secondary heat sink available with either:</p> <ul style="list-style-type: none"> • Total AFW flow greater than 410 gpm, <p>OR</p> <p><i>It is expected that Adverse Containment (>2.81 psig) conditions will exist soon after the entry into E-0. When announced, the crew will use the bracketed parameter values.</i></p> <ul style="list-style-type: none"> • At least one S/G NR level greater than 29% [39% ADV].
<p>EXAMINER: The feedwater line break may cause RCS temperature to rise. The applicants may not implement Step 8 RNO actions at this time.</p>		
	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.

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Event Description: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
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	RO	<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. <p>Recognizes failure of AUTO closure and attempts to MANUALLY close MSIVs from the MCR handswitches. May dispatch an AUO to the Aux Control Room to place the MSIV handswitches to the AUX position.</p> <ul style="list-style-type: none"> • 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: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
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	RO	<p>10. CHECK pZR PORVs and block valves:</p> <ul style="list-style-type: none"> a. PZR PORVs CLOSED. b. At least one block valve OPEN. <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 DARK, due to power loss.</p> <p>RO observes 1-HS-68-332A, BLOCK VLV FOR PORV 334, GREEN indicating light is DARK, RED indicating light is DARK due to loss of power.</p>
	RO	<p>11. CHECK pZR 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 pZR sprays CLOSED.</p> <p>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.</p>

NOTE

Seal injection flow should be maintained to all RCPs.

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Event Description: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
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	RO	<p>13. CHECK if RCPs should remain in service: <i>The RCPs tripped due to the loss of offsite power.</i></p> <ul style="list-style-type: none"> a. Phase B signals DARK [MISSP]. b. RCS pressure greater than 1500 psig.
	RO	<p>14. CHECK S/G pressures:</p> <ul style="list-style-type: none"> • All S/G pressures controlled or rising. <p><i>RO observes PAM pressure instruments on SG 1 through 4 (black labels) and determines that pressures are 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.</i></p> <ul style="list-style-type: none"> • All S/G pressures greater than 120 psig. <p><i>RO observes PAM pressure instruments on SG 1 through 4 (black labels) and determines that pressures are greater than 120 psig.</i></p>
	SRO	<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: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

FINAL SUBMITTAL

Time

Position

Applicant's Actions or Behavior

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.

EXAMINER: E-2, "Faulted Steam Generator Isolation," Attachment 1 is included as Attachment 3.

BOP

1. **RESPONSE NOT OBTAINED**

Manually **CLOSE** valves.

IF valves can **NOT** be closed, **THEN** Locally **REMOVE** power to valves:

- **DISPATCH** NAUO to perform Attachment 1 (E-2).

When contacted as the Control Building AUO to perform Attachment 1, the Console operator will enter msr26a, msr26b, msr26c, and msr26d to place the MSIV switches in the Aux Control Room in the AUX position. The Console Operator will report back that this has been done.

NOTE

If it is known that a steam leak exists in the Turbine building, the following step should not be performed until the affected steam header is depressurized.

BOP

2. **PLACE** steam dump controls OFF:

- 1-HS-1-103A, STEAM DUMP FSV "A".
- 1-HS-1-103B, STEAM DUMP FSV "B".

Step already performed as part of E-0.

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Event Description: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

**FINAL
SUBMITTAL**

Time	Position	Applicant's Actions or Behavior
	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.
	SRO	3. RESPONSE NOT OBTAINED IF pressure in all four S/Gs dropping uncontrolled, THEN GO TO ECA-2.1, Uncontrolled Depressurization of All Steam Generators.

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Event Description: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
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ECA-2.1

The following steps are taken from ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

CAUTION

If, at any time, except during SI termination steps 14 through 24, any Intact S/G can be isolated from the break and re-pressurized, then recovery actions should continue with E-2, Faulted Steam Generator Isolation.

SRO

1. REFER TO EPIP-1, Emergency Plan Classification Flowchart.

CAUTION

If the TD AFW pump is the only available source of feed flow to ANY S/G, the steam supply must be maintained available.

RO

2. **ENSURE** secondary pressure boundary isolated:
- **ENSURE** all MSIVs and MSIV bypasses CLOSED.
 - **PLACE** steam dump controls OFF.
 - **ENSURE** MFW reg and bypass reg valves CLOSED.
 - **ENSURE** MFW isolation and bypass isolation valves CLOSED.
- S/G 1 and 3 MFW Isol valves will not be closed due to power loss.**
- **IF** both MD AFW pumps available, **THEN ENSURE** steam supply valves to TD AFW pump CLOSED.
 - **ENSURE** S/G PORVs CLOSED.
 - **ENSURE** S/G blowdown ISOLATED.

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Event Description: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

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Time	Position	Applicant's Actions or Behavior
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	SRO	<p>2. RESPONSE NOT OBTAINED</p> <p>Manually CLOSE valves to restore pressure boundary on at least one S/G.</p> <p>IF valves can NOT be closed, THEN DISPATCH personnel to close valves locally, one loop at a time:</p> <ul style="list-style-type: none"> • CLOSE MSIV and bypass valve as necessary USING Appendix A (ECA-2.1). <p><i>E-2, Attachment 1 has been implemented, and contains the same actions as ECA-2.1 Appendix A. The MSIVs will NOT be closed during the scenario.</i></p> <ul style="list-style-type: none"> • ISOLATE S/G atmospheric relief valve as necessary. • CLOSE additional feedwater or condensate MOVs as necessary. <p><i>BOP may dispatch personnel to close #1 FW Htr outlet valves, Console operator will acknowledge the request.</i></p> <ul style="list-style-type: none"> • ISOLATE blowdown locally as necessary.
<p>CAUTION</p> <p>If total feed flow CAPABILITY of 410 gpm is available, FR-H.1, Loss of Secondary Heat Sink, should NOT be implemented.</p>		
<p>NOTE</p> <p>Minimum detectable flow is assured by observing flow indicator response to valve movement.</p>		
	BOP	<p>3. CONTROL feed flow to minimize RCS cooldown and prevent S/G dryout:</p> <p>a. CHECK T-cold cooldown rate less than 100°F in the last one hour.</p>

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Event Description: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

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Time	Position	Applicant's Actions or Behavior
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EXAMINER: Step 3 RNO may not be required depending upon the progression of the scenario when this step is performed.

If the RCS cooldown is less than 100°F, then the scenario continues to Step 13.

At the Chief Examiner's discretion, the scenario may be terminated after minimum detectable flow has been established.

	BOP	<p>3. RESPONSE NOT OBTAINED</p> <p>a. REDUCE feed flow to each S/G to minimum detectable to minimize cooldown.</p> <p>** GO TO Substep 3c.</p> <p><i>BOP will take manual control of all AFW level control valves and adjust flow to all S/Gs until the related flow indicator deflects off the bottom scale.</i></p>
	RO	<p>c. IF any S/G NR level drops to 29% [39% ADV], THEN MAINTAIN at least minimum detectable flow to each S/G with low level.</p>
	SRO	<p>4. MONITOR shutdown margin during RCS cooldown:</p> <ul style="list-style-type: none"> • REFER TO 1-SI-0-10, Shutdown Margin OR REACTINW Computer Program. <p><i>SRO requests performance of 1-SI-0-10 by the Surrogate STA.</i></p>
	SRO	<p>5. MONITOR T-hot stable or dropping.</p>

CAUTION

The 1500 psig RCP trip criteria is NOT applicable if the pressure drop is caused by S/G depressurization as indicated by RCS temperature at T-sat for S/G pressure.

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Event Description: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
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NOTE

Seal injection flow should be maintained to all RCPs.

	SRO	6. MONITOR if RCPs should remain in service: a. Phase B DARK [MISSP]. b. RCS pressure greater than 1500 psig. RCPs tripped during the loss of offsite power event.
	SRO	7. MONITOR pwr PORVs and block valves: a. Pwr PORVs CLOSED. b. At least one block valve OPEN. Actions previously performed.
	SRO	8. CHECK secondary side activity levels: • S/G discharge rad monitors NORMAL. • Condenser vacuum exhaust rad monitors NORMAL. • S/G blowdown rad monitor recorders NORMAL trend prior to isolation, • S/G sample results by Chemistry NORMAL. BOP reports primary and secondary radiation during the performance of E-0, Appendix A. SRO may direct the BOP to recheck secondary radiation at this point, and call Chemistry to have SGs sampled for activity.

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.

Op Test No.: 2 Scenario # 1 Event # 6 Page 42 of 43

Event Description: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
	RO	<p>9. DETERMINE if RHR pumps should be stopped:</p> <ul style="list-style-type: none"> a. CHECK RHR suction aligned to RWST. b. CHECK RCS pressure greater than 150 psig. c. CHECK RCS pressure stable or rising. d. RESET SI, AND CHECK the following: <ul style="list-style-type: none"> • SI ACTUATED permissive DARK. • AUTO SI BLOCKED permissive LIT. e. STOP RHR pumps, AND PLACE in A-AUTO. f. MONITOR RCS pressure greater than 150 psig. <p><i>RO will place 1A-A RHR pump hand switch to stop and allow it to spring return to A-AUTO.</i></p>
	RO	<p>10. DETERMINE if cntmt spray should be stopped:</p> <ul style="list-style-type: none"> a. MONITOR cntmt pressure less than 2.0 psig.
	RO	<p>10.a. RESPONSE NOT OBTAINED:</p> <p>WHEN cntmt pressure is less than 2.0 psig, THEN PERFORM Substeps 10b thru e. ** GO TO Step 11.</p>
	RO	<ul style="list-style-type: none"> b. CHECK at least one cntmt spray pump RUNNING. c. RESET cntmt spray signal. d. STOP cntmt spray pumps, AND PLACE in A-AUTO. e. CLOSE cntmt spray discharge valves 1-FCV-72-2 and 1-FCV-72-39.
	RO	<p>11. MONITOR RWST level greater than 34%.</p>

Op Test No.: 2 Scenario # 1 Event # 6 Page 43 of 43

Event Description: Feedwater line break inside containment on #4 SG fails to 100%. Auto safety injection fails to occur. After the reactor trip a total loss of offsite power occurs. 1A DG trips when started and the 1B DG fails to automatically start. Requires emergency start of the 1B DG by the RO during the performance of IMMEDIATE OPERATOR ACTIONS. MSIVs fail to close. Requires transition from E-2, "Faulted Steam Generator Isolation," to ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
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	RO	12. DETERMINE if cold leg accumulators should be isolated: a. ENSURE power to isolation valves restored USING Appendix B (ECA-2.1), CLA Breaker Operation. b. CHECK RCS pressure less than 250 psig.
	RO	12.b RESPONSE NOT OBTAINED WHEN RCS pressure is less than 250 psig, THEN ** PERFORM Substeps 12c and 12d.
	RO	13. MONITOR modified SI termination criteria: a. RCS subcooling greater than 65°F [85°F ADV]. b. RCS pressure stable or rising. c. Pzr level greater than 15% [33% ADV].
EXAMINER: When the modified SI termination criteria have been checked in step 13, scenario may be terminated.		
END OF SCENARIO		

SHIFT TURNOVER CHECKLIST

Page 1 of 2

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 _____	_____ _____ _____ _____
			<u>Off-going - Name</u> <u>On-coming - Name</u>
Part 1 - Completed by off-going shift / Reviewed by on-coming shift: RCS Cb = 1031 ppm			
<ul style="list-style-type: none"> • Abnormal equipment lineup / conditions: <u>1A-A RHR Pump is out-of-service for motor winding inspection. LCO 3.5.2 and 3.6.6 were entered 10 hours ago.</u> <u>1A-A RHR pump is expected to be returned to service in 6 hours. Protected equipment signs have been posted for 1B-B RHR pump.</u> • SI/Test in progress/planned: (including need for conduct of evolution briefings) _____ _____ _____ • Major Activities/Procedures in progress/planned: <u>Train A/Channel I Work Week. 100% power, RCS boron concentration 1031 ppm, Control Bank D is at 220 steps.</u> <u>Maintain current plant conditions.</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 _____	_____ _____ _____ _____
			Off-going - Name
			On-coming - Name
Part 1 - Completed by off-going shift / Reviewed by on-coming shift:			
RCS Cb = 1031 ppm			
<ul style="list-style-type: none"> • Abnormal equipment lineup / conditions: 1A-A RHR Pump is out-of-service for motor winding inspection. LCO 3.5.2 and 3.6.6 were entered 10 hours ago. 1A-A RHR pump is expected to be returned to service in 6 hours. Protected equipment signs have been posted for 1B-B RHR pump. _____ _____ • SI/Test in progress/planned: (including need for conduct of evolution briefings) _____ _____ _____ • Major Activities/Procedures in progress/planned: Train A/Channel I Work Week. 100% power, RCS boron concentration 1031 ppm, Control Bank D is at 220 steps. Maintain current plant conditions. _____ _____ _____ • 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 1

Attachment 1

**Reactivity Briefing Sheet for
Runback to 75% Power.”**

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: _____ / _____ Date _____
RXE

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

RXE support required Onsite? ☒ Yes ☐ No Describe: Call out for Ramp Up plan

Title of Reactivity Control Plan: **900 MW (75%) Runback**

Assumptions: 1. Reactor stable at full power prior to runback
2. Calculated volumes below assume Tav_g maintained on Tref

Major Steps: 1. Runback to 85%.
2. Rapid Load Reduction to 75%

Detailed Description:

NOTE: See attached plots.

1. BORATE ~369 gal of BA.
2. EXPECT the RIL Lo annunciator to alarm.
3. WHEN the runback is complete and as Tav_g allows, THEN WITHDRAW CBD to ~189 steps.
4. PLACE control rods in MANUAL for AFD control.
5. DILUTE ~1018 gal PW during the Xenon build-in for the first ~5 hours following the runback to maintain Tav_g near Tref.
6. BORATE the RCS as necessary to maintain Tav_g near Tref as Xenon decays to an equilibrium value (~732 gal BA).

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

Scenario 1

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
5.	<p>CHECK cntmt isolation:</p> <p>a. Phase A isolation:</p> <ul style="list-style-type: none"> • Train A GREEN. • Train B GREEN. <p>b. Cntmt vent isolation:</p> <ul style="list-style-type: none"> • Train A GREEN. • Train B GREEN. 	<p>ACTUATE Phase A and Cntmt Vent Isolation signal,</p> <p>OR</p> <p>Manually CLOSE valves and dampers as necessary.</p>

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

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 1

Attachment 3

E-2, "Faulted Steam
Generator Isolation,"

Attachment 1,
"Isolation of MSIVs and
MSIV Bypass Valves"

WBN Unit 1	Faulted Steam Generator Isolation	E-2 Rev. 0012
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**Attachment 1
(Page 1 of 4)**

Isolation of MSIVs and MSIV Bypass Valves

1.0 INSTRUCTIONS

1.1 Isolation of MSIVs and MSIV Bypass Valves

- A. **IF** any MSIV will **NOT** close, **THEN**
GO TO Section 1.2 (Attachment 1).
- B. **IF** any MSIV bypass valve will **NOT** close, **THEN**
GO TO Section 1.3 (Attachment 1).

WBN Unit 1	Faulted Steam Generator Isolation	E-2 Rev. 0012
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**Attachment 1
(Page 2 of 4)**

Isolation of MSIVs and MSIV Bypass Valves

1.2 MSIV Isolation

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

S/G (Circle affected S/G)	EQUIPMENT	AUX TRANSFER SWITCH	AUX POSITION √
1	MSIV Loop 1, Train A, 1-FCV-1-4	1-XS-1-4A	<input type="checkbox"/>
	MSIV Loop 1, Train B, 1-FCV-1-4	1-XS-1-4B	<input type="checkbox"/>
2	MSIV Loop 2, Train A, 1-FCV-1-11	1-XS-1-11A	<input type="checkbox"/>
	MSIV Loop 2, Train B, 1-FCV-1-11	1-XS-1-11B	<input type="checkbox"/>
3	MSIV Loop 3, Train A, 1-FCV-1-22	1-XS-1-22A	<input type="checkbox"/>
	MSIV Loop 3, Train B, 1-FCV-1-22	1-XS-1-22B	<input type="checkbox"/>
4	MSIV Loop 4, Train A, 1-FCV-1-29	1-XS-1-29A	<input type="checkbox"/>
	MSIV Loop 4, Train B, 1-FCV-1-29	1-XS-1-29B	<input type="checkbox"/>

- B. **CONSULT** UO to verify affected MSIV closed.

WBN Unit 1	Faulted Steam Generator Isolation	E-2 Rev. 0012
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**Attachment 1
(Page 3 of 4)**

Isolation of MSIVs and MSIV Bypass Valves

1.2 MSIV Isolation (continued)

C. IF affected MSIV still open **OR**

Control power fuse removal desired, **THEN**

REMOVE MSIV fuses:

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

D. **NOTIFY** UO upon completion.

WBN Unit 1	Faulted Steam Generator Isolation	E-2 Rev. 0012
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**Attachment 1
(Page 4 of 4)**

Isolation of MSIVs and MSIV Bypass Valves

1.3 MSIV Bypass Isolation

A. **PLACE HS** in OFF for MSIV bypass valves that will **NOT** close:

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

B. **NOTIFY** UO upon completion.

Facility:	Watts Bar December 2011	Scenario No. 2	Op Test No.: 2
Examiners:	_____	Operators:	SRO
	_____		RO
	_____		BOP
Run Time:	90 minutes		
Initial Conditions:	100% power, RCS boron concentration 1031 ppm. Control Bank D at 220 steps.		
FINAL SUBMITTAL			
Turnover: Train B/Channel II Work Week. 1B-B RHR pump is out of service for motor winding inspection. LCO 3.5.2 and 3.6.6 were entered 1 hour ago. 1B-B RHR pump is expected to be returned to service in 12 hours. Protected equipment signs have been posted for 1A-A RHR pump. A power reduction to 95% at 2%/min using AOI-39, "Rapid Load Reduction," is required to be performed to remove the 1B Condensate Booster pump from service due to an oil leak.			
Event No.	Malfunction No.	Event Type*	Event Description
1	n/a	N-BOP/SRO	Reduce power to 95% at 2%/min using AOI-39, "Rapid Load Reduction."
		R-RO	RO performs power reduction.
2	rx02a	I-RO TS-SRO	Loop 1 RCS Cold Leg RTD fails high.
3	rx20	I-BOP	1-PT-1-33, MAIN STEAM PRESS fails high.
4	rc07a	C-RO TS-SRO	1-PCV-68-334, PZR PORV fails open.
5	cc04	C-BOP	A leak develops on the RCP oil cooler supply header line inside containment.
	rp01c	M-ALL	Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%.
	si08g si08h rp55c	C-BOP	ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump.
	ms01a	M-ALL	Main steam line break on Loop 1 inside containment.
(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

NOTE: DO NOT RUN WITH SCENARIO 1

Scenario 2 - Summary

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

Turnover Train B/Channel II Work Week. 1B-B RHR pump is out of service for motor winding inspection. LCO 3.5.2 and 3.6.6 were entered 1 hour ago. 1B-B RHR pump is expected to be returned to service in 12 hours. Protected equipment signs have been posted for 1A-A RHR pump. A power reduction to 95% at 2%/min using AOI-39, "Rapid Load Reduction," is required to be performed to remove the 1B Condensate Booster pump from service due to an oil leak.

Event 1 Reduce power to 95% at 2%/min using AOI-39, "Rapid Load Reduction," to remove the 1B Condensate Booster pump from service.

Event 2 Loop 1 RCS Cold Leg RTD 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 and entry into multiple Actions of LCO 3.3.1.

Event 3 1-PT-1-33, MAIN STEAM PRESS fails high causing 1-PC-46-20, MFPT A & B MASTER SPEED CONTROL to raise MFP speed. Requires the BOP to place 1-PC-46-20 in MANUAL to control speed. Requires entry into AOI-16, "Loss of Normal Feedwater," Section 3.6, "MFW pump speed control circuit failure."

Event 4 1-PCV-68-334, PZR PORV fails open. Requires the RO to take IMMEDIATE OPERATOR ACTION to attempt to close 1-HS-68-334A and/or to close 1-HS-68-332A, BLOCK VALVE FOR PORV 334. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," Section 3.2, "PZR Pressure Drop Due to Failed PORV/Safety or Spray Valve." Requires a Tech Spec evaluation and entry into LCO 3.4.11.

Event 5 A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, a manual reactor trip to remove the RCPs from service is required.

Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." Per FR-S.1, the RCPs are left in service until reactor power is reduced below 5%.

ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump.

Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection," and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.

Scenario 2 - Critical Task Summary

- | | |
|-----------------|--|
| Critical Task 1 | Insert negative reactivity into the core by inserting control rods. |
| Critical Task 2 | Isolate the faulted steam generator prior to exiting E-2, "Faulted Steam Generator Isolation." |

Watts Bar Nuclear Plant
2011-12 NRC Examination Scenario 2
Simulator Console Operators Instructions

SIMULATOR SETUP INFORMATION

1. ENSURE Examination Security has been established.
2. RESET to Initial Condition 301 by performing the following actions:
 - a. Select ICManager on the THUNDERBAR menu (right hand side of Instructor Console Screen).
 - b. Locate IC# 301.
 - c. Right "click" on IC# 301.
 - d. Select Reset on the drop down menu.
 - e. Right "click" on RESET.
 - f. Enter the password for IC 301.
 - 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
x	rp55c	failure of auto start on turbine driven aux feedpump	M		00:00:00	00:00:00	00:00:00		Active	Active
x	hs-74-21a-1	01170 rhr pmp bb suct fr ctmr sm(green)	O		00:00:00	00:00:00	00:00:00		Off	Off
x	hs-63-73a-1	01240 hr pmp b-v motor switch(green)	O		00:00:00	00:00:00	00:00:00		Off	Off
x	si08h	failure of auto si and blackout signals afwp 1b-b	M		00:00:00	00:00:00	00:00:00		Active	Active
x	hs-74-20a-1	01240 hr pmp b-b motor switch(green)	O		00:00:00	00:00:00	00:00:00		Off	Off

Watts Bar Nuclear Plant
2011-12 NRC Examination Scenario 2
Simulator Console Operators Instructions

SIMULATOR SETUP INFORMATION

	Key	Description	Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
x	rh01b	rhr pump b trip	O		00:00:00	00:00:00	00:00:00		Active	Active
x	rp01c	manual and automatic reactor trip signal failure (atws)	M		00:00:00	00:00:00	00:00:00		Active	Active
x	si08g	failure of auto si and blackout signals afwp 1a-a	M		00:00:00	00:00:00	00:00:00		Active	Active
x	rx02a	cold leg 1 rtd 1 failure	M	2	00:00:00		00:00:00		100	54.96
x	rx20	main steam header pressure transmitter fails to pos pt-1-33	M	3	00:00:00		00:00:00		100	76.55
x	rc07a	przr porv pcv-68-334 fail to any position	M	4	00:00:00		00:00:00		100	0
x	cc04	comp cool pipe break inside containment	M	5	00:00:00		00:00:00		94.5	0
x	ms01a	main steam line break inside containment sg #1	M	7	00:00:15		00:02:00		6	0
x	rp51b	reactor trip breaker rtb trip	M	6	00:00:10		00:00:00		Active	InActive
x	rp51a	reactor trip breaker rta trip	M	6	00:00:00		00:00:00		Active	InActive

5. Place simulator in RUN and acknowledge any alarms.

6. ENSURE 1-HS-74-20A, B RHR PMP (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-74-10A, RHR PMP A (ECCS).

8. ENSURE the "Train B Week - Channel II" sign is placed on 1-M-30.

9. Place simulator in FREEZE.

10. 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.

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

Watts Bar Nuclear Plant
2011-12 NRC Examination Scenario 2
Simulator Console Operators Instructions

Exam Event No.	Simulator Event No.	Description/Role Play
1	n/a	<p>Power reduction to 95% at 2%/min using AOI-39, "Rapid Load Reduction."</p> <p>ROLE PLAY: <i>When contacted as Load Coordinator, repeat back the information provided. (SRO may contact the SM to make notification.)</i></p> <p>ROLE PLAY: <i>If contacted as Cnds Demin AUO for notification of pump shutdowns, acknowledge the request.</i></p> <p>ROLE PLAY: <i>If contacted as Shift Manager to refer to EPIP-1, acknowledge the request.</i></p>
2	2	<p>Loop 1 RTD failure</p> <p>ROLE PLAY: <i>When contacted as Maintenance/Work Control, repeat back request for performance of IMI-160.</i></p> <p>ROLE PLAY: <i>When contacted as Work Control, repeat back request to have a troubleshooting and repair package made up for Loop 1 RCS Temperature instrument.</i></p>
3	3	<p>1-PT-1-33, MAIN STEAM PRESS fails High.</p> <p>ROLE PLAY: <i>When contacted as Work Control, repeat back request for a troubleshooting and repair package for 1-PT-1-33, MAIN STEAM PRESS.</i></p> <p>ROLE PLAY: <i>If/when dispatched as the TB AUO, repeat back request to inspect 1-PT-1-33 for leaks. Report back that there are no leaks visible.</i></p>
4	4	<p>1-PCV-68-334 PZR PORV fails open.</p> <p>ROLE PLAY: <i>When contacted as Work Control, repeat back request to have power removed from 1-FCV-68-332 BLOCK VLV FOR PZR PORV 334 within one hour.</i></p> <p>ROLE PLAY: <i>When contacted as Work Control, repeat back request for a troubleshooting and repair package for 1-PCV-68-334 PZR PORV.</i></p>

Watts Bar Nuclear Plant
2011-12 NRC Examination Scenario 2
Simulator Console Operators Instructions

Exam Event No.	Simulator Event No.	Description/Role Play
5	5	<p>CCS RCP Oil Cooler Leak/Reactor fails to trip (ATWS)/Loop 1 SLB Inside Containment.</p> <p>ROLE PLAY: <i>If contacted as Aux Bldg AUO to check for leakage in the CCS, state that there is no leakage indicated in the Aux Building.</i></p> <p>ROLE PLAY: <i>If contacted as Aux Bldg AUO to check 1B CCP for start, state it checks Normal locally and is ready for start.</i></p> <p>ROLE PLAY: <i>When contacted as the Control Building AUO, repeat back request to open the reactor trip breakers and MG set output breakers locally. AFTER 3 minutes, delete malfunction rp01c, and enter Event 6, which will open the reactor trip breakers.</i></p> <p>ROLE PLAY: <i>When contacted as the Turbine Building AUO, repeat back request to open breakers to the MG sets.</i></p> <p>ROLE PLAY: <i>When contacted as Shift Manager to refer to EPIP-1 in FRS.1 at step 11, acknowledge the request and <u>ENTER Simulator Event 7</u> (ms01a, main steam line break inside containment sg #1).</i></p> <p>ROLE PLAY: <i>When contacted as AUO to perform Attachment 1 of E-0, acknowledge the request and report complete.</i></p> <p>ROLE PLAY: <i>When contacted as the Auxiliary Building AUO, repeat back request to shutdown sample pumps for 1-RM-90-106 and 1-RM0-90-112.</i></p> <p>ROLE PLAY: <i>When contacted as Chemistry, repeat back request for SG samples for activity.</i></p>

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

Event Description: Reduce power to 95% at 2%/min using AOI-39, "Rapid Load Reduction."

**FINAL
SUBMITTAL**

Time	Position	Applicant's Actions or Behavior
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AOI-39

The following actions are taken from AOI-39, "Rapid Load Reduction."

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	<p>1. INITIATE a manual boration:</p> <p>a. DETERMINE recommended boration flow rate and volume from Reactivity Briefing Sheet:</p> <p>b. INITIATE normal boration:</p> <p>1) ADJUST BA flow controller, 1-FC-62-139, to desired flow rate.</p> <p>RO adjusts 1-FI-62-139, BA TO BLENDER FCV-62-140 CONTROL to approximately 78%, which corresponds to approximately 31 gpm.</p> <p>2) ADJUST BA batch counter 1-FQ-62-139 to required quantity.</p> <p>RO sets the batch counter to "000160" to add 160 gallons of boron, based on the Reactivity Briefing Book, Thumb Rule values.</p> <p>3) PLACE mode selector 1-HS-62-140B to BOR.</p> <p>4) (p) PLACE VCT makeup control 1-HS-62-140A, to START.</p> <p>5) VERIFY desired boric acid flow indicated on 1-FI-62-139.</p>
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Op Test No.: <u>2</u>	Scenario # <u>2</u>	Event # <u>1</u>	Page <u>2</u> of <u>47</u>
Event Description: Reduce power to 95% at 2%/min using AOI-39, "Rapid Load Reduction."			
FINAL SUBMITTAL			
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	<p>2. ESTABLISH a turbine load reduction rate less than or equal to 5%/min:</p> <p>a. PLACE turbine in IMP IN <i>BOP depressed the "IMP IN" pushbutton and observes the transfer from "IMP OUT" to "IMP IN" control complete.</i></p> <p>b. SET a desired load in the SETTER with the REFERENCE CONTROL. <i>BOP depresses the reference control ▽ (down) button to reduce the setter display to less than 95% load as directed by the SRO.</i></p> <p>c. SET the LOAD RATE at less than or equal to 5%/min. <i>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%/minute will be used.</i></p> <p>d. (p) DEPRESS GO pushbutton. <i>BOP depresses the REFERENCE CONTROL "GO" button.</i></p>
<p align="center">NOTE</p> <p>AFD green target band can be monitored using ICS Turn On code DOGHOUSE.</p>		
	RO	<p>3. MONITOR rod position:</p> <ul style="list-style-type: none"> • Rods above Lo-Lo insertion limit • AFD within Target Band

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>1</u>	Page	<u>3</u>	of	<u>47</u>
Event Description: Reduce power to 95% at 2%/min using AOI-39, "Rapid Load Reduction."									
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	SRO	4. REFER TO EPIP-1, Emergency Plan Classification Flowchart <i>SRO may request Shift Manager to Refer to EPIP-1 Console Operator will acknowledge the request.</i>
	SRO	5. NOTIFY the Load Coordinator of the required load reduction and expected ramp rate. <i>When the SRO contacts Load Coordinator, the Console Operator will repeat back the information provided. SRO may contact the Shift Manager to make the notifications.</i>
<p style="text-align: center;">NOTE</p> <p>If reactor power is stabilized at a lower level a drop in T-avg will occur due to Xenon build up. Dilution may be required to maintain power level.</p>		
	RO	6. MONITOR T-avg and T-ref: <ul style="list-style-type: none"> • T-ave trending to T-ref. • Mismatch less than 5°F.
	SRO	7. CHECK rate of power reduction is rapid enough for existing plant conditions.
	BOP	8. NOTIFY Cnds Demin AUO of impending pmp shutdowns. <i>When Cnds Demin AUO is notified of impending pump shutdowns, Console Operator will acknowledge the request.</i>
	SRO	9. WHEN rated thermal power change exceeds 15% in one hour, THEN NOTIFY Chemistry to initiate 1-SI-68-28.
<p>EXAMINER: At the Chief Examiner's discretion after power has been dropped to 95%, cue the Console Operator to enter Event 2.</p>		

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>2</u>	Page	<u>4</u>	of	<u>47</u>
Event Description:	Loop 1 RCS Cold Leg RTD 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.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

Indications:

Loop 1 Tavg Indicator 1-TI-68-2E [M-5] indicates high.

93-A RCS LOOP ΔT DEVIATION

94-A TAVG-TREF DEVIATION

94-B TAVG-T AUCT DEVIATION

90-F EAGLE PROC PROT CHANNEL I RTD FAILURE

110-F PROT SET TROUBLE

123-C OVERTEMP ΔT TRIP ALERT

123-D OVERTEMP ΔT TURB RUNBACK & C-3 ROD BLOCK

	RO	Will perform IMMEDIATE ACTION step of AOI-2, "Malfunction of Reactor Control System," Section 3.2, "Uncontrolled Rod Bank Movement," to PLACE control rods in MANUAL and to CHECK control rod movement has stopped.
	RO	May enter and perform initial actions of ARI-94-A, "TAVG-TREF DEVIATION," and refer to AOI-2.
	SRO	Enters and directs actions of AOI-2, "Malfunction of Reactor Control System," Section 3.2, "Uncontrolled Rod Bank Movement."
ARI 94-A		The following steps are the first 4 steps from ARI 94-A, "TAVG-TREF DEVIATION."
	RO	[1] CHECK Loop Tavg on 1-TI-68-2E, -25E, -44E, and -67E [1-M-5].
	RO	[2] IF Tavg is less than or equal to 561°F, THEN PERFORM 1-SI-68-34 within 30 minutes.
	RO	[3] CHECK Tref & Auct Tavg recorder 1-TR-68-2B [1-M-5].

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>2</u>	Page	<u>5</u>	of	<u>47</u>
Event Description:		Loop 1 RCS Cold Leg RTD 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.							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>[4] IF control rods are in AUTO, THEN:</p> <p>[4.1] PLACE control rods in MANUAL AND RESTORE Tav_g to T_{ref} using rods OR ADJUST turbine load to match Tav_g with T_{ref}.</p> <p>[4.2] REFER TO AOI-2.</p>
AOI-2		The following actions are taken from AOI-2, "Malfunction of Reactor Control System," Section 3.2, "Uncontrolled Rod Bank 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>b. CHECK control rod movement STOPPED.</p> <p><i>Since these are IMMEDIATE ACTION steps, the actions have already been taken.</i></p>
EXAMINER: AOI-2, Attachment 1 is included in the scenario as Attachment 1.		
	RO	<p>2. MAINTAIN T-ave on PROGRAM. (Reference Attachment 1)</p> <ul style="list-style-type: none"> • (ρ) USE control rods. <p>OR</p> <ul style="list-style-type: none"> • (ρ) ADJUST turbine load.
	RO	3. CHECK loop T-ave channels NORMAL.

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>2</u>	Page	<u>6</u>	of	<u>47</u>
Event Description:		Loop 1 RCS Cold Leg RTD 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.							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>3. RESPONSE NOT OBTAINED:</p> <p>DEFEAT failed channels:</p> <p>a. PLACE 1-XS-68-2D, ΔT CHANNEL DEFEAT, to failed channel position, AND PULL.</p> <p><i>RO will rotate 1-XS-68-2D to the LOOP 1 position and then pull out the selector switch.</i></p>
<p>EXAMINER: The next switch manipulation will result in the following alarm sequence:</p> <ul style="list-style-type: none"> • 94-A TAVG-TREF DEVIATION - Alarm Clears • 94-B TAVG-T AUCT DEVIATION - Alarm Clears and then reflashes 		
	RO	<p>b. PLACE 1-XS-68-2M, TAVG CHANNEL DEFEAT, in failed channel position AND PULL.</p> <p><i>RO will rotate 1-XS-68-2M to the LOOP 1 position and then pull out the selector switch.</i></p> <p>ENSURE TR-68-2A placed to a Loop with operable ΔT/OTΔT/OPΔT channels using 1-XS-68-2B.</p> <p><i>Since 1-XS-68-2B is selected to LOOP 1, the RO will select any other loop as input to the recorder.</i></p> <p>NOTIFY Maintenance to implement IMI-160 for failed channel.</p> <p><i>SRO will contact Maintenance/Work Control and request performance of IMI-160. Console Operator will repeat back request.</i></p> <p>(Continued Next Page)</p>

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>2</u>	Page	<u>7</u>	of	<u>47</u>
Event Description:	Loop 1 RCS Cold Leg RTD 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.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>3. RESPONSE NOT OBTAINED: (Cont'd)</p> <p>WHEN at least 5 minutes have elapsed since failed T-ave channel is defeated AND auto rod control desired, THEN</p> <p>a. ENSURE T-ave 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 rods in AUTO.</p> <p>RO rotates 1-RBSS from the MANUAL position to the right to the AUTO position.</p>
	RO	<p>4. CHECK Auct T-avg NORMAL on 1-TR-68-2B.</p> <p>After Step 3 is performed and the failed channel is defeated, Auct Tavg will indicate NORMAL on 1-TR-68-2B.</p>
	RO	<p>5. CHECK NIS power range channels NORMAL.</p> <p>RO observes all NIS channels are indicating the same values and are NORMAL.</p>
	RO	<p>6. CHECK the following:</p> <ul style="list-style-type: none"> • Turbine impulse pressure channel 1-PI-1-73, NORMAL. <p>BOP observes that 1-PI-1-73, % HP TURBINE POWER TR A is matched with 1-PI-1-72, % HP TURBINE POWER TR B and both are NORMAL.</p> <ul style="list-style-type: none"> • T-ref and Auct T-avg NORMAL on 1-TR-68-2B (Reference Attachment 1). <p>After failed loop ΔT and loop T-avg channels have been defeated in Step 3 RNO, Tref and Auct Tavg are NORMAL.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>2</u>	Page	<u>8</u>	of	<u>47</u>
Event Description:		Loop 1 RCS Cold Leg RTD 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.							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	SRO	<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 contacted as Work Control, the Console Operator will repeat back request to have a troubleshooting and repair package made up for Loop 1 RCS Temperature instrument.</i></p>

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>2</u>	Page	<u>9</u>	of	<u>47</u>
Event Description:	Loop 1 RCS Cold Leg RTD 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.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	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. 3.3.1-1, Rx Trip System (RTS) <p>Function 6. Overtemperature ΔT Condition W. Place channel in trip within 72 hours OR be in Mode 3 within 78 hours.</p> <p>Function 7. Overpower ΔT Condition W. Place channel in trip within 72 hours OR reduce THERMAL POWER to <P-7. SG level trip LCO is not applicable, since Loop 1 does not input into the TTD circuitry.</p> <ul style="list-style-type: none"> 3.3.2-1, ESFAS Instrumentation. <p>AFW pump start logic LCO is not applicable, since Loop 1 does not input into the TTD circuitry.</p>
	SRO	<p>10. NOTIFY Chemistry of any reactor power changes greater than 15% in one hour.</p> <p>Power change has not exceeded 15%, so this step is not applicable.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>2</u>	Page	<u>10</u>	of	<u>47</u>
Event Description:		Loop 1 RCS Cold Leg RTD 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.							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	SRO	<p>11. WHEN ready to restore repaired ΔT and loop T-avg channels, THEN:</p> <ul style="list-style-type: none"> • PUSH IN 1-XS-68-2D, ΔT CHANNEL DEFEAT and SELECT AWAY from all channels. • PUSH IN 1-XS-68-2M, TAVG CHANNEL DEFEAT, and SELECT AWAY from all channels. <p><i>SRO determines that the conditions of this step are not met and continues to the next step.</i></p>
<p>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>		
<p>EXAMINER: Step 12 actions are provided if the applicants did NOT return rods to automatic during the performance of Step 3 RESPONSE NOT OBTAINED actions.</p>		
	SRO	<p>12. WHEN auto rod control desired, THEN:</p> <p>a. ENSURE T-ave and T-ref within 1°F.</p> <p><i>RO withdraws control rods in MANUAL to match T-avg and T-ref within 1°F.</i></p> <p>b. ENSURE zero demand on control rod position indication [1-M-4].</p> <p><i>RO observes that there is a zero demand indicated on the PASSIVE SUMMER ROD DEMAND on both CERPI displays.</i></p> <p>c. PLACE rods in AUTO.</p> <p><i>RO rotates 1-RBSS from the MANUAL position to the right to the AUTO position.</i></p>

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>2</u>	Page	<u>11</u>	of	<u>47</u>
Event Description:	Loop 1 RCS Cold Leg RTD 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.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	SRO	13. WHEN conditions allow auto PZR level control, THEN ENSURE PZR level returned to normal program, AND PLACE 1-FCV-62-93 in AUTO. <i>If action was taken earlier to take manual control of PZR level, the RO will place 1-HIC-62-93A in AUTO after verifying level has been returned to program.</i>
	SRO	14. RETURN TO Instruction in effect.
EXAMINER: The crew briefing is optional. The next event, Event 3, may be entered prior to the brief, at the discretion of the Chief Examiner.		
	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).
If not already cued, Console Operator will check with Chief Examiner prior to inserting Event 3.		

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>3</u>	Page	<u>12</u>	of	<u>47</u>
Event Description:		1-PT-1-33, MAIN STEAM PRESS fails high causing 1-PC-46-20, MFPT A & B MASTER SPEED CONTROL to raise MFP speed. Requires the BOP to place 1-PC-46-20 in MANUAL to control speed. Requires entry into AOI-16, "Loss of Normal Feedwater," Sub section 3.6, "MFW pump speed control circuit failure."							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							
Indications: 57-B, #1 HEATERS FW SUPPLY PRESS HI 63-F SG LEVEL DEVIATION									
	BOP	Diagnoses and announces the failure of 1-PT-1-33, MAIN STEAM PRESS high.							
	BOP	May enter and take actions of ARI 57-B, "#1 HEATERS FW SUPPLY PRESS HI."							
	BOP	May enter and take actions of ARI 63-F "SG LEVEL DEVIATION."							
	SRO	Enters and directs actions of AOI-16, "Loss of Normal Feedwater," Section 3.6, "MFW pump speed control circuit failure."							
AOI-16		The following actions are taken from AOI-16, "Loss of Normal Feedwater," Section 3.6, "MFW pump speed control circuit failure."							
	BOP	1. CONTROL MFP speed using MANUAL control of master controller or individual controller(s) as required. <i>BOP places 1-PC-46-20, MFPT A & B MASTER SPEED CONTROL in MANUAL by lifting the toggle switch from the "AUTO" position, and then move to the left to lower MFP 1A and 1B speed</i>							
	RO	2. PLACE control rods in MANUAL. <i>SRO directs the RO to place 1-RBSS ROD BANK SELECT in MANUAL.</i>							
	BOP	3. CHECK MFW pumps recirc valves CLOSED. <i>BOP checks 1-FIC-3-70 MFWP A RECIRC CONTROL and 1-FIC-3-84 MFWP B RECIRC CONTROL CLOSED by observing valve position demand indications.</i>							

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>3</u>	Page	<u>13</u>	of	<u>47</u>
Event Description:		1-PT-1-33, MAIN STEAM PRESS fails high causing 1-PC-46-20, MFPT A & B MASTER SPEED CONTROL to raise MFP speed. Requires the BOP to place 1-PC-46-20 in MANUAL to control speed. Requires entry into AOI-16, "Loss of Normal Feedwater," Sub section 3.6, "MFW pump speed control circuit failure."							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							
	RO	<p>4. (p) ENSURE T-avg and T-ref within 3°.</p> <p><i>RO observes Tref-Auct Tavg on 1-TR-68-2B and determines that Auct T-avg and T-ref are within 3°F.</i></p>							
	BOP	<p>5. MAINTAIN MFWP discharge press on PROGRAM.</p> <p><i>BOP may adjust 1-PC-46-20, MFPT A & B MASTER SPEED CONTROL in MANUAL to return MFWP discharge pressure to program (1-FC-46-20 provides program.)</i></p>							
	BOP	<p>6. ENSURE S/G levels return to PROGRAM.</p> <p><i>BOP observes SG 1 through SG 4 levels on 1-M-4 instruments and determines that levels are returning to normal.</i></p>							
	BOP	<p>7. CHECK steam dump mode in TAVG position.</p> <p><i>BOP determines that 1-HS-103D STEAM DUMP MODE handswitch is in the "TAVG" position.</i></p>							
	BOP	<p>8. INITIATE repairs to failed equipment.</p> <p><i>When SRO contacts Work Control, the Console Operator repeats back the request for a troubleshooting and repair package for 1-PT-1-33, MAIN STEAM PRESS.</i></p>							
	RO	<p>9. WHEN auto rod control desired, THEN:</p> <p>a. ENSURE T-ave and T-ref within 1°F.</p> <p><i>RO observes T-avg and T-ref within 1°F on 1-TR-68-2B, TREF & AUCT TAVG - °F.</i></p> <p>b. ENSURE zero demand on control rod position indication [1-M-4].</p> <p><i>RO observes that there is a zero demand indicated on the PASSIVE SUMMER ROD DEMAND on both CERPI displays.</i></p> <p>c. PLACE rods in AUTO.</p> <p><i>RO rotates 1-RBSS from the MANUAL position to the right to the AUTO position.</i></p>							

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>3</u>	Page	<u>14</u>	of	<u>47</u>
Event Description:		1-PT-1-33, MAIN STEAM PRESS fails high causing 1-PC-46-20, MFPT A & B MASTER SPEED CONTROL to raise MFP speed. Requires the BOP to place 1-PC-46-20 in MANUAL to control speed. Requires entry into AOI-16, "Loss of Normal Feedwater," Sub section 3.6, "MFW pump speed control circuit failure."							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							
	BOP	<p>10. WHEN MFP pump control repairs completed, THEN PLACE MFP speed control in AUTO.</p> <p><i>SRO determines that repairs will not be completed and directs the BOP to maintain 1-PC-46-20 in MANUAL.</i></p>							
	SRO	<p>11. RETURN TO Instruction in effect.</p> <p><i>SRO determines that the procedure section will remain open until repairs are complete.</i></p>							
<p>EXAMINER: The crew briefing is optional. The next event, Event 4, may be entered prior to the brief, at the discretion of the Chief Examiner.</p>									
	SRO	<p>Crew Brief would typically be conducted for this event as time allows prior to the next event.</p>							
	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>							
<p>If not already cued, Console Operator will check with Chief Examiner prior to inserting Event 4.</p>									

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>4</u>	Page	<u>15</u>	of	<u>47</u>
Event Description:		1-PCV-68-334, PZR PORV to open. Requires the RO to take IMMEDIATE OPERATOR ACTION to attempt to close 1-HS-68-334A and/or to close 1-HS-68-332A, BLOCK VALVE FOR PORV 334. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," Section 3.2, "PZR Pressure Drop Due to Failed PORV/Safety or Spray Valve." Requires a Tech Spec evaluation.							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

Indications:		
91-A PZR PORV/SAFETY OPEN		
90-B PZR PRESS LO DEVN BACKUP HTRS ON		
	RO	Diagnoses and announces the failure open of 1-PCV-68-334, PZR PORV.
	RO	Performs IMMEDIATE OPERATOR ACTIONS of AOI-18, "Malfunction of Pressurizer Pressure Control System," Section 3.2, "PZR pressure drop due to failed PORV/Safety or spray valve." RO CLOSES 1-HS-68-332A BLOCK VALVE FOR PORV 334.
	SRO	Enters and directs actions of AOI-18, "Malfunction of Pressurizer Pressure Control System," Sub section 3.2, "PZR pressure drop due to failed PORV/Safety or spray valve."
AOI-18		The following actions are taken from AOI-18, "Malfunction Of Pressurizer Pressure Control System," Section 3.2, "PZR pressure drop due to failed PORV/Safety or spray valve."
NOTE		
Step 1 and 2 are IMMEDIATE ACTION steps		
	RO	<p>1. CHECK PZR spray valves CLOSED:</p> <ul style="list-style-type: none"> • Green indicating lights LIT <p>RO observes GREEN light LIT on 1-XI-68-340D, PZR SPRAY LOOP 1 and 1-XI-68-334B, PZR SPRAY LOOP 2.</p> <ul style="list-style-type: none"> • PZR spray demand meters, <p>1-PIC-68-334B and</p> <p>1-PIC-68-334D indicating ZERO [1-M-4]</p> <p>RO observes position indications for 1-PIC-68-334D, PZR SPRAY LOOP 1, and 1-PIC-68-334B, PZR SPRAY LOOP 2.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>4</u>	Page	<u>16</u>	of	<u>47</u>
Event Description:	1-PCV-68-334, PZR PORV to open. Requires the RO to take IMMEDIATE OPERATOR ACTION to attempt to close 1-HS-68-334A and/or to close 1-HS-68-332A, BLOCK VALVE FOR PORV 334. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," Section 3.2, "PZR Pressure Drop Due to Failed PORV/Safety or Spray Valve." Requires a Tech Spec evaluation.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>2. CHECK PZR PORVs CLOSED</p> <ul style="list-style-type: none"> • PORV indicating lights <p>RO observes 1-HS-68-334A RED indicating light is LIT, GREEN indicating light is DARK.</p> <ul style="list-style-type: none"> • tailpipe temperature <p>RO observes elevated temperature on 1-TI-68-331, PORV 340A & 334 TAILPIPE TEMP.</p> <ul style="list-style-type: none"> • acoustic monitoring <p>BOP may be sent to observe 1-XI-68-363, PZR VALVES ACOUSTIC MONITOR. If dispatched, the BOP observes 1-XI-68-334 indicating lights are LIT.</p>
	RO	<p>2. RESPONSE NOT OBTAINED:</p> <p>IF PZR press is less than 2335, THEN CLOSE PORV OR CLOSE associated block valve.</p> <p>Since this is an IMMEDIATE ACTION step, it is expected that 1-HS-68-334A may be in the CLOSE position AND 1-HS-68-332A will be in the CLOSED position.</p>
	RO	<p>3. VERIFY actions taken in Steps 1 and 2 have STOPPED press drop.</p> <p>RO observes RCS pressure on 1-PI-68-340A, 1-PI-68-334, 1-PI-68-323, 1-PI-68-322, PZR PRESS rising.</p>
	RO BOP	<p>4. CHECK PZR Safeties CLOSED:</p> <ul style="list-style-type: none"> • tailpipe temperatures <p>RO observes elevated temperature on 1-TI-68-331, PORV 340A & 334 TAILPIPE TEMP.</p> <ul style="list-style-type: none"> • acoustic monitor <p>BOP may be sent to observe 1-XI-68-363, PZR VALVES ACOUSTIC MONITOR. If dispatched, the BOP observes 1-XI-68-334 indicating lights are LIT.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>4</u>	Page	<u>17</u>	of	<u>47</u>
Event Description:	1-PCV-68-334, PZR PORV to open. Requires the RO to take IMMEDIATE OPERATOR ACTION to attempt to close 1-HS-68-334A and/or to close 1-HS-68-332A, BLOCK VALVE FOR PORV 334. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," Section 3.2, "PZR Pressure Drop Due to Failed PORV/Safety or Spray Valve." Requires a Tech Spec evaluation.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	RO	5. ENSURE PZR heaters on as required: <ul style="list-style-type: none"> • Control Group on at 2220 psig • Backup Groups on at 2210 psig
	RO	6. CHECK aux spray, 1-FCV-62-84, CLOSED. <i>RO observes handswitch 1-HS-62-84, AUX SPRAY TO PZR, in the "CLOSED" position with the RED indicating light DARK and the GREEN indicating light LIT.</i>
	RO	7. CHECK PZR press STABLE or RISING. <i>RO observes RCS pressure on 1-PI-68-340A, 1-PI-68-334, 1-PI-68-323, 1-PI-68-322, PZR PRESS rising.</i>
	RO	8. WHEN pressurizer pressure stable and equipment status supports returned to normal, THEN ENSURE the following in AUTO: <ul style="list-style-type: none"> • PZR Master controller • PZR spray controllers • All heater groups

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>4</u>	Page	<u>18</u>	of	<u>47</u>
Event Description:	1-PCV-68-334, PZR PORV to open. Requires the RO to take IMMEDIATE OPERATOR ACTION to attempt to close 1-HS-68-334A and/or to close 1-HS-68-332A, BLOCK VALVE FOR PORV 334. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," Section 3.2, "PZR Pressure Drop Due to Failed PORV/Safety or Spray Valve." Requires a Tech Spec evaluation.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	SRO	<p>9. REFER TO the following Tech Specs:</p> <ul style="list-style-type: none"> • 3.3.1, RTS Instrumentation Not applicable • 3.3.2, Engineered Safety Feature Actuation System (ESFAS) Instrumentation Not applicable • 3.3.4, Remote Shutdown System Not applicable • 3.4.1, RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits <p>May be applicable, depending upon severity of pressure drop when the PORV opened.</p> <ul style="list-style-type: none"> • 3.4.3, RCS Pressure and Temperature (P/T) Limits Not applicable • 3.4.9, Pressurizer Not applicable • 3.4.10, Pressurizer Safety Valves Not applicable • 3.4.11, Pressurizer Power-Operated Relief Valves <p>Condition B. One PORV inoperable and not capable of being manually cycled.</p> <p>Close associated block valve within 1 hour.</p> <p>AND</p> <p>Remove power from associated block valve within 1 hour</p> <p>AND</p> <p>Restore PORV to OPERABLE status within 72 hours.</p>
	SRO	<p>10. INITIATE repairs to failed equipment.</p> <p>When SRO contacts Work control to have power removed from 1-FCV-68-332A BLOCK VLV FOR PZR PORV 334, and for a troubleshooting and repair package for 1-PCV-68-334, repeat back request.</p>
	SRO	<p>11. RETURN TO Instruction in effect.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>4</u>	Page	<u>19</u>	of	<u>47</u>
Event Description:	1-PCV-68-334, PZR PORV to open. Requires the RO to take IMMEDIATE OPERATOR ACTION to attempt to close 1-HS-68-334A and/or to close 1-HS-68-332A, BLOCK VALVE FOR PORV 334. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System," Section 3.2, "PZR Pressure Drop Due to Failed PORV/Safety or Spray Valve." Requires a Tech Spec evaluation.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

EXAMINER: The crew briefing is optional. The next event, Event 5, may be entered prior to the brief, at the discretion of the Chief Examiner.

	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>

If not already cued, Console Operator will check with Chief Examiner prior to inserting Event 5.

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>5</u>	Page	<u>20</u>	of	<u>47</u>
Event Description:		<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

Indications: 237-C RCP 1 OIL CLRS RET FLOW LO 238-C RCP 2 OIL CLRS RET FLOW LO 239-C RCP 3 OIL CLRS RET FLOW LO 240-C RCP 4 OIL CLRS RET FLOW LO		
	BOP	Diagnoses and announces the leak on the RCP oil cooler line.
	BOP	May enter and take actions of ARI 237(238, 239, 240)-C RCP 1 (2, 3, 4) OIL CLRS RET FLOW LO.
	SRO	Enters and directs actions of AOI-15, "Loss of Component Cooling Water (CCS)."
ARI 237-C		The following actions are taken from ARI 237-C RCP 1 OIL CLRS RET FLOW LO.
	BOP	[1] IF Phase B initiated, THEN GO TO Emergency Instructions.
	BOP	[2] CHECK the following [0-M-27B], AND COMPARE with other RCPs: • 1-FI-70-116, RCP 1 UPR OIL CLR FLOW • 1-FI-70-119, RCP 1 LWR OIL CLR FLOW
		[3] ENSURE CCS isolation valves OPEN: • 1-FCV-70-100 and -140, RCP OIL CLRS SUP CIV-ØB • 1-FCV-70-89 and -92, RCP OIL CLRS RET CIV-ØB

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>5</u>	Page	<u>21</u>	of	<u>47</u>
Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
<p>FINAL SUBMITTAL</p>									
Time	Position	Applicant's Actions or Behavior							

	BOP	[4] CHECK 1-PI-70-24A, CCS HX A SUP PRESS [0-M-27B], AND START CCS Pumps as necessary to maintain press between 40 and 108 psig.
	BOP	<p>[5] IF flow NOT restored, THEN:</p> <p>[5.1] MONITOR RCP temps on computer.</p> <p>[5.2] IF bearing temp greater than or equal to 195°F, THEN GO TO AOI-24, RCP MALFUNCTIONS DURING PUMP OPERATION.</p> <p>[5.3] REFER TO AOI-15, LOSS OF COMPONENT COOLING WATER (CCS).</p> <p>[5.4] ADJUST 1-THV-70-695A or 1-THV-70-696A per TI-31.08, FLOW BALANCING VALVES SETPOINTS.</p>
AOI-15		The following actions are taken from AOI-15, "Loss of Component Cooling Water (CCS)," Section 3.2, "Loss of CCS Flow."
	BOP	<p>1. CHECK CCS pumps status:</p> <p>a. CHECK any CCS pump TRIPPED or running pump NOT pumping forward:</p> <ul style="list-style-type: none"> • ERCW/CCS Motor tripout alarm, • Low header pressure (Train A or B), • Multiple low flow alarms. <p>BOP observes and reports that the proper CCS pumps are in service and pumping forward.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>5</u>	Page	<u>22</u>	of	<u>47</u>
Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
<p>FINAL SUBMITTAL</p>									
Time	Position	Applicant's Actions or Behavior							

	SRO	<p>1. RESPONSE NOT OBTAINED:</p> <p>a. GO TO CAUTION prior to Step 2.</p>
<p align="center">CAUTION</p> <p>A closed Surge Tank vent valve may cause a positive or negative tank pressure, giving an erroneous level indication.</p>		
	BOP	<p>2. CHECK 1-FCV-70-66, U1 Surge Tank Vent, OPEN.</p> <p><i>BOP observes handswitch 1-HS-70-66A, U1 SURGE TANK VENT, RED indicating light is LIT and the GREEN indicating light is DARK.</i></p>
	BOP	<p>3. IF Surge Tank level less than 57%, THEN ENSURE 1-LCV-70-63, U1 Surge Tank Makeup LCV, OPEN (Refer to SOI-70.01 as required if makeup NOT available).</p> <p><i>BOP observes handswitch 1-HS-70-63A, U1 SURGE TANK MAKEUP, RED indicating light is LIT and the GREEN indicating light is DARK.</i></p>
	BOP	<p>4. MONITOR A and B side Surge Tank levels greater than 10%.</p>
	BOP	<p>5. IF RHR Shutdown Cooling is inservice, THEN ** GO TO AOI-14, Loss of RHR Shutdown Cooling.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>5</u>	Page	<u>23</u>	of	<u>47</u>
Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
<p>FINAL SUBMITTAL</p>									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>6. MONITOR the following for Unit 1 CCS Train A:</p> <ul style="list-style-type: none"> • U-1 CCS Train A level • ERCW flow to CCS HX A <p>IF loss of either is imminent, THEN PERFORM the following: <i>SRO determines that although surge tank level is dropping, level loss is NOT IMMINENT and continues to the RESPONSE NOT OBTAINED column.</i></p>
	BOP	<p>6. RESPONSE NOT OBTAINED: GO TO Step 7.</p>
	BOP	<p>7. MONITOR the following for Unit 1 CCS Train B:</p> <ul style="list-style-type: none"> • U-1 CCS Train B level • ERCW flow to CCS HX C <p>IF loss of either is imminent, THEN STOP and LOCKOUT the following Train B equipment:</p> <ul style="list-style-type: none"> • CCS pumps C-S & 2B-B, • CS pump 1B-B, • RHR pump 1B-B, • SI pump 1B-B, • CCP 1B-B. <p><i>SRO determines that Train B surge tank level loss is NOT IMMINENT and continues without stopping pumps.</i></p>

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Event Description:		<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>							
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	BOP	<p>8. CHECK all RCP upper and lower oil cooler flows NORMAL:</p> <ul style="list-style-type: none"> • Upper cooler flow: 150 - 220 gpm. • Lower cooler flow: 5 - 10 gpm. <p><i>BOP observes upper and lower oil cooler flows and determines that all flows are low.</i></p>
	BOP	<p>8. RESPONSE NOT OBTAINED:</p> <p>IF oil cooler flow abnormally high or low indicating possible line break, THEN:</p> <p>a. CLOSE RCP oil cooler isol valves:</p> <ul style="list-style-type: none"> • 1-FCV-70-100 or 1-FCV-70-140, RCP Oil Coolers Supply CIV. <p><i>BOP places at least 1-HS-70-100A, RCP OIL CLRS SUP CIV ϕB OR 1-HS-70-140A, RCP OIL CLRS SUP CIV ϕB in the CLOSED position.</i></p> <ul style="list-style-type: none"> • 1-FCV-70-89 or 1-FCV-70-92, RCP Oil Coolers Return CIV. <p><i>BOP places at least 1-HS-70-89A, RCP OIL CLRS RET CIV ϕB OR 1-HS-70-92A, RCP OIL CLRS RET CIV ϕB in the CLOSED position.</i></p>

EXAMINER:

Enter time flow to oil coolers terminated: _____

CAUTION

RCPs can be operated for up to 10 minutes after loss of CCS flow.

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Event Description:		<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>							
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		<p>8. RESPONSE NOT OBTAINED: (Continued.)</p> <p>b. TRIP Reactor.</p> <p><i>When the reactor trip is attempted, the trip is unsuccessful from both 1-RT-1 REACTOR TRIP (1-M-4) and 1-RT-2 REACTOR TRIP (1-M-6).</i></p>
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Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
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FR-S.1		When the applicants initiate a reactor trip, the trip fails. This requires entry into FR-S.1, "Nuclear Power Generation/ATWS."
<p align="center">NOTE</p> <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	Performs IMMEDIATE OPERATOR ACTIONS. Attempts to manually trip the reactor from 1-M-4 and 1-M-6. When actions are unsuccessful, the RO begins to insert the control rods.
	BOP	Performs IMMEDIATE OPERATOR ACTIONS. Manually trips the turbine from 1-M-2.
<p align="center">CAUTION</p> <p>RCPs should not be tripped UNTIL reactor power is less than 5%.</p>		
<p align="center">EXAMINER:</p> <p>Enter time RCPs removed from service: _____</p>		
<p align="center">NOTE</p> <p>Steps 1 and 2 are IMMEDIATE ACTION steps.</p>		

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Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
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EXAMINER: When the Console Operator receives the communication from the RO dispatching personnel to open the reactor trip breakers locally OR to open the MG set supply breakers, the Console Operator will wait 3 minutes, then will remove malfunction rp01c to clear the ATWS, and enter malfunctions rp51a and rp51b to open the reactor trip breakers.

Critical Task 1

Insert negative reactivity into the core by inserting control rods.

<i>Critical Task 1</i>	RO	<p>1. RESPONSE NOT OBTAINED:</p> <p>Manually TRIP reactor.</p> <p>IF reactor will NOT trip, THEN INSERT control rods.</p> <p><i>RO observes rods inserting at 72 steps per minute in AUTOMATIC. When the rod speed slows to 48 steps per minute, the RO transfers from AUTO to MAN on 1-RBSS, ROD BANK SELECT. After selecting MAN, the RO inserts rods at 48 steps per minute by holding 1-FLRM, ROD MOTION CONTROL to the "IN" position.</i></p>
	BOP	<p>2. ENSURE Turbine Trip:</p> <ul style="list-style-type: none"> • All turbine stop valves CLOSED.
	BOP	<p>3. CHECK AFW pumps operation:</p> <ul style="list-style-type: none"> a. Both MD AFW pumps RUNNING. b. TD AFW pump RUNNING. c. LCVs in AUTO or controlled in MANUAL.

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>5</u>	Page	<u>28</u>	of	<u>47</u>
<p>Event Description: A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>									
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	BOP	3. RESPONSE NOT OBTAINED: Manually START pumps and open valves as necessary.
	BOP	4. INITIATE RCS Boration: a. ENSURE at least one centrifugal charging pump RUNNING . b. OPEN RWST outlet valves 1-LCV-62-135 and 1-LCV-62-136. c. CLOSE VCT outlet valves 1-LCV-62-132 and 1-LCV-62-133. d. OPEN BIT outlet valves 1-FCV-63-25 and 1-FCV-63-26. e. CHECK BIT flow. f. PLACE BA pumps in FAST speed. g. Throttle OPEN emergency borate valve 1-FCV-62-138 to maintain boric acid flow greater than 35 gpm.
	BOP	5. CHECK pwr pressure less than 2335 psig.
	SRO	6. VERIFY Contmt Vent Isolation: • Train A GREEN. • Train B GREEN.
	BOP	6. RESPONSE NOT OBTAINED: PERFORM the following: a. ENSURE containment purge supply and exhaust fans STOPPED. [M-9] <i>Since purge was not in service, the containment purge supply and exhaust fans all be found in the STOP, PULL-TO-LOCK position.</i> b. CLOSE dampers. [M-9]

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>5</u>	Page	<u>29</u>	of	<u>47</u>
Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
FINAL SUBMITTAL									
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	BOP	7. IF AFW flow established, THEN a. PLACE 1-HS-3-45 to LONG CYCLE RECIRC. b. PLACE MFW Bypass Reg Valves in AUTO.
	SRO	8. IF SI actuated OR required, THEN PERFORM Steps 1 through 6 of E-0, Reactor Trip or Safety Injection, as time allows.
	RO	9. ENSURE the following trips: a. Reactor Trip.
	RO	9.a. RESPONSE NOT OBTAINED: a. DISPATCH operator to locally trip reactor: • OPEN reactor trip breakers and MG set output breakers [MG set room]. • OPEN breakers to MG sets [480V unit boards A and B].
	BOP	b. Turbine Trip.
	RO	10. MAINTAIN rod insertion UNTIL rods fully inserted.
EXAMINER: Console Operator will <u>enter the Steam Line break</u> at this time when contacted as Shift Manager to REFER to EPIP-1 in the next step.		
	SRO	11. REFER TO EPIP-1, Emergency Plan Classification Flowchart for ATWS event. <i>When contacted as Shift Manager to refer to EPIP-1, Console operator will acknowledge the request and also insert the Steam Line break at this time.</i>

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Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
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	RO	<p>12. MONITOR reactor subcriticality:</p> <p>a. CHECK Power range channels less than 5%.</p> <p>b. CHECK Intermediate range startup rate NEGATIVE.</p> <p>c. GO TO Step 21.</p>
<p>EXAMINER: When the crew diagnoses the Steam Line break, they may perform the following actions while continuing FR-S.1:</p> <ul style="list-style-type: none"> • Initiate Safety Injection • Close the MSIVs 		
	RO	<p>21. TERMINATE emergency boration:</p> <p>a. PLACE BA transfer pumps in SLOW speed.</p> <p>b. CLOSE emergency borate valve 1-FCV-62-138.</p> <p>c. IF alternate boration opened, THEN Locally CLOSE 1-ISV-62-929.</p>
<p>NOTE</p> <p>If the reactor is verified to be subcritical, Status Trees may be implemented for other Red or Orange paths</p>		
	SRO	22. IMPLEMENT other Red or Orange paths identified on Status Trees
	SRO	23. IF SI actuated, THEN RETURN TO Instruction in effect.

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Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
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E-0		The following actions are taken from E-0, "Reactor Trip or Safety Injection."
NOTE		
<p>Steps 1 thru 4 are IMMEDIATE ACTION STEPS.</p> <p>Status Trees / SPDS should be monitored when transitioned to another instruction.</p>		
	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, RX 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>

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Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
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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:</p> <ul style="list-style-type: none"> • CSST (offsite), OR • D/G (blackout). <p>When observed by the RO during IMMEDIATE OPERATOR ACTIONS, both shutdown boards are energized, based on 1-EI-57-39, 6.9 SDB 1A-A VOLTS indicating approximately 7000 volts and 1-EI-57-66, 6.9 SDB 1B-B VOLTS indicating approximately 7000 volts.</p>
	RO	<p>4. CHECK SI actuated:</p> <p>a. Any SI annunciator LIT.</p> <p>RO will announce that the window 70-A, SI ACTUATED is LIT. May also announce that FIRST OUT 76-G SI MANUAL is LIT.</p> <p>b. Both trains SI ACTUATED.</p> <ul style="list-style-type: none"> • 1-XX-55-6C • 1-XX-55-6D

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Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
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EXAMINER: E-0, "Reactor Trip or Safety Injection," Appendixes A and B are included as Attachment 2.

	BOP	5. PERFORM Appendixes A and B, E-0, pages 16-30 <i>SRO assigns BOP to perform Appendixes A and B. Handout for E-0 contains copy for EXAMINER assigned to BOP.</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].
EXAMINER: Crew may isolate AFW to faulted S/G #1 at this point.		
	RO	8. 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:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
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	RO	<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>RO 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>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.</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>EXAMINER: PORV 334 will indicate open and its Block valve will indicate closed in the next step due to previous failure.</p>		

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Event Description:		<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>							
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	RO	<p>10. CHECK pzz PORVs and block valves:</p> <p style="margin-left: 20px;">a. Pzz PORVs CLOSED.</p> <p style="margin-left: 20px;">b. At least one block valve OPEN.</p> <p>RO observes 1-HS-68-340AA, PZR PORV 340A, GREEN indicating light is LIT, RED indicating light is DARK.</p> <p>RO observes 1-HS-68-334A, PZR PORV 334, RED indicating light is LIT, GREEN indicating light is DARK.</p> <p>RO observes 1-HS-68-333A, BLOCK VLV FOR PORV 340A, GREEN indicating light is DARK, RED indicating light is LIT.</p> <p>RO observes 1-HS-68-332A, BLOCK VLV FOR PORV 334, GREEN indicating light is LIT, RED indicating light is DARK.</p>
	RO	<p>11. CHECK pzz safety valves CLOSED:</p> <p style="margin-left: 20px;">• EVALUATE tailpipe temperatures and acoustic monitors.</p> <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 elevated temperatures due to the previous failure of 1-PCV-68-334.</p>
	RO	<p>12. CHECK pzz sprays CLOSED.</p> <p>RO observes the GREEN indicating lights are LIT for 1-XI-68-334B, PZR SPRAY LOOP 2 and 1-XI-68-334D, PZR SPRAY LOOP 1</p>
<p>NOTE</p> <p>Seal injection flow should be maintained to all RCPs.</p>		

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Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>13. CHECK if RCPs should remain in service:</p> <p>a. Phase B signals DARK [MISSP].</p> <p><i>SRO may have directed that the RCPs be shutdown when power was less than 5%, due to the loss of oil cooler flow.</i></p>
	RO	<p>a. RESPONSE NOT OBTAINED:</p> <p>STOP all RCPs. GO TO Step 14.</p>
	RO	<p>14. CHECK S/G pressures:</p> <ul style="list-style-type: none"> • All S/G pressures controlled or rising. <p><i>RO observes PAM pressure instruments on SG 1 through 4 (black labels) and determines that pressure on SG 1 is NOT 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.</i></p> <ul style="list-style-type: none"> • All S/G pressures greater than 120 psig. <p><i>RO observes PAM pressure instruments on SG 1 through 4 (black labels) and determines that pressure is low on SG 1.</i></p>
	SRO	<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>

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>5</u>	Page	<u>37</u>	of	<u>47</u>
Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
<p>FINAL SUBMITTAL</p>									
Time	Position	Applicant's Actions or Behavior							

E-2		The following actions are taken from E-2, "Faulted Steam Generator Isolation."
CAUTION		
If a faulted S/G is NOT needed for RCS cooldown, it should remain isolated during subsequent recovery actions.		
	RO	<p>1. ENSURE all MSIVs and MSIV bypasses CLOSED.</p> <p><i>RO determines that the MSIVs are CLOSED based on GREEN and BLUE indicating lights LIT on handswitches.</i></p>
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	<p>2. PLACE steam dump controls OFF:</p> <ul style="list-style-type: none"> • 1-HS-1-103A, STEAM DUMP FSV "A". • 1-HS-1-103B, STEAM DUMP FSV "B". <p><i>SRO observes that the steam dump controls were placed in the OFF position during E-0 performance.</i></p>
	BOP	<p>3. CHECK for at least one Intact S/G:</p> <ul style="list-style-type: none"> • Any S/G pressure controlled or rising, OR • Any S/G pressure greater than P-sat for RCS incore temperature. <p><i>BOP determines that SG 1 is FAULTED and that the remaining SGs are INTACT based on SG pressure response.</i></p>

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Event Description: A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.

**FINAL
SUBMITTAL**

Time	Position	Applicant's Actions or Behavior
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	BOP	<p>4. IDENTIFY Faulted S/G based on ANY of the following:</p> <ul style="list-style-type: none"> Any S/G pressure dropping in an uncontrolled manner, OR Any S/G pressure less than 120 psig, OR S/G enclosure temps high: <ol style="list-style-type: none"> 1) T1002A for 2 and 3, 2) T1003A for 1 and 4. OR Local indication of break in any of the following: <ol style="list-style-type: none"> 1) Main steam lines, 2) Main feedwater lines, 3) Other secondary piping.
<p align="center">CAUTION</p> <ul style="list-style-type: none"> If the turbine-driven AFW pump is the only available source of feed flow, steam supply to the turbine-driven AFW pump must be maintained from one SG. RCS cooldown requires the availability of at least one S/G. 		

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>5</u>	Page	<u>39</u>	of	<u>47</u>
Event Description:		<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

Critical Task 2		
<i>Isolate the faulted steam generator (SG 1) prior to exiting E-2, "Faulted Steam Generator Isolation."</i>		
Critical Task 2	BOP	<p>5. ISOLATE Faulted S/G:</p> <p style="margin-left: 20px;">a. ISOLATE AFW flow to Faulted S/G.</p> <p><i>BOP rotates 1-HS-3-164A, SG 1 SUPPLY LCV-3-164 CNTL from the AUTO position to the ACC. RESET MODULATE position. The BOP then rotates 1-HS-3-164A, SG 1 SUPPLY LCV-3-164 CNTL to the CLOSE position and PULLS the switch OUT.</i></p> <p><i>BOP rotates 1-HS-3-174A, SG 1 SUPPLY LCV-3-174 CNTL from the AUTO position to the ACC. RESET MODULATE position. The BOP then rotates 1-HS-3-174A, SG 1 SUPPLY LCV-3-174 CNTL to the CLOSE position and PULLS the switch OUT.</i></p> <p style="margin-left: 20px;">b. ENSURE MFW ISOLATED to Faulted S/G:</p> <ul style="list-style-type: none"> • MFW isolation and bypass isolation valves CLOSED. <p><i>BOP observes 1-HS-3-33A, SG 1 MFW ISOL VLV, 1-HS-3-47A, SG2 MFW ISOL VLV, 1-HS-3-87A, SG 3 MFW ISOL VLV and 1-HS-3-100A, SG 4 MFW ISOL VLV, RED indicating lights are DARK, GREEN indicating lights are LIT</i></p> <p><i>BOP observes 1-XI-3-236, SG 1 MFW BYP ISOL VLV, 1-XI-3-239, SG2 MFW BYP ISOL VLV, 1-XI-3-242, SG 3 MFW BYP ISOL VLV and 1-XI-3-245, SG 4 MFW BYP ISOL VLV, RED indicating lights are DARK, GREEN indicating lights are LIT</i></p> <p>(Continued Next Page)</p>

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>5</u>	Page	<u>40</u>	of	<u>47</u>
Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

Critical Task 2 (Cont'd)	BOP	<ul style="list-style-type: none"> • MFW reg and bypass reg valves CLOSED. <p>BOP observes 1-XX-3-35 MFW REG, RED indicating lights are DARK, GREEN indicating lights are LIT.</p> <p>BOP observes 1-XX-3-35A BYP REG, RED indicating lights are DARK, GREEN indicating lights are LIT.</p> <ul style="list-style-type: none"> • MFPs TRIPPED. <p>BOP observes 1-HS-46-9A, MFPT A TRIP-RESET and 1-HS-46-36A, MFPT B TRIP-RESET RED indicating lights are DARK, GREEN indicating lights are LIT.</p> <p>BOP observes 1-HS-3-200A, Standby MFWP Switch, RED indicating light is DARK, GREEN indicating light is LIT.</p> <p>c. ENSURE Faulted S/G PORV CLOSED.</p> <p>BOP may rotate 1-HS-1-6, SG 1 PORV PCV-1-5 from the P-AUTO position to the CLOSE position. BOP observes the RED indicating light is DARK, GREEN indicating light is LIT.</p> <p>d. ENSURE Faulted S/G blowdown ISOLATED.</p> <p>BOP may rotate 1-HS-1-7/181 SG 1 BLOWDOWN VLVS from the P-AUTO position to the CLOSE position. BOP observes RED indicating light is DARK, GREEN indicating light is 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>	
	BOP	6. ENSURE TD AFW pump being supplied from Intact S/G.
	BOP	7. MONITOR CST volume greater than 200,000 gal.

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>5</u>	Page	<u>41</u>	of	<u>47</u>
Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
<p>FINAL SUBMITTAL</p>									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>8. WHEN RCS temperature is stable or rising following Faulted S/G blowdown, THEN ADJUST Intact S/G PORV controllers in AUTO to:</p> <ul style="list-style-type: none"> • P-sat for the highest RCS temp (one or more RCPs running) <p><i>Not applicable, since the RCPs were previously stopped due to loss of CCS flow to the oil coolers.</i></p> <p>OR</p> <ul style="list-style-type: none"> • P-sat for the highest T-cold temp (no RCPs running) <p><i>BOP or RO will check 1-TI-68-18, LOOP 1 CL TEMP, 1-TI-68-41, LOOP 2 CL TEMP, 1-TI-68-60, LOOP 3 CL TEMP and 1-TI-68-83, LOOP 4 CL TEMP to determine the highest T-cold temperature. The BOP or RO will then refer to steam tables or the ICS computer to determine the saturation pressure.</i></p> <p><i>The BOP will then lower the setting of 1-PIC-1-13A, SG 2 PORV FCV-1-12, 1-PIC-1-24A, SG 3 PORV FCV-1-23, and 1-PIC-1-31A, SG 1 PORV FCV-1-30 to the saturation pressure identified.</i></p>
	BOP	<p>9. CHECK secondary side radiation:</p> <ul style="list-style-type: none"> • S/G discharge monitors NORMAL. • Condenser vacuum exhaust rad monitors NORMAL. • S/G blowdown rad monitor recorders NORMAL trend prior to isolation. • S/G sample results by Chemistry.

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>5</u>	Page	<u>42</u>	of	<u>47</u>
Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>10. CHECK SI termination criteria:</p> <p>a. CHECK RCS subcooling greater than 65°F [85°F ADV].</p> <p>b. CHECK secondary heat sink available with either:</p> <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]. <p>c. CHECK RCS pressure stable or rising.</p> <p>d. CHECK pZR level greater than 15% [33% ADV].</p> <p><i>It is possible that PZR level may not be greater than 33% when the crew reaches this step. If PZR level is less than 33%, the crew will transition to E-1, "Loss of Reactor or Secondary Coolant," instead of ES-1.1, "SI Termination." Both paths are acceptable, and are provided in the scenario.</i></p>
<p>EXAMINER: Scenario may be terminated at this point at the discretion of the Chief Examiner.</p>		
	SRO	<p>d. RESPONSE NOT OBTAINED:</p> <p>RESTORE pZR level:</p> <p>1) ATTEMPT to stabilize RCS pressure with normal pZR sprays.</p> <p>2) ** GO TO Step 11.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>5</u>	Page	<u>43</u>	of	<u>47</u>
Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	SRO	e. GO TO ES-1.1, SI Termination. <i>When the transition to ES-1.1, "SI Termination," is directed by the SRO, inform the applicants that another crew will continue from this point.</i>
	SRO	11. GO TO E-1, Loss of Reactor or Secondary Coolant.

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Event Description: A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
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E-1

The following actions are taken from E-1, "Loss of Reactor or Secondary Coolant."

NOTE

Seal injection flow should be maintained to all RCPs.

	SRO	1. CHECK if RCPs should remain in service: a. Phase B DARK [MISSP]. b. RCS pressure greater than 1500 psig. <i>RCPs should have been stopped prior to reaching this step.</i>
	SRO	2. REFER TO EPIP-1, Emergency Plan Classification Flowchart.
NOTE		
Time since initiation of event is defined by performance of Step 3.		
	SRO	3. RECORD current time to mark initiation of LOCA and determination of time for hot leg recirc.
	BOP	4. CHECK S/G pressures: • All S/G pressures controlled or rising. • All S/Gs pressures greater than 120 psig.
	SRO	4. RESPONSE NOT OBTAINED: IF Faulted S/G has NOT been isolated, THEN ** GO TO E-2, Faulted Steam Generator Isolation. <i>The faulted SG isolation has already been addressed during performance of E-2, "Faulted Steam Generator Isolation," so a transition is NOT required.</i>

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Event Description: A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
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	BOP	<p>5. MAINTAIN Intact S/G NR levels:</p> <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].
	BOP	<p>6. CHECK secondary radiation:</p> <ul style="list-style-type: none"> • S/G discharge monitors NORMAL. • Condenser vacuum exhaust rad monitors NORMAL. • S/G blowdown rad monitor recorders NORMAL trend prior to isolation.
	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].
<p>EXAMINER: PORV 334 will indicate open and its Block valve will indicate closed in the next step due to previous failure.</p>		

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Event Description: A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.

**FINAL
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Time	Position	Applicant's Actions or Behavior
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	RO	<p>8. MONITOR 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, GREEN indicating light is LIT, RED indicating light is DARK.</i></p> <p><i>RO observes 1-HS-68-334A, PZR PORV 334, RED indicating light is LIT, GREEN indicating light is DARK.</i></p> <p><i>RO observes 1-HS-68-333A, BLOCK VLV FOR PORV 340A, 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, GREEN indicating light is LIT, RED indicating light is DARK.</i></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>
	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.

Op Test No.:	<u>2</u>	Scenario #	<u>2</u>	Event #	<u>5</u>	Page	<u>47</u>	of	<u>47</u>
Event Description:	<p>A leak develops on the RCP oil cooler supply header line inside containment. Requires entry into AOI-15, "Loss of Component Cooling Water (CCS)." After the RCP oil cooler flow path is isolated, requires a manual reactor trip to remove the RCPs from service. Reactor fails to trip (ATWS). Requires entry into FR-S.1, "Nuclear Power Generation/ATWS." RCPs are left in service until reactor power is reduced below 5%. ALL AFW pumps fail to automatically start. Requires the BOP to manually start each AFW pump. Main steam line break on Loop 1 inside containment. Requires performance of E-0, "Reactor trip or Safety Injection" and E-2, "Faulted Steam Generator Isolation," after FR-S.1, "Nuclear Power Generation/ATWS," allows performance.</p>								
<p>FINAL SUBMITTAL</p>									
Time	Position	Applicant's Actions or Behavior							

	SRO	<p>11. CHECK SI termination criteria:</p> <p>a. CHECK RCS subcooling greater than 65°F [85°F ADV].</p> <p>b. CHECK secondary heat sink available with either:</p> <ul style="list-style-type: none"> • Total feed flow to Intact S/Gs greater than 410 gpm, <p>OR</p> <ul style="list-style-type: none"> • At least one Intact S/G NR level greater than 29% [39% ADV]. <p>c. CHECK RCS pressure stable or rising.</p> <p>d. CHECK pwr level greater than 15% [33% ADV].</p> <p>e. ** GO TO ES-1.1, SI Termination.</p>
<p>EXAMINER: When the transition to ES-1.1, "SI Termination," is directed by the SRO, inform the applicants that another crew will continue from this point.</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 = 1031 ppm			
<ul style="list-style-type: none"> • Abnormal equipment lineup / conditions: <u>1B-B RHR pump is out of service for motor winding inspection. LCO 3.5.2 and 3.6.6 were entered 1 hour ago. 1B-B RHR pump is expected to be returned to service in 12 hours. Protected equipment signs have been posted for 1A-A RHR pump. 1B Condensate Booster pump has an oil leak, and is being monitored every 30 minutes.</u> • SI/Test in progress/planned: (including need for conduct of evolution briefings) _____ _____ _____ • Major Activities/Procedures in progress/planned: <u>Train B/Channel II Work Week. 100% power, RCS boron concentration 1031 ppm. Control Bank D is at 220 steps. A power reduction to 95% at 2%/min using AOI-39, "Rapid Load Reduction," is required to be performed to remove the 1B Condensate Booster pump from service.</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

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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 Unit Station _____	_____ _____ _____ _____ _____
			<u>Off-going - Name</u>
			<u>On-coming - Name</u>
Part 1 - Completed by off-going shift / Reviewed by on-coming shift:			
RCS Cb = 1031 ppm			
<ul style="list-style-type: none"> • Abnormal equipment lineup / conditions: <u>1B-B RHR pump is out of service for motor winding inspection. LCO 3.5.2 and 3.6.6 were entered 1 hour ago. 1B-B RHR pump is expected to be returned to service in 12 hours. Protected equipment signs have been posted for 1A-A RHR pump. 1B Condensate Booster pump has an oil leak, and is being monitored every 30 minutes.</u> • SI/Test in progress/planned: (including need for conduct of evolution briefings) _____ _____ _____ • Major Activities/Procedures in progress/planned: <u>Train B/Channel II Work Week. 100% power, RCS boron concentration 1031 ppm. Control Bank D is at 220 steps. A power reduction to 95% at 2%/min using AOI-39, "Rapid Load Reduction," is required to be performed to remove the 1B Condensate Booster pump from service.</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 2

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 2

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
5.	CHECK cntmt isolation: a. Phase A isolation: <ul style="list-style-type: none"> • Train A GREEN. • Train B GREEN. b. Cntmt vent isolation: <ul style="list-style-type: none"> • 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
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26. **ENSURE** Control Building fans
STOPPED and dampers CLOSED:

- SPREADING ROOM SUPPLY
and EXH FANS AND dampers.
- TOILET & LKR RM EXHAUST
FAN AND dampers.

Manually **STOP** fans **AND**

NOTIFY TSC if any damper **NOT**
CLOSED.

27. **INITIATE** Appendix B (E-0), Phase B
Pipe Break Contingencies.

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)



Watts Bar Nuclear Plant

Unit 1

Abnormal Operating Instruction

AOI-39

Rapid Load Reduction

Revision 0014

Quality Related

Level of Use: Continuous Use

Effective Date: 03-02-2011

Responsible Organization: OPS, Operations

Prepared By: R. A. O'Rear

Approved By: Brian McInay

WBN Unit 1	Rapid Load Reduction	AOI-39 Rev. 0014
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Revision Log

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
9	06/20/06	2, 4, 5	Revised condenser backpressure requirements per PIC 52076-A
10	06/22/07	2, 4	Revised condenser backpressure requirements per DCN 52215 stage 1.
11	08/30/07	2, 6, 20, 21	Non-intent. Added Step 1 RNO transit to Appendix A on a failure of turbine load reduction in AUTO. Complies with changes made to GO-4 for PER125113.
12	03/07/08	4, 5-6, 12	Replaced Table 1 and cautions at beginning of step 3.1, Section 3.2 & 3.3 for DCN 52228.
13	02/24/10	All	<p>Converted from W95 to W2003 using Rev 12. Deleted table for recommended boration rates and referenced Reactivity Briefing Sheet. Added concern for AFD to Caution for over borating. Included Reactivity Control Plan discussion into section 4.0. [PCR 3827] Added steps to shutdown a MFP [PCR 3449] Added step to place EHC in IMP-IN. [PCR 4219] Enhanced steps for borating to provide flexibility to control AFD and Rod position. [PCR 3328, 3318]</p> <p>Changed target band for AFD to $\pm 3\%$ as outlined in NOB. Added TI-7.012 as a Developmental Ref.</p>
14	03/02/11	2, 4, 6-9, 13, 14, 17, 19, 22-24	<p>Reversed order of steps to ensure boration is started first as recommended by Reactivity Management Review Board.</p> <p>Minor editorial changes included: added page numbers to Diagnostic box, updated source identification, added Greek symbol (ρ) to steps directly affecting reactivity.</p>

WBN Unit 1	Rapid Load Reduction	AOI-39 Rev. 0014
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1.0 PURPOSE

This Instruction provides the guidance to initiate a controlled load reduction whenever plant conditions require a rapid power reduction without a reactor trip.

2.0 SYMPTOMS

- A. Tech Spec Safety Limit being exceeded.
- B. Tech Spec Limiting Condition for Operation (LCO) and/or ACTION not being satisfied due to circumstances in excess of those addressed in LCO 3.0.3.
- C. Expiration of a Tech Spec ACTION time.
- D. Serious condition requiring rapid load reduction to prevent or minimize a more serious condition, but not requiring a unit trip.
- E. The SM has determined that plant conditions require a rapid load reduction at less than or equal to 5% per minute.

2.2 Indications

- A. NONE

2.3 Automatic Actions

- A. If a signal has occurred requiring an Auto turbine runback and the runback failed to occur, then action should be taken in accordance with AOI-16, Loss Of Normal Feedwater or AOI-37, Turbine Runback Response.

WBN Unit 1	Rapid Load Reduction	AOI-39 Rev. 0014
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3.0 OPERATOR ACTIONS

3.1 Diagnostics

CAUTION

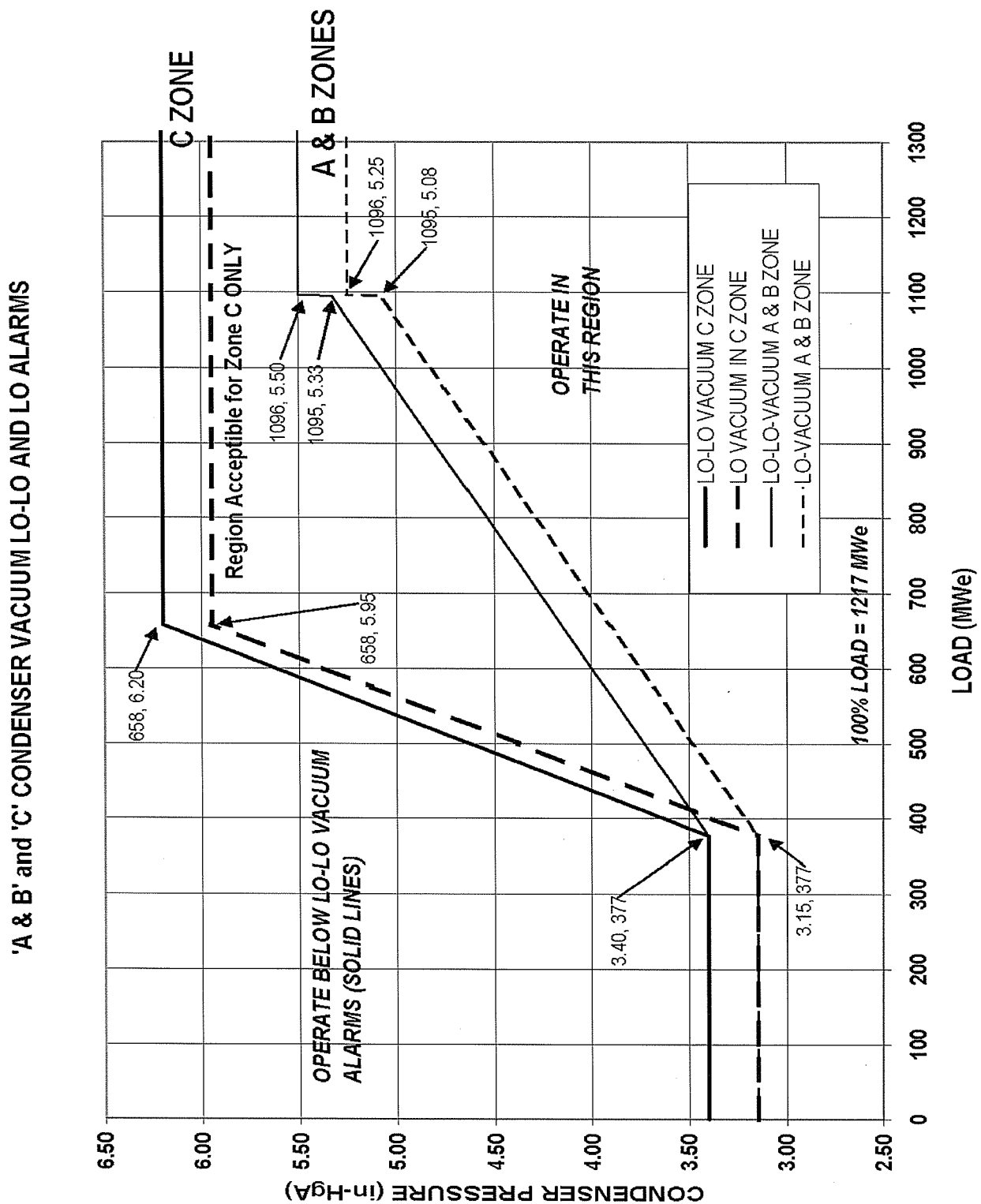
Condenser backpressure should be maintained less than the limits of Table 1 during load reduction-see next page.

NOTE

Load reduction rate shall be limited to a maximum of 5%/min. If greater than 5% is required or becomes necessary, then reactor should be tripped.

IF	GO TO Subsection	Page
Reactor power is greater than 50%	3.2	6
Reactor power is less than 50%	3.3	13

3.1 Diagnostics (continued)



WBN Unit 1	Rapid Load Reduction	AOI-39 Rev. 0014
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Step	Action/Expected Response	Response Not Obtained
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3.2 Power Reduction From Greater Than 50% Power

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.

1. **INITIATE** a manual boration:

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

b. **INITIATE** normal boration:

- 1) **ADJUST** BA flow controller, 1-FC-62-139, to desired flow rate.
- 2) **ADJUST** BA batch counter 1-FQ-62-139 to required quantity.
- 3) **PLACE** mode selector 1-HS-62-140B to BOR.
- 4) **(p) PLACE** VCT makeup control 1-HS-62-140A, to START.
- 5) **VERIFY** desired boric acid flow indicated on 1-FI-62-139.

a. **INITIATE** emergency boration.

- 1) **PLACE** boric acid transfer pump aligned to blender in FAST speed
- 2) **(p) ADJUST** 1-FCV-62-138 to establish desired flow rate.
- 3) **WHEN** boration is complete, **THEN** **CLOSE** 1-FCV-62-138, **AND** **PLACE** boric acid transfer pump used in SLOW speed

WBN Unit 1	Rapid Load Reduction	AOI-39 Rev. 0014
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Step	Action/Expected Response	Response Not Obtained
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3.2 Power Reduction From Greater Than 50% Power (continued)

- 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

2. **ESTABLISH** a turbine load reduction rate less than or equal to 5%/min:
- PLACE** turbine in IMP IN
 - SET** a desired load in the SETTER with the REFERENCE CONTROL.
 - SET** the LOAD RATE at less than or equal to 5%/min.
 - (p) **DEPRESS** GO pushbutton.
- SELECT** TURBINE MANUAL, and **PERFORM** Appendix A.
- OR
- CHECK** that turbine control has tripped to MANUAL as indicated by the TURBINE MANUAL pushbutton backlighted,
- (p) Momentarily **DEPRESS** the G.V. LOWER at intervals that control load reduction less than or equal to 5% /min.

WBN Unit 1	Rapid Load Reduction	AOI-39 Rev. 0014
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Step	Action/Expected Response	Response Not Obtained
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3.2 Power Reduction From Greater Than 50% Power (continued)

NOTE AFD green target band can be monitored using ICS Turn On code DOGHOUSE.

3. **MONITOR** rod position:

- Rods above Lo-Lo insertion limit
- AFD within Target Band

(p) ADJUST boric acid flow rate as needed to return rods to required position

IF higher boric acid flow rate is needed to compensate for load reduction rate, **THEN**
INITIATE emergency boration

1. **PLACE** boric acid transfer pump aligned to blender in FAST speed
2. **(p) ADJUST** 1-FCV-62-138 to establish desired flow rate.

WHEN boration is complete,
THEN
CLOSE 1-FCV-62-138,
AND
PLACE boric acid transfer pump used in SLOW speed

4. **REFER TO** EPIP-1, Emergency Plan Classification Flowchart

5. **NOTIFY** the Load Coordinator of the required load reduction and expected ramp rate

WBN Unit 1	Rapid Load Reduction	AOI-39 Rev. 0014
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Step	Action/Expected Response	Response Not Obtained
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3.2 Power Reduction From Greater Than 50% Power (continued)

NOTE If reactor power is stabilized at a lower level a drop in T-avg will occur due to Xenon build up. Dilution may be required to maintain power level.

- | | |
|---|---|
| <p>6. MONITOR T-avg and T-ref:</p> <ul style="list-style-type: none"> • T-ave trending to T-ref. • Mismatch less than 5°F. | <p>(p) CONTROL T-avg with Control Rods in manual.</p> <p>IF T-ave and T-ref mismatch can NOT be maintained less than 5°F,
THEN
TRIP reactor, and
** GO TO E-0, Reactor Trip or Safety Injection.</p> |
| <p>7. CHECK rate of power reduction is rapid enough for existing plant conditions.</p> | <p>(p) TRIP reactor, and
** GO TO E-0, Reactor Trip or Safety Injection.</p> |
| <p>8. NOTIFY Cnds Demin AUO of impending pmp shutdowns.</p> | |

WBN Unit 1	Rapid Load Reduction	AOI-39 Rev. 0014
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Step	Action/Expected Response	Response Not Obtained
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3.2 Power Reduction From Greater Than 50% Power (continued)

9. **WHEN** rated thermal power change exceeds 15% in one hour,
THEN
NOTIFY Chemistry to initiate 1-SI-68-28.
10. **WHEN** between 70 and 75% power,
THEN
REMOVE one Cnds Bstr Pmp and one Cnds Demin Pmp from service:
 - **PLACE** selected Cnds Bstr Pmp handswitch to STOP.
 - **PLACE** selected Cnds Demin Pmp handswitch to STOP, and **CLOSE** the suction valve.

WBN Unit 1	Rapid Load Reduction	AOI-39 Rev. 0014
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Step	Action/Expected Response	Response Not Obtained
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3.2 Power Reduction From Greater Than 50% Power (continued)

NOTE A MFPT may be removed from service at power levels between 65% and 45%, if approved by the SM.

NOTE If holding power level at less than 60%, the Cnds Demin pumps may be left running based on header pressure and the ability of the pumps to pump forward.

11. **WHEN** between 55 and 70% power,
THEN
REMOVE both operating Cnds Demin
Pumps and one of three #3 Heater
Drain Pumps from service:

- a. Simultaneously **PLACE** Cnds
Demin Pump handswitches to
STOP.
- b. **CLOSE** Cnds Demin Pump
suction valves.
- c. **STOP** and **PULL-TO-LOCK** one
of three #3 Heater Drain Pumps.

12. **WHEN** 65% power is reached,
THEN
STOP and **PULL-TO-LOCK** one of
two #7 Heater Drain Pumps.

13. **WHEN** 49% power is reached,
THEN
CHECK Annunciator Window 69-E,
P-9 RX TRIP FROM TURB TRIP
BLOCKED, is LIT.

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Step	Action/Expected Response	Response Not Obtained
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3.2 Power Reduction From Greater Than 50% Power (continued)

14. **IF** Power reduction below 50% is required,
THEN
**** GO TO** Subsection 3.3, Step 4.
15. **STOP** The load reduction by depressing HOLD on the Turbine Reference Setter.
16. **STABILIZE** Turbine/Reactor power with T_{avg}/T_{ref} within 3°F.
17. **WHEN** Boration is COMPLETE,
THEN
PERFORM the following to REALIGN makeup to AUTO:
 - a. **ENSURE** 1-FC-62-142, PW TO BLENDER, on 35% (70gpm) and Manual-Auto toggle in AUTO.
 - b. **ADJUST** 1-FC-62-139, BA TO BLENDER, to new RCS C_B .
 - c. **PLACE** 1-HS-62-140B, VCT MAKEUP MODE, in AUTO.
 - d. **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL, to START.
 - e. **CHECK** Red light is LIT.
18. **** GO TO** GO-4, Normal Power Operation.

End of Subsection

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Step	Action/Expected Response	Response Not Obtained
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3.3 Power Reduction From 50% Power

- CAUTION**
- Condenser Backpressure limits are on page 5.
 - Avoid excessive rod insertion after turbine is tripped. If resulting reactor power is subcritical or less than desired, rods **SHALL NOT** be withdrawn in an attempt to recover reactor power.

NOTE If the initiating condition is corrected, power reduction may be terminated.

1. **CHECK** reactor power less than or equal to 49%, annunciator window 69-E, P-9 RX TRIP FROM TURBINE TRIP BLOCKED, is LIT. **** GO TO** Subsection 3.2
2. **ENSURE** rod control in AUTO. Manually **INSERT** the control bank as turbine load is reduced, maintaining T_{avg} on program.

CAUTION **TURBINE MANUAL** operation requires continuous operator monitoring and control.

3. **ESTABLISH** a turbine load reduction rate of less than or equal to 5%/min:
 - a. **PLACE** turbine in IMP IN
 - b. **SET** a desired load in the SETTER with the REFERENCE CONTROL
 - c. **SET** the LOAD RATE less than or equal to 5%/min.
 - d. (p) **DEPRESS** GO pushbutton.

SELECT TURBINE MANUAL,
OR
CHECK that Turbine Control has tripped to MANUAL as indicated by the TURBINE MANUAL pushbutton backlighted,
(p) Momentarily **DEPRESS** the G.V. LOWER at intervals that control load reduction less than or equal to 5%/min.

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Step	Action/Expected Response	Response Not Obtained
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3.3 Power Reduction From 50% Power (continued)

4. **WHEN** 48% reactor power is reached,
THEN
CHECK annunciator window 70-C,
P-8 LO PWR-FLOW TRIP BLOCKED,
is LIT.

5. **CHECK** power reduction rate rapid
enough for existing plant conditions. **PERFORM** one of the following based
on plant conditions:
(p) TRIP reactor and **** GO TO** E-0,
Reactor Trip or Safety Injection.
OR
(p) TRIP turbine and **** GO TO** AOI-17,
Turbine Trip.

6. **WHEN** 45% power is reached,
THEN
CONTINUE with the procedure.

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Step	Action/Expected Response	Response Not Obtained
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3.3 Power Reduction From 50% Power (continued)

7. IF two MFWPs in service

THEN

SHUTDOWN one MFWP:

a. IF 1A MFWP is to be removed
from service,
THEN

- 1) **PLACE** 1-SIC-46-20A,
MFPT A speed control in
MANUAL and **DECREASE**
speed.
- 2) **ENSURE** recirc valve
OPENS
- 3) **WHEN** 1A MFP speed is
approx 3,300 rpm,
THEN
PLACE 1-HS-46-9A, to
TRIP
- 4) **REFER TO** SOI-2 & 3.01,
Condensate and Feedwater
System to complete
shutdown.

Step	Action/Expected Response	Response Not Obtained
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Step	Action/Expected Response	Response Not Obtained
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3.3 Power Reduction From 50% Power (continued)

- | | | |
|-----|--|---|
| 10. | WHEN less than 40% power,
THEN
CHECK 1-HS-3-264A, AMSAC
BLOCK <40% light is LIT. | Manually PUSH AMSAC
Test/Blk/Operate, 1-HS-3-264A
AMSAC TEST/BLOCK pushbutton. |
| 11. | WHEN 30% power is reached,
THEN
PERFORM the following: <ul style="list-style-type: none"> a. ENSURE turbine is operating in
the IMP OUT position. b. STOP and PULL-TO-LOCK one
of two #3 Heater Drain Pumps. c. STOP one of two operating CBPs
by PLACING the pump
handswitches to STOP. d. STOP one of three operating
Hotwell Pumps. | |
| 12. | STABILIZE the unit between 20
and 30% reactor power with reliable
steam/feed flow indications. | PERFORM either of the following:
(p) TRIP reactor and
** GO TO E-0, Reactor Trip or Safety
Injection.
OR
(p) TRIP turbine and
** GO TO AOI-17, Turbine Trip. |
| 13. | EVALUATE conditions to determine if
turbine AND reactor shutdown
required. | |

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Step	Action/Expected Response	Response Not Obtained
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3.3 Power Reduction From 50% Power (continued)

14. **WHEN** Boration is COMPLETE,
THEN
PERFORM the following to REALIGN
makeup to AUTO:

- a. **ENSURE** 1-FC-62-142, PW TO
BLENDER, on 35% (70gpm) and
Manual-Auto toggle in AUTO.
- b. **ADJUST** 1-FC-62-139, BA TO
BLENDER, to new RCS C_B.
- c. **PLACE** 1-HS-62-140B, VCT
MAKEUP MODE, in AUTO.
- d. **TURN** 1-HS-62-140A, VCT
MAKEUP CONTROL, to START.
- e. **CHECK** Red light is LIT.

15. **WHEN** rated thermal power change
exceeds 15% in one hour,
THEN
NOTIFY Chemistry to initiate
1-SI-68-28.

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Step	Action/Expected Response	Response Not Obtained
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3.3 Power Reduction From 50% Power (continued)

16. **PERFORM** the following:

- **REFER TO** GO-5, Unit Shutdown From 30% Reactor Power To Hot Standby for guidance in removing equipment from service.
- **(p) ADJUST** reduction rate as necessary to facilitate removal of equipment and maintain controlled conditions.
- **CONTINUE** rapid load reduction.

End of Subsection

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4.0 DISCUSSION

- A. When removing the unit from service with conditions that require a rapid shutdown from 100% RTP, it is advisable to begin a boration in accordance with the applicable Reactivity Control Plan. The boration should assist in keeping the rods above the RIL during the power reduction while allowing the rods to insert to maintain T_{avg}/T_{ref} . The inserted rods should provide the capacity to withdraw rods and stabilize T_{avg} in the event that a momentary hold is required during the power reduction.
- B. Very fast ramp rates (up to 5%/min) may result in rods inserting below the RIL briefly until the effects of the boration are realized. The Reactivity Control Plan boration volumes are calculated to maintain nominal rod position for AFD control. Boration should be started at the beginning of the power reduction. Time outside of the plus or minus 3% target band during the load reduction is allowed, but should be minimized in order to limit the resultant Xenon oscillation. Rods should remain in automatic for T_{avg} control during the load reduction until the applicable Reactivity Control Plan specifies Manual control.
- C. For events requiring a partial load reduction at a rapid rate such as an automatic turbine runback or the need for manual run back the turbine in order to remove equipment from service, the load reduction should be made using rods for T_{avg} control. Boration should be initiated as soon as the unit is stabilized at the new lower power level in order to clear any RIL alarms and to return AFD to within limits. Placard values can be used to commence the initial boration, and then the rod position can be optimized by a more detailed review of the Reactivity Control Plan. The guidance for a partial load drop assumes a rapidly evolving transient occurring over a short duration. In situations requiring a partial load reduction of greater than 50% load, and it is determined during the evolution that the RIL is being exceeded, then a boration should be commenced during the load reduction as soon as time and operator span-of-control allows.
- D. For power levels less than 50% power the TS limits for AFD do not apply. While it is desirable to maintain Delta Flux within the target band for all power levels greater than 15%, it should be emphasized that plant stability and maneuverability is a higher priority than Delta Flux control at low power levels.

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5.0 REFERENCES

5.1 Performance

- A. AOI-16, Loss of Normal Feedwater.
- B. AOI-17, Turbine Trip.
- C. AOI-37, Turbine Runback Response.
- D. E-0, Reactor Trip Or Safety Injection.
- E. GO-4, Normal Power Operation.
- F. GO-5, Unit Shutdown From 30% Reactor Power To Hot Standby.
- G. EPIP-1, Emergency Plan Classification Flowchart.
- H. 1-SI-68-28, Primary Radiochemistry Requirements.
- I. SOI-2 & 3.01, Condensate and Feedwater System.
- J. SOI-62.02, Boron Concentration Control.

5.2 Developmental

- A. SPP-10.4, Reactivity Management Program.
- B. TI-7.012, Administration Of The Reactivity Briefing Sheets And Reactivity Control Plan

5.3 Technical Specifications

- A. 3.1.1, Shutdown Margin (SDM) - T-avg > 200°F.
- B. 3.1.7, Control Bank Insertion Limits
- C. 3.2.3, Axial Flux Difference (AFD)
- D. LCO 3.0.3

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**Appendix A
(Page 1 of 2)**

Operating with Turbine Controls in Manual Mode

1.0 INSTRUCTIONS

NOTES

- 1) This section should only be used when the OPERATOR AUTO mode is malfunctioning and the turbine is online.
- 2) When the turbine controls are in MANUAL mode the active Turbine Manual buttons will be illuminated.
- 3) Turbine load changes immediately when a raise or lower button is pressed.
- 4) Brief momentary button presses are best for making small load changes.
- 5) Raising and Lowering load contained in steps 1.0B and 1.0C below may be used alternatively to achieve desired load.

- A. **IF** turbine controls are **NOT** in TURBINE MANUAL mode **AND** TURBINE MANUAL mode is desired, **THEN**

PRESS TURBINE MANUAL button in TURBINE MODES group.

- B. **INITIATE** load reduction by **PERFORMING** the following on the Turbine EHC panel:

1. **(p) MOMENTARILY PRESS** the lower button (GV) in the TURBINE MANUAL group.
2. **MONITOR** REFERENCE DROP.
3. **REPEAT** Substeps 1.0B.1 and 1.0B.2 as required to achieve desired load.

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Appendix A
(Page 2 of 2)

Operating with Turbine Controls in Manual Mode

1.0 INSTRUCTIONS (continued)

CAUTION

Raise and Lower buttons operate Governor Valves at a rate of 33%/ minute. If Fast push button is also depressed at the same time the valve movement rate is 133.3%/ minute.

- C. **INITIATE** load increase by PERFORMING the following on the Turbine EHC panel:
 - 1. **(p) MOMENTARILY PRESS** the raise button (GV) in the TURBINE MANUAL group.
 - 2. **MONITOR** REFERENCE INCREASE.
 - 3. **REPEAT** Substeps 1.0C.1 and 1.0C.2 as required to achieve desired load.
- D. **IF** OPERATOR AUTO turbine control mode is desired, **THEN**
PRESS OPER AUTO button in TURBINE MODES group.

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**Source Notes
(Page 1 of 1)**

Requirements Statement	Source Document	Implementing Statement	Affected Steps
Rewrite GOI-6 to become a rapid load reduction procedure.	SOER 94-01 Rec. 2	C.1	All



Watts Bar Nuclear Plant

Unit 1

System Operating Instruction

SOI-2&3.01

Condensate And Feedwater System

Revision 0112

Quality Related

Level of Use: Multiple

Effective Date: 02-17-2011

Responsible Organization: OPS, Operations

Prepared By: R. A. O'Rear

Approved By: Brian McInay

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Revision Log

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
110	10/27/10	2, 9, 11-13, 29, 34, 44, 45, 48, 49, 51, 53, 55, 59, 66, 68-70, 78, 79, 82-84, 88-90, 99, 102-104, 108, 110, 113, 115, 121-123, 125, 128, 129, 131-134, 136, 138, 140, 142, 146, 149, 151, 155, 156, 158, 161, 164, 166, 170-172, 174, 177, 180, 184-187, 189, 191-198, 200, 202-204, 206, 208, 214-217	<p>Created Section 8.28 to facilitate fast draindown of hotwell (PCR 4288). Corrected Source Note notation (PCR 4432). Enhanced hose step in Section 8.25. Added MFP trip oil press verification to Eng recommended value due to SQN-NOER-10-032. Minor/editorial changes: Revised TE NOTE in Section 5.4 and 5.5 and deleted incorrect TE NOTE in Section 5.4 to clarify which TEs need to be above 250°F (PER 232129). Added Critical Step markers and Critical Evolution consideration step to Sections 8.22.1 and 8.22.2 (PER 246210). Revised NOTE 1 in Section 5.10 and 5.11 (PCR 4629). Updated Maintenance Shop names, WO to SR, and RADCON to RP. Revised section closure steps. Corrected minor formatting errors.</p>
111	12/20/2010	2, 35, 124, 217, 218	<p>Added infrequent section 8.29 to align condensate to suction of MFWP to use recirc valve flowpath to condenser for cooling. Added HS information for operating FCV-3-205 in section 7.3.3 step 4 [PER 268677]</p>
112	02/17/11	2, 18, 70-76, 78-84, 86, 95-100, 102-103, 105, 106, 108, 111	<p>Revised and clarified sections 5.10 and 5.11 to control MFW pump trip bus breakers and to work in conjunction with and allow preparations to be performed in parallel with GO-2. [PCR 5003] Made minor format changes to Sections 5.10 and 5.11 to enhance configuration control and comply with Writers Guide.</p>

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ATTACHMENTS

- Attachment 1H: Condensate And Feedwater System Handswitch Checklist 2&3.01-1H
- Attachment 1P: Condensate And Feedwater System Power Checklist 2&3.01-1P
- Attachment 2P: Condensate And Feedwater System Power Checklist 2&3.01-2P
- Attachment 1V: Condensate And Feedwater System Valve Checklist 2&3.01-1V
- Attachment 2V: Condensate And Feedwater System Valve Checklist 2&3.01-2V

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1.0 INTRODUCTION

1.1 Purpose

To provide instructions for operation of the Condensate and Feedwater Systems.

1.2 Scope

This Instruction includes startup, normal operation, and shutdown [C.11] operation of the following equipment:

- A. Hotwell Pumps
- B. Condensate Booster Pumps
- C. Main Feed Pumps (MFP) [C.11]
- D. Standby Main Feed Pump (SMFP)
- E. Condenser Vacuum Pumps (CVP)
- F. Condensate Demin Pumps

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2.0 REFERENCES

2.1 Performance References

- A. SOI-2.02, Condensate Startup Filter
- B. SOI-3.02, Auxiliary Feedwater System
- C. SOI-5&6.01, Extraction Steam, Heater Drains, and Vent System
- D. SOI-14.01, Condensate Demineralizer Polisher Operation
- E. SOI-25/26.01, Raw Service and High Pressure Fire Protection Systems
- F. SOI-37.01, Gland Seal Water System
- G. SOI-47.01, Main Turbine Turning Gear Operation
- H. SOI-47.03, Main Turbine Steam Seal System
- I. SOI-54.01, Injection Water System
- J. SOI-90.02, Gaseous Process Radiation Monitors
- K. SOI-90.05, Post-Accident Rad Monitors
- L. TI-101.03A.01, System 3A, MFP Periodic Checkout Operation Using Aux Boiler Steam
- M. 0-PI-OPS-17.0, 18 Month Locked Valve Verification
- N. MI-57.036, Electric Motor/Generator Replacement and Bearing
- O. 0-PI-OPS-1.1, Jumper Control Process

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2.2 Developmental References

- A. SOI-2.03, Main Condenser Fast Fill and Drain
- B. N3-2-4002, System Description, Condensate System
- C. N3-3A-4002, System Description, Main Feedwater, Feedwater Control, and Injection Water
- D. Vendor Manuals:
 - 1. WBN-VTM B580-0010, Byron Jackson, Contract 083018, #0038
 - 2. WBN-VTM-B580-0030; Vendor Technical Manual For Byron Jackson Condensate Booster, Condensate Hotwell, #3 & #7 Heater Drain And Standby Main Feed Pumps; Byron Jackson, Ingersoll-Rand, Contract 083174
 - 3. WBN-VTD-B580-0150; Installation, Operation And Maintenance Instructions For The Byron Jackson Standby Main Feed Pumps [PUB. # G404550]
 - 4. WBN-VTM-W120-2094
 - 5. WBN-VTD-P076-0020, Parson-Peebles Operating and Maintenance Instructions For Standby Main Feed, Hotwell, Booster, NO. 3 and NO. 7 Heater Drain Pump Motors [PUB. # AGC/254498-502]

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2.2 Developmental References (continued)

E. TVA Drawings:

1. 45B1754-5C
2. 1-45B6236-010, -011, -017, -020, -033, -034, -035, -041, -042, -043, -044
3. 1-45B6275-011, -028
4. 45N700-1
5. 45N721-1
6. 1-45W600-2, -3, -5, -6, -7, -8, -9, -11
7. 1-45W600-46-1, -3, -4, -5, -7
8. 1-45W600-57-1, -2, -31
9. 1-45W703-1
10. 1-45W753-7
11. 1-45W760-2-1 through -5
12. 1-45W760-3-1 through -11
13. 1-45W1646-2
14. 1-47W803-1
15. 1-47W804-1, -2

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3.0 PRECAUTIONS AND LIMITATIONS

A. Hotwell/Hotwell Pumps

1. Failure to isolate 1-LCV-37-1, GSW STOR TNK MU LEVEL CNTL, before starting the first Hotwell Pump, will result in GSW Tank overflow.
2. Flow from the Hotwell to the CSTs should be limited when condenser vacuum does **NOT** exist. Notify Chemistry for contingent actions. [C.12]
3. Filling Hotwell 18" or more above normal when water temp is below 60°F could cause Condenser wall weld failure.
4. 1-LCV-2-9, MAIN CONDENSER AUTO MAKEUP LEVEL CNTL, has a hole drilled in valve to allow 8 to 10 gpm leak-by with valve closed, thus raising Hotwell level.
5. Pumping Hotwell water to the CST when vacuum is broken raises CST O₂.
6. Hotwell Pump motor bearing temp alarm should be set at 225°F or lower. Max temperature limit on bearings is 300°F per reference 2.2.A.
7. Hotwell pumps require >12 inches Hotwell Level to ensure adequate suction is available. [C.6]
8. If hotwell pump motor has been **NOT** running for 7 days or more, or motor upper bearing maintenance has just been performed, Mechanical Maintenance must be contacted to prelube the upper bearing by removing about a cup of oil from the drain valve at the bearing sight glass and adding it back through the oil filler/breather connection at the top of the bearing. (Ref: MI-57.036, Attachment 1, Step 1.B)

B. Common/Misc Systems

1. Since the Condenser Vacuum Exhaust effluent must be monitored for a SG tube leak, and the CVE monitors must remain isolated until vacuum is achieved to avoid water damage, the following comp measures must be taken per guidance in System Description N3-2-4002, Section 4.10:
 - a. SG blowdown rad monitors should be placed in service.
 - b. Sampling provisions of the ODCM will be used to assess radioactive effluents out of the CVE.

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3.0 PRECAUTIONS AND LIMITATIONS (continued)

2. RCW supplies to various oil Hxs throughout system are isolated to prevent excessive oil cooling and condensation in piping. Care should be taken to ensure these valves are open before starting associated equipment.
3. Injection Water Pump damage may occur if operated over 4 minutes without at least one MFP receiving seal flow. Pumps have no recirc capability.
4. Steam Dumps to the Main Condenser should **NOT** be used with a water box out of service. Prolonged exposure to super heated steam in a water box without circ water may cause damage to condenser tubes and adversely impact Condenser Vacuum Pump performance.
5. 1-FS-2-35 permits 1-FCV-15-43 to open at greater than 3500 gpm condensate flowrate.
6. To protect the condensate demins, 1-TS-15-43 alarms at greater than or equal to 145°F blowdown fluid temperature and closes 1-FCV-15-43 at greater than or equal to 150°F.
7. 1-FCV-2-260, (actuated by 1-PDI-2-260), maintains a constant ΔP across the second stage HXs and the GSC.
8. 1-FCV-2-329B is modulated by 1-PDIC-2-329 to maintain 2.1 psid across the first stage HXs (1-FCV-2-329A full open).
9. During unit startup, 1-FCV-2-329A is fully open, initially. As load rises, 1-FCV-2-329B's capacity to maintain 2.1 psid is exceeded. At 2.8 psid ($\approx 13\%$ load) across low pressure heaters, 1-FCV-2-329B closes and 1-FCV-2-329A is modulated by 1-TIC-2-329A to maintain 230°F condensate temperature out of the first stage heat exchangers.
10. If SGBD flow is being initiated or isolated with unit at greater than 13% load, 1-FCV-2-329A could be fully closed. This valve should be partially opened to ensure condensate flow through first stage heat exchanger prior to initiating SGBD flow to prevent water hammer. Controller gain/setpoint may be adjusted as required to maintain stable system operation as directed by System Engineering/Instrument Maintenance (IM).
11. Chemistry should be notified before initiating Short Cycle, Long Cycle, or Power Operation to coordinate chemical addition and sampling activities.
12. Instrument Maintenance should be notified to ensure required instruments are in service as necessary to support system operation.

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3.0 PRECAUTIONS AND LIMITATIONS (continued)

13. Work in Radiologically Controlled Area (RCA) requires the use of existing RWPs, and may require additional ALARA Preplans. Failure to follow posted Rad control requirements can cause unnecessary radiation exposure. Radiation Protection should be notified of work having the potential to change radiological conditions.
14. Steps that directly affect reactivity will be preceded with the Greek symbol (ρ).

C. Condensate

1. Before pressurizing the Condensate System or drawing a vacuum, consideration should be given to Injection Water, Gland Seal Water, Auxiliary Feedwater, Exhaust Hood Sprays, and Chemical Feeds.
2. Cond Demin AUO should be notified before starting pumps that could affect Cond Demin ΔP , to allow actions to prevent high ΔP auto-bypass.
3. Normal Condensate operating temp limit is 140°F. Operating above 140°F can damage Cond Demin Resin.

D. Shortcycle

1. Short Cycle is not for long-term operation. Due to piping vibration and movement, Short Cycle operation should be minimized by proceeding to Long Cycle recirc as soon as reasonable, when the required conditions are satisfied.

E. Long Cycle Deaeration

1. Used when:
 - a. SG temp is 400°F or less (not required when in Hot Standby with NO possibility of injecting into SGs, i.e., NO feedwater pumps in service) and MFW ISOL MOVs closed.
 - b. Condensate press below 350 psig (below 550 psig if operating CBP).
 - c. SG press atmospheric or greater.
 - d. Condensate temp 100°F or greater (If Unit Heatup/Startup in progress).

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3.0 PRECAUTIONS AND LIMITATIONS (continued)

2. The deaeration line valves (1-ISV-3-602 and 1-FCV-3-195) should be open during long-cycle deaeration with only HWP's operating and closed during all other modes. 1-FCV-3-195 will NOT withstand the higher pressure drop caused by the MFPs. [C.17]

F. Condensate Booster Pumps

1. The minimum oil temperature recommendation is 70°F to 80°F. This is based on ensuring adequate oil is available during startup, when the oil temperature is lowest. (with oil temperature this low, the auxiliary oil pump may trip on overload, or the oil relief valve may lift due to high pressure and cause the bearing to be starved). The maximum oil temperature is 135°F. This is based on allowing a maximum oil temperature out of the bearing of 185°F, with a ~40°F rise across the bearing.
2. If injection water is aligned to a non-running Condensate Booster Pump, the pump should either be promptly started or injection water isolated to avoid water intrusion to the CBP's oil system.

G. Standby Main Feedwater Pump

1. 1-PCV-3-40 must be set at 1200 psia and closed, and 1-FCV-3-195 closed before starting any of the three MFPs.
2. The Standby Main Feed Pump minimum oil temperature recommendation is 70°F to 80°F. This is based on ensuring adequate oil is available during startup, when the oil temperature is lowest. (with oil temperature this low, the auxiliary oil pump may trip on overload, or the oil relief valve may lift due to high pressure, and cause the bearing to be starved). The maximum oil temperature is 135°F. This is based on allowing a maximum oil temperature out of the bearing of 185°F, with an ~40°F rise across the bearing.
3. Standby Main Feed Pump (SMFP) should be operated at low flow conditions without a Condensate Booster Pump, to prevent lifting #1 Heater relief valves at 1650 psig.
4. SMFP Motor, Gear, and Pump Lube systems should be heated to 140 to 160°F oil leaving the bearings before placing RCW in service to the oil coolers. Oil temp alarm is 170°. This helps limit startup vibration.

3.0 PRECAUTIONS AND LIMITATIONS (continued)

5. A feedwater isolation (FWI) signal will cause the SMFP miniflow valves to fully open. The valves will return to their modulated position on FWI signal reset, or they can be controlled manually. This design change was made to give the miniflow valves a "head start" open signal on FWI to limit the delta pressure transient across the valves for improvement of operation and service life.
6. The following are monitored during Standby MFP operation. Pump is manually tripped if manufacturer's limit is reached and no auto-trip occurs.

PARAMETER	MANUFACTURER'S LIMIT
Low Suction Press	100 psig (below 50% load) 250 psig (50% load or above)
High Discharge Press	1363 psig
Low Bearing Oil Press	8 psig or less (Auto Trip) 10 psig or less (Auto Trip)
High Bearing Metal Temp	225°F or more (Journal & Thrust)

7. If SBMFP vibration is greater than or equal to 5 mils, evaluate Unit load reduction to allow removal of pump from service. If vibration reaches 10 mils, immediately trip the pump.
8. The following guidance may be used to start or stop the SBMFP during hot weather:

NOTE

The "MFPT CONDENSER VACUUM LO" alarm [Window 55-D] comes in at 12.5" Hg vacuum (17.5" HgA). This corresponds to a MFPT condenser drain temperature of $\approx 185^{\circ}\text{F}$.

If the SBMFP is in service due to elevated hotwell and circulating water temperatures, the following guidance may be used to remove the SBMFP from service as water temperatures drop:

The SBMFP may be secured if any of the following conditions exist:

- a. Both MFPT condensers are ≤ 12.5 in. HgA, **OR**
- b. Hotwell pump discharge temperature drops to $\leq 129^{\circ}\text{F}$, **OR**

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3.0 PRECAUTIONS AND LIMITATIONS (continued)

- c. C zone main condenser back pressure drops to ≤ 5.0 in. HgA, **OR**
- d. CCW inlet temperature drops to $\leq 87^{\circ}\text{F}$ (should be secured prior to $\leq 67^{\circ}\text{F}$) with all 4 CCW pumps in service, **OR**
- e. MFPT Condenser drain temperature $\leq 171^{\circ}\text{F}$.

If the SBMFP is **NOT** in service, the following guidance may be used to place the SBMFP in service as water temperatures rise:

The SBMFP should be placed in service if any of the following conditions exist:

- f. Either MFPT condensers are >15.4 in. HgA, **OR**
 - g. Hotwell pump discharge temperature achieves the maximum allowable condensate polisher inlet temperature of 140°F , **OR**
 - h. C zone main condenser back pressure achieves the alarm setpoint when operating above 90% power, **OR**
 - i. Plant power is power limited due to C Zone main condenser back pressure exceeding the associated alarm setpoint, **OR**
 - j. MFPT Condenser drain temperature $>180^{\circ}\text{F}$.
9. All jumper installation and removal shall be in accordance with 0-PI-OPS-1.1, Jumper Control Process.

H. MFWPs/MFPTs

- 1. MFPTs and MFPs Motor, Gear, and Pump Lube systems should be heated to 140 to 160°F oil leaving the bearings before placing RCW in service to the oil coolers. Oil temp alarm is 170°F . This helps limit startup vibration.
- 2. The MFPT turning gear is **NOT** designed to be "rolled off" like the main turbine. Any action or evolution that could spin the MFP turbine while the turning gear is in operation could result in damage if the turning gear is **NOT** removed from service. Example: Unisolating the manual valves to the HP or LP steam supply.
- 3. MFP suction press should be kept as low as possible to help prevent exceeding the discharge piping design pressure of 1230 psig. However, short duration disch press up to 1363 psig is acceptable.

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3.0 PRECAUTIONS AND LIMITATIONS (continued)

4. The TDMFP should **NOT** be operated until sufficient forward flow (approx 4500 gpm) can be provided continuously to the SGs using the SMFP.
5. Trip of a MFPT, loss of MFPT reset, or reset of a MFP **NOT** available due to maintenance activities, may cause ESFAS AFW start or require entering LCO 3.3.2, Condition J.
6. A feedwater isolation (FWI) signal will cause the TDMFP miniflow valves to fully open. The vales will return to their modulated position on FWI signal reset, or they can be controlled manually. This design change was made to give the miniflow valves a "head start" open signal on FWI to limit the delta pressure transient across the valves for improvement to operation and service life.
7. If MFPT steam seals are applied with rotor at rest, rotor, seal, and/or bearing damage can occur. Prolonged admission of seal steam before establishing condenser vacuum may damage condenser. Removing steam seals before condenser vacuum is zero, may damage seals due to high air in-leakage through seals.
8. When extended shutdown of MFP Turbines is required, voltage should be removed from affected MFPT Control Panel to extend relay coil life. [C.4]
9. MFP Turbine vibration is high when operated at rated speed (5012 RPM) and low forward flow or recirc flows. Operator action should be taken to minimize time in this condition to less than 20 minutes, at which time speed should be reduced to achieve acceptable vibration conditions.
10. The following are monitored during MFP operation. MFPs are manually tripped if manufacturer's limit is reached and no auto-trip occurs:

PARAMETER	MANUFACTURER'S LIMIT	PUMP
Low Suction Press	100 psig (below 50% load) 250 psig (50% load or above)	MFPs
High Discharge Press	1363 psig	MFPs
Low Bearing Oil Press	8 psig or less (Auto Trip) 10 psig or less (Auto Trip)	MFPs & MFPT
Low Vacuum	10 in. Hg or less (Auto Trip)	MFPT
High Thrust Bearing Wear	0.010 in. or more wear displacement from 0 (Auto Trip)	MFPT
High Bearing Metal Temp	225°F or more (Journal & Thrust)	MFPs & MFPT
Overspeed	6006 to 6126 rpm (Auto Trip)	MFPT

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3.0 PRECAUTIONS AND LIMITATIONS (continued)

11. If MFP and/or MFPT vibration is greater than or equal to 5 mils, evaluate Unit load reduction to allow removal of pump from service. If vibration reaches 10 mils, immediately trip the pump.
 12. In Mode 1, entry into Tech Spec 3.3.2 condition J may be suspended for up to 4 hours when placing the second Turbine Driven Main Feedwater Pump (TDMFWP) in service or removing one of two Turbine Driven Main Feedwater Pumps (TDMFWP) from service. Refer to Tech Spec 3.3.2 table 3.3.2-1.
 13. In Mode 2, trip function of all Turbine Driven Main Feedwater Pumps (TDMFWP) is required when one or more (TDMFWP) is supplying feedwater to the Steam Generators. During the process of placing the first TDMFW pump in service, the anticipatory AFW auto-start channel for the non-operating TDMFW pump is deenergized to prevent inadvertent AFW auto-start during rollup trip testing and overspeed trip testing. Once the operating TDMFW pump has established sufficient feed flow to maintain SG level, the anticipatory AFW auto-start channel for the non-operating TDMFW pump is placed in the "trip" condition, and the AFW pumps secured. Refer to Tech Spec 3.3.2.6.e and B 3.3.2.6.e.
 14. MFPT condenser initial vacuum is drawn using the Condenser Vacuum Pumps and then swapped to the Main Condenser to prevent creating a large pressure change in the Main Condenser.
- I. MFPs Common/Feedwater
1. 1-PCV-3-40 must be set at 1200 psia and closed, and 1-FCV-3-195 closed before starting any of the three MFPs.
 2. MFW discharge piping Overpressure may occur if CBPs or Cond Demin Pumps are operated in conjunction with the MFPs below 50% Power.
 3. Loss of MFP Injection Water may result in steaming or hot water leakage into the bearing oil or bearing overheat. Injection Water should be restored immediately or a controlled shutdown of the MFP should be initiated.
 4. When MFW flow is stopped, the MFW piping may lose its charge to the main condenser. The line charge and pressure must be reestablished very slowly past the valves or pump used to stop flow, prior to reopening the valves or starting pump, to prevent a severe water-hammer.

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3.0 PRECAUTIONS AND LIMITATIONS (continued)

5. MFW Bypass flows in excess of 84,510 pph will exceed the calibration range of the bypass flow transmitters' computer points F0407A, F0427A, F0447A, and F0467A which will make U1118 series ICS venturi -based calorimetric power inaccurate.
6. During startup, the main FRVs and bypass FRVs should be momentarily throttled almost closed, prior to starting the first higher pressure pump (CDPs, CBPs, MFPs) and the flow and pressure downstream of FRVs established very slowly, to avoid severe water hammer.
7. For short duration test purposes, using a single MFP, 1-FCV-3-195 may be opened to allow higher long cycle recirculation flow than achievable via 1-PCV-3-40, with the following limitations:
 - a. MFW and long cycle piping must be charged and at the higher pressure before opening 1-FCV-3-195.
 - b. 1-FCV-3-195 to be gradually opened fully and **NOT** throttled.
 - c. Limited to two MFW loops with the other two loops main and bypass FRVs and long cycle paths closed (single loop flow performed for SMFP).
 - d. Throttle flow on the one or two open main FRVs.
 - e. No two higher pressure pumps (CDPs, CBP, or MFPs) are to be in operation simultaneously.
 - f. Should only be done during cold shutdown long cycle recirculation.

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3.0 PRECAUTIONS AND LIMITATIONS (continued)

J. Low Power (Below 22% load)/Swapover Operations:

1. SG Feedwater additions must be via the upper (bypass) nozzle and should be continuous rather than intermittent, to reduce SG upper nozzle thermal cycling, but intermittent flow is permitted.
2. SG lower nozzle must be isolated (MFW ISOL MOVs closed) to prevent cold water, at the hot lower nozzle, in order to limit the number of feedwater system induced transients and the minimum temperature of continuous FW flow into the S/G preheater region.
3. 1-HS-3-45, LONG CYCLE RECIRC-NORMAL, accomplishes partial auto realignment for the 2 modes; however, manual positioning of some valves is required as directed by this instruction.
4. The interlock functions of 1-HS-3-45, LONG CYCLE RECIRC-NORMAL, are functional, but the operator is expected to take appropriate action if conditions warrant. Feedwater flow to the lower nozzle must be terminated and bypass flow established if any of the following minimums are reached:
 - (1) MFW line temp below 250°F.
 - (2) MFW line flow below 14%.
5. A low flow alarm at 20% (ARI-57-63 Window 59-C) gives the operator time to take corrective action before manual actions must be taken when flow drops to <14%. This low flow condition (<14%) is indicated by the extinguishing of the blue Main Flow > SP lights on 1-M-3.

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Date _____

INITIALS

8.17 Condensate Booster Pump Operation at Power

8.17.1 CBP Shutdown at Power

CAUTION

Consider load reduction of approximately 2% based on current plant conditions.

NOTES

- 1) When a CBP is stopped near full power the following parameters are expected to change as follows: Feedwater flow will fluctuate and stabilize at original value, MFWP suction pressure will lower approx. 70 psig (See P&L 3.0H.10), and #3 HDT level will fluctuate approximately 1/2 inch.
- 2) FW Heater levels may fluctuate, consider local monitoring.
- 3) The ICS may be used to monitor discharge valve closure progress by observing lowering CBP motor power and raising discharge pressure.
- 4) Precaution 3.0F.2 should be reviewed prior to removing a CBP from service.

- [1] **ENSURE** selected CBP AUX OIL PUMP in P-AUTO:
(N/A other CBPs)

- A. 1-HS-2-105A, AUX OIL PMP CNDS BSTR PMP A. _____
- B. 1-HS-2-107A, AUX OIL PMP CNDS BSTR PMP B. _____
- C. 1-HS-2-109A, AUX OIL PMP CNDS BSTR PMP C. _____

- [2] **THROTTLE CLOSE** selected Condensate Booster Pump
discharge valve: (N/A other CBPs)

- A. 1-ISV-2-607, CONDENSATE BSTR PUMP 1A
DISCHARGE ISOL [T7G/685]. _____
- B. 1-ISV-2-608, CONDENSATE BSTR PUMP 1B
DISCHARGE ISOL [T7F/685]. _____
- C. 1-ISV-2-609, CONDENSATE BSTR PUMP 1C
DISCHARGE ISOL [T7F/685]. _____

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Date _____

INITIALS

8.17.1 CBP Shutdown at Power (continued)

[3] **PLACE** selected CBP(s) handswitch to STOP, **AND**

HOLD UNTIL associated suction valve starts to CLOSE
[1-M-3]: (**N/A** other CBPs)

A. 1-HS-2-97A, CNDS BSTR PMP A. _____

B. 1-HS-2-91A, CNDS BSTR PMP B. _____

C. 1-HS-2-84A, CNDS BSTR PMP C. _____

[4] **ENSURE** suction valve CLOSED for applicable CBP [1-M-3]:
(**N/A** other CBPs)

A. 1-FCV-2-94 [1-HS-2-94A], CNDS BSTR PMP A
SUCTION VLV. _____

B. 1-FCV-2-87 [1-HS-2-87A], CNDS BSTR PMP B
SUCTION VLV. _____

C. 1-FCV-2-81 [1-HS-2-81A], CNDS BSTR PMP C
SUCTION VLV. _____

[5] **LOCALLY OBSERVE** pump rotation stops. _____

[6] **CLOSE** respective CBP Oil Hx RCW Supply:
(**N/A** valves not used)

NOMENCLATURE	LOCATION	POSITION	UNID	PERF INITIALS
CONDENSATE BOOSTER PUMP 1A				
CBP OIL COOLER 1A RCW INLET ISOL	T7G/685	CLOSED	1-ISV-24-711	
CONDENSATE BOOSTER PUMP 1B				
CBP OIL COOLER 1B RCW INLET ISOL	T7F/685	CLOSED	1-ISV-24-710	
CONDENSATE BOOSTER PUMP 1C				
CBP OIL COOLER 1C RCW INLET ISOL	T7F/685	CLOSED	1-ISV-24-709	

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Date _____

INITIALS

8.17.1 CBP Shutdown at Power (continued)

NOTE

Approximately 30 minutes should be allowed from time of pump shutdown to allow pump casing to cool to prevent seal leakoff from flashing to steam.

- [7] **CLOSE** the applicable Seal Water Injection valves for the CBP being shutdown: (**N/A** other CBPs)

NOMENCLATURE	LOCATION	UNID	PERF INITIALS
CNDS BSTR PUMP 1A SEAL WTR INJ ISOL	T8G/685.5	1-ISV-54-540	
CNDS BSTR PUMP 1B SEAL WTR INJ ISOL	T8F/685.5	1-ISV-54-541	
CNDS BSTR PUMP 1C SEAL WTR INJ ISOL	T8F/685.5	1-ISV-54-542	
CNDS BSTR PUMP 1A SEAL WTR LEAKOFF	T8G/685.5	1-LOV-54-543	
CNDS BSTR PUMP 1B SEAL WTR LEAKOFF	T8F/685.5	1-LOV-54-544	
CNDS BSTR PUMP 1C SEAL WTR LEAKOFF	T8F/685.5	1-LOV-54-545	

- [8] **IF** stopping the Aux Oil Pump, **THEN**

PLACE selected CBP AUX OIL PUMP in
STOP/PULL-TO-LOCK: (**N/A** other CBPs)

- A. 1-HS-2-105A, AUX OIL PMP CNDS BSTR PMP A. _____
- B. 1-HS-2-107A, AUX OIL PMP CNDS BSTR PMP B. _____
- C. 1-HS-2-109A, AUX OIL PMP CNDS BSTR PMP C. _____

End of Section

Facility:	Watts Bar December 2011	Scenario No. 4	Op Test No.: 2	
Examiners:	_____	Operators:	_____	SRO
	_____		_____	RO
	_____		_____	BOP
Run Time:	78 minutes			
Initial Conditions:	100% power, RCS boron concentration 747 ppm. Control Bank D is at 220 steps.			
FINAL SUBMITTAL				
Turnover: Train A/Channel 1 Work Week. 1A-A CCP is tagged for motor bearing replacement. LCO 3.5.2 and TR 3.1.4 were entered 8 hours ago. Protected equipment signs have been posted for 1B-B CCP. An oil leak developed on the 1A MFP during the last shift. Leak rate is being monitored, and Operations Management is meeting to determine whether the pump will be removed from service. The Standby Main Feedwater pump is in service.				
Event No.	Malf. No.	Event Type*	Event Description	
1	rx05a	I-RO TS-SRO	1-LT-68-339, PZR LEVEL fails low.	
2	rx18	C-RO	T-avg control signal fails high.	
3	n/a	R-RO N-BOP/SRO	Operations Superintendent contacts the control room and states that the 1A MFP is to be taken out of service. Power is to be reduced at 3%/min to 75% using AOI-39, "Rapid Load Reduction." BOP manipulates Turbine controls in support of the rapid plant shutdown.	
4	fw05a	C-BOP TS-SRO	At 95% power, 1A Main Feedwater pump trips due to low oil pressure.	
5	fw94 fw95	C-BOP	1-FCV-2-205, MFPT "A" CONDENSER CNDS OUTLET and 1-FCV-2-210, MFPT "A" CONDENSER CNDS INLET fail to close automatically.	
6	fw29c fw22c fw49a rp01b rprt1 ed06b rpr68 rpr69	M-ALL	1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. The automatic reactor trip function has failed, requiring a manual trip of the reactor from panel 1-M-6 due to a failure of the manual trip switch on 1-M-4. E-0, "Reactor Trip or Safety Injection," will be entered and a transition to ES-0.1, "Reactor Trip Response," will be made. At the trip, the TDAFW pump becomes steam bound, the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. FR-H.1, "Loss of Secondary Heat Sink," will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4. Bleed-and-feed must start immediately, since neither CCP is available. The 1-M-4 reactor trip switch failure will require the Reactor Trip Breakers to be cycled locally in FR-H.1.	
(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor				

Scenario 4 - Summary

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

Turnover Train A/Channel 1 Work Week. 1A-A CCP is tagged for motor bearing replacement. LCO 3.5.2 and TR 3.1.4 were entered 8 hours ago. Protected equipment signs have been posted for 1B-B CCP. An oil leak developed on the 1A MFP during the last shift. Leak rate is being monitored, and Operations Management is meeting to determine whether the pump will be removed from service. The Standby Main Feedwater pump is in service.

- Event 1** 1-LT-68-339, PZR LEVEL fails low. Requires entry into AOI-20, "Malfunction of Pressurizer Level Control System." Requires return of letdown flowpath to normal. Requires a Tech Spec evaluation
- Event 2** T-avg control signal 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," Section 3.2, "Uncontrolled rod movement." Requires manual control of 1-FCV-62-93, CHARGING FLOW PZR LEVEL CONTROL.
- Event 3** Operations Superintendent contacts the control room and states that the 1A MFP is to be taken out of service due to the slow oil leak. Power is to be reduced at 3%/min to 75% using AOI-39, "Rapid Load Reduction."
- Event 4** At 95% power, 1A Main Feedwater pump trips due to low oil pressure. Requires entry into AOI-16, "Loss of Normal Feedwater," Section 3.4, "TDMFWP Trip OR Loss of Flow GREATER than or equal to 800 MWe (67% Turbine Load)." Requires a Tech Spec evaluation of Axial Flux Difference. Requires a boration to return AFD to target band.
- Event 5** 1-FCV-2-205, MFPT "A" CONDENSER CNDS OUTLET and 1-FCV-2-210, MFPT "A" CONDENSER CNDS INLET fail to close automatically. Requires the BOP to manually close valves.
- Event 6** 1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from panel 1-M-6 due to a failure of the manual trip switch on 1-M-4. E-0, "Reactor Trip or Safety Injection," will be entered, and a transition to ES-0.1, "Reactor Trip Response," will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Heat Sink," will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4. Bleed-and-feed must start immediately, since neither CCP is available. The 1-M-4 manual reactor trip switch failure will require the Reactor Trip Breakers to be cycled locally in FR-H.1.

Scenario 4 - Critical Task Summary

- | | |
|-----------------|---|
| Critical Task 1 | Manually trip the reactor from the control room using handswitch 1-RT-2, REACTOR TRIP, on panel 1-M-6, upon recognition of the failure of the automatic trip circuit and failure of 1-RT-1, REACTOR TRIP, on panel 1-M-4. |
| Critical Task 2 | Initiate RCS bleed and feed so that the RCS depressurizes sufficiently for safety injection pumps to inject into the RCS. |
| Critical Task 3 | Initiate RCS bleed and feed prior to reaching hot conditions in the Steam Generators. |

Watts Bay Nuclear Plant
2011-12 NRC Examination Scenario 4
Simulator Console Operators Instructions

SIMULATOR SETUP INFORMATION

1. ENSURE Examination Security has been established.
2. RESET to Initial Condition 304 by performing the following actions:
 - a. Select ICManager on the THUNDERBAR menu (right hand side of Instructor Console Screen).
 - b. Locate IC# 304.
 - c. Right "click" on IC# 304.
 - d. Select Reset on the drop down menu.
 - e. Right "click" on RESET.
 - f. Enter the password for IC# 304.
 - 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
fw94	fail auto close 2-205	M		00:00:00	00:00:00	00:00:00		Active	Active
fw95	fail auto close 2-210	M		00:00:00	00:00:00	00:00:00		Active	Active
rp01	rp01 manual reactor trip close-trip sw	O		00:00:00	00:00:00	00:00:00		neutral	neutral
rp01b	automatic reactor trip signal failure (atws)	M		00:00:00	00:00:00	00:00:00		Active	Active
cv01a	charging pump a trip	M		00:00:00	00:00:00	00:00:00		Active	Active
fw22c	airbound tda4w pump	M		00:00:00	00:00:00	00:00:00		Active	Active
rx05a	p2r level transmitter fails to position chnl 1 68-339	M	1	00:00:00		00:00:00		0	59.4271
rx18	t-avg control signal failure	M	2	00:00:00		00:00:00		100	56.4271
fw05a	turbine driven feed pump a trip	M	4	00:00:00		00:00:00		Active	InActive
pi-46-12	02120 mfp a brg oil press	O	4	00:00:00		00:00:00		0	18.9983
fw29c	main fw reg viv fcv-3-90 fail position	M	5	00:00:00		00:00:00		25	0

Watts Bar Nuclear Plant
2011-12 NRC Examination Scenario 4
Simulator Console Operators Instructions

SIMULATOR SETUP INFORMATION

Key	Description	Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
fw49a	afw pump a sheared shaft	M	19	00:00:00		00:00:00		Active	InActive
ed06b	loss of 6.9 kv shutdown board bus 1b-b	M	19	00:00:00		00:00:00		Active	InActive
rpr18	block train a auto si	R	21	00:00:00		00:00:00		Block	Normal
rpr19	block train b auto si	R	21	00:00:00		00:00:00		Block	Normal
rpr68	HS Manual trip/close reactor trip breaker a	R	25	00:00:00		00:00:00		Close	Open
rpr69	HS Manual trip/close reactor trip breaker b	R	26	00:00:00		00:00:00		Close	Open

5. rpr68 and rpr69 overrides are entered to locally cycle the reactor trip breakers when requested. To cycle reactor trip breaker A, enter Event 25 to close the breaker then immediately modify the remote to the trip position. To cycle reactor trip breaker B, enter Event 26 to close the breaker then immediately modify the remote to the trip position.
6. Place simulator in RUN and acknowledge any alarms.
7. ENSURE 1-HS-62-108A, CCP A-A (ECCS (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-62-104A, CCP B-B (ECCS).
8. ENSURE the "Train A Week - Channel I" sign is placed on 1-M-30.
9. Place simulator in FREEZE.
10. ENSURE Watts Bar Nuclear Plant Unit 1 Reactivity Briefing Book 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.
11. WHEN prompted by the Chief Examiner, place the Simulator in RUN.

Watts Bar Nuclear Plant
2011-12 NRC Examination Scenario 4
Simulator Console Operators Instructions

Exam Event No.	Simulator Event No.	Description/Role Play
n/a	n/a	ROLE PLAY: When the applicants assume shift, the BOP may contact the TB AUO for the latest status of the oil leak on 1A MFW pump. If/when contacted, state that the oil leak rate is stable, approximately 0.25 gpm. The oil is contained and Fire Operations personnel are at the 1A MFW pump.
1	1	1-LT-68-339, PZR LEVEL fails low. ROLE PLAY: When contacted as Work Control, repeat back request to remove the failed channel from service. ROLE PLAY: When contacted as Work Control, repeat back request for a troubleshooting and repair package for 1-LT-68-339, PZR LEVEL.
2	2	T-avg control signal fails high. ROLE PLAY: When contacted as Work Control, repeat back request to prepare a troubleshooting and repair package for the Tavg auctioneering circuit.
3	n/a	Operations Superintendent contacts the control room and states that the 1A MFP is to be taken out of service. Power is to be reduced at 3%/min to 75% using AOI-39, "Rapid Load Reduction." ROLE PLAY: When the SRO contacts Shift Manager, the Console Operator will repeat back the request to evaluate conditions using EPIP-1, Emergency Plan Classification Flowchart. ROLE PLAY: When the SRO contacts Load Coordinator, the Console Operator will repeat back the information provided. ROLE PLAY: When contacted as Chemistry, repeat back request perform power change samples to be performed.

Watts Bar Nuclear Plant
2011-12 NRC Examination Scenario 4
Simulator Console Operators Instructions

Exam Event No.	Simulator Event No.	Description/Role Play
4	4	<p>At 95% power, 1A Main Feedwater pump trips due to low oil pressure.</p> <p>ROLE PLAY: When contacted as the Turbine Building AUO, repeat back request to investigate the cause of the 1A MFP trip. Report that the oil leak caused the trip and that Fire Op's is on the scene containing the oil. Report that there is no fire.</p> <p>ROLE PLAY: When the BOP contacts the AUO to perform this step(LOCALLY MAINTAIN oil temp between 110 to 130°F on running Standby MFP using 1-THV-24-948.), the Console Operator will repeat back the request. Report back that SMFP oil temperature is 115°F.</p> <p>ROLE PLAY: When contacted as Chemistry, repeat back request perform power change samples to be performed.</p> <p>ROLE PLAY: When the SRO contacts Work Control, the Console Operator will repeat back request to prepare a troubleshooting and repair package for the 1A Main Feedwater Pump.</p>
5	n/a	<p>1-FCV-2-205, MFPT "A" CONDENSER CNDS OUTLET and 1-FCV-2-210, MFPT "A" CONDENSER CNDS INLET fail to close automatically.</p> <p>ROLE PLAY: None</p>
6	n/a	<p>1A-A MD AFW pump shaft failure.</p> <p>ROLE PLAY: When dispatched as an AUO, report that the 1A-A MD AFW pump shaft appears to be broken.</p>
		<p>TDAPW pump becomes steam bound.</p> <p>ROLE PLAY: When dispatched as an AUO to the TD AFW pump, state that the discharge piping and pump casing are very hot. If requested to vent the pump, report back that the vent valve is stuck and that assistance from Maintenance has been requested.</p>
		<p>1B-B 6.9 KV Shutdown Board Trip.</p> <p>ROLE PLAY: When dispatched as an AUO to the 1B-B 6.9 KV Shutdown Board, state that the board tripped on differential relay operation. State that the board is damaged severely, and that there is NO fire.</p>

Watts Bar Nuclear Plant
2011-12 NRC Examination Scenario 4
Simulator Console Operators Instructions

Exam Event No.	Simulator Event No.	Description/Role Play
		<p>Block of AUTO SI. (From FR-H.1 Step 11.b, contained in attachment 3 of the scenario guide)</p> <p>ROLE PLAY: <i>If/when notified as Work Control OR Instrument Maintenance to block auto SI using IMI-99.040, AUTO SI Block repeat back the request. Wait <u>10 minutes</u> then insert remote functions rpr18, block train a auto si and rpr19, block train b auto si. Report back that IMI-99.040 is complete.</i></p>
		<p>Cycle Reactor Trip Breakers Locally (From FR-H.1 Step 12 RNO or Appendix A, contained in attachment 3 of the scenario guide)</p> <p>ROLE Play: <i>When contacted to cycle the reactor trip breakers locally, acknowledge the request then wait <u>3 min</u> prior to entering simulator event 25 and event 26.</i></p> <p><i>To cycle the trip breakers enter Event 25 to close the "A" reactor trip breaker, verify the red indicating light is lit, then immediately modify the override to open the "A" reactor trip breaker and verify the green light is lit.</i></p> <p><i>To cycle the trip breakers enter Event 26 to close the "B" reactor trip breaker, verify the red indicating light is lit, then immediately modify the override to open the "B" reactor trip breaker and verify the green light is lit.</i></p>

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>1</u>	Page	<u>1</u>	of	<u>43</u>
Event Description: 1-LT-68-339, PZR LEVEL fails low. Requires entry into AOI-20, "Malfunction of Pressurizer Level Control System." Requires return of letdown flowpath to normal. FINAL SUBMITTAL Requires a Tech Spec evaluation.									
Time	Position	Applicant's Actions or Behavior							

EXAMINER: The Chief Examiner cues the Console Operator to enter Event 1.

Indications:

92-A PZR LEVEL LO

92-C PZR LEVEL LO HTRS OFF & LTDN CLOSED

	RO	Diagnoses and announces the failure of the 1-LT-68-339. PZR LEVEL.
	RO	Takes the IMMEDIATE ACTION of AOI-20, "Malfunction of Pressurizer Level Control System."
	SRO	Enters and directs actions of AOI-20, "Malfunction of Pressurizer Level Control System."
AOI-20		The following actions are taken from AOI-20, "Malfunction of Pressurizer Level Control System."
NOTE		
Step 1 is an IMMEDIATE ACTION step.		
	RO	1. CHECK charging in service.
	RO	2. CHECK pwr level program signal NORMAL (green pen): • 1-LR-68-339 <i>RO determines that the GREEN indicating pen is indicating normal full power PZR level (60%).</i>
	RO	3. ENSURE 1-XS-68-339E selected to OPERABLE channels for control and backup: • LT-68-339 & 335 OR • LT-68-335 & 320 OR • LT-68-339 & 320

Op Test No.: <u>2</u>	Scenario # <u>4</u>	Event # <u>1</u>	Page <u>2</u> of <u>43</u>
Event Description: 1-LT-68-339, PZR LEVEL fails low. Requires entry into AOI-20, "Malfunction of Pressurizer Level Control System." Requires return of letdown flowpath to normal. FINAL SUBMITTAL Requires a Tech Spec evaluation.			
Time	Position	Applicant's Actions or Behavior	

		SRO directs the RO to position 1-XS-68-339E to select LT-68-335&320.
	RO	4. CHECK letdown in SERVICE <ul style="list-style-type: none"> • 1-FCV-62-69 OPEN • 1-FCV-62-70 OPEN • 1-FCV-62-77 OPEN • Letdown orifice OPEN • Letdown flow NORMAL RO determines letdown was isolated by the failure of 1-LT-68-339 low.
	RO	4. RESPONSE NOT OBTAINED: ENSURE pZR heater banks D and C ON. ESTABLISH charging and letdown: • REFER TO Attachment 1
EXAMINER: The following actions are taken from AOI-20, "Malfunction of Pressurizer Level Control System," Attachment 1, "ALIGNMENT OF CHARGING AND LETDOWN."		
NOTE		
This section can be used in conjunction with SOI-62.01 for local control of 1-FCV-62-89, 1-PCV-62-81 or 1-FCV-62-93. Substitute local actions as appropriate for Steps 1.1A.1, 1.1A.2, 1.1A.6, 1.1D, 1.1G and 1.1E.		
1.1 Establish Charging and Letdown.		
	RO	A. IF charging NOT established, THEN PERFORM the following: Since charging is in service, the SRO continues to the next step.

Op Test No.: 2 Scenario # 4 Event # 1 Page 3 of 43

Event Description: 1-LT-68-339, PZR LEVEL fails low. Requires entry into AOI-20, "Malfunction of Pressurizer Level Control System." Requires return of letdown flowpath to normal.
FINAL
SUBMITTAL Requires a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
	RO	<p>B. ENSURE letdown isol valves OPEN:</p> <ol style="list-style-type: none"> 1-FCV-62-69, CVCS LETDOWN ISOLATION. 1-FCV-62-70, CVCS LETDOWN ISOLATION <p><i>RO rotates 1-FCV-62-70 CVCS LETDOWN ISOLATION to the right to the OPEN position, and holds the handswitch OPEN until the RED indicating light is LIT and the GREEN indicating light is DARK.</i></p> <ol style="list-style-type: none"> 1-FCV-62-77, CVCS LP LETDOWN ISOLATION.
	RO	<p>C. PLACE 1-HIC-62-78A, LETDOWN HX OUTLET TEMP 1-TCV-70-192 CNTL, in MANUAL at 25% OPEN.</p> <p><i>1-HIC-62-78A, LETDOWN HX OUTLET TEMP TCV-70-192 CNTL is placed in MANUAL by lifting the toggle switch from the AUTO position, the toggle is pushed to the right to open the valve to 75% (as read on the controller.)</i></p>
	RO	<p>D. PLACE 1- HIC-62-81A, LETDOWN PRESS CONTROL, in MANUAL at 40-50% OPEN if using 75 gpm orifice (20-30% OPEN if using 45 gpm orifice)</p> <p><i>1-HIC-62-81A, LETDOWN PRESS CONTROL is placed in MANUAL by lifting the toggle switch from the "AUTO" position, the toggle is pushed to the right to open the valve to 50-60% (as read on the controller).</i></p>
	RO	<p>E. ESTABLISH 75 gpm or greater charging flow while maintaining seal injection flow between 8 and 13 gpm for each RCP using 1-FCV-62-93 and 1-FCV-62-89.</p> <p><i>RO establishes 75 gpm charging flow on 1-FI-62-93A, and 8 to 13 gpm on 1-FI-62-1A, RCP 1 SEAL SUP FLOW, 1-FI-62-14A, , RCP 2 SEAL SUP FLOW, 1-FI-62-27A, RCP 3 SEAL SUP FLOW, and 1-FI-62-40A, RCP 4 SEAL SUP FLOW.</i></p>

Op Test No.: 2 Scenario # 4 Event # 1 Page 4 of 43

Event Description: 1-LT-68-339, PZR LEVEL fails low. Requires entry into AOI-20, "Malfunction of Pressurizer Level Control System." Requires return of letdown flowpath to normal.
FINAL
SUBMITTAL Requires a Tech Spec evaluation.

Time	Position	Applicant's Actions or Behavior
	RO	<p>F. OPEN letdown orifices as needed:</p> <ul style="list-style-type: none"> • 1-FCV-62-72 (45 gpm) • 1-FCV-62-73 (75 gpm). • 1-FCV-62-74 (75 gpm). • 1-FCV-62-76 (5 gpm). <p><i>RO selects either 1-HS-62-73A, LETDOWN ORIFICE B 75 GPM - CIV-ϕA, or 1-FCV-62-74, LETDOWN ORIFICE C 75 GPM - CIV-ϕA and rotates the selected handswitch to the right to the OPEN position, and holds the handswitch OPEN until the RED indicating light is LIT and the GREEN indicating light is DARK.</i></p>
	RO	<p>G. ADJUST 1-HIC-62-81A, LETDOWN PRESS CONTROL, for desired press, (320 psig at normal letdown temp), and PLACE in AUTO.</p> <p><i>1-HIC-62-81A, LETDOWN PRESS CONTROL toggle switch is moved to the right to close the valve and raise pressure to 320 psig. 1-HIC-62-81A is placed in AUTO by pushing the toggle switch down to the AUTO position.</i></p>
	RO	<p>H. PLACE 1-HIC-62-78A, LETDOWN HX OUTLET TEMP TCV-70-192 CNTL, in AUTO.</p> <p><i>1-HIC-62-78A, LETDOWN HX OUTLET TEMP TCV-70-192 CNTL, is placed in AUTO by pushing the toggle switch down to the AUTO position.</i></p>
	RO	<p>I. RETURN pZR level to program.</p> <p><i>RO makes periodic adjustments to 1-HIC-62-93A, CHARGING FLOW PZR LEVEL CONTROL and 1-HIC-62-89A, CHG HDR - RCP SEALS FLOW CONTROL to return PZR level to program level.</i></p>
	RO	<p>J. WHEN ready to return 1-FCV-62-93 to AUTO control, THEN PERFORM Section 1.2</p>
1.2 Establish AUTO Control of 1-FCV-62-93		

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>1</u>	Page	<u>5</u>	of	<u>43</u>
Event Description: 1-LT-68-339, PZR LEVEL fails low. Requires entry into AOI-20, "Malfunction of Pressurizer Level Control System." Requires return of letdown flowpath to normal. FINAL SUBMITTAL Requires a Tech Spec evaluation.									
Time	Position	Applicant's Actions or Behavior							

	RO	A. RETURN 1-FCV-62-93 to AUTO. <i>1-HIC-62-93A, CHARGING FLOW PZR LEVEL CONTROL, is placed in AUTO once PZR level is on program if required.</i>
EXAMINER: After completing Attachment 1, "ALIGNMENT OF CHARGING AND LETDOWN," the applicants will return to AOI-20, Subsection 3.2, at Step 5.		
	RO	5. ENSURE pzs level returning to program: • CONTROL 1-HIC-62-93A in MAN as necessary • MAINTAIN regen hx letdown temp < 380 °F.
	RO	6. CHECK pzs heaters ENERGIZED: a. Control Heaters D red light LIT. <i>RO observes handswitch 1-HS-68-341F, CONTROL HEATERS D RED indicating light LIT.</i> b. Backup Heaters C red light LIT. <i>RO places handswitch 1-HS-68-341H, BACKUP HEATERS C in the OFF position, then may place the handswitch to the ON position for boron concentration control. Handswitch 1-HS-68-341H is then returned to P-AUTO position.</i>
	RO	7. ENSURE operable channel selected for recording with 1-XS-68-339B [1-M-5]: <i>RO observes that 1-XS-68-339E is selected LT-68-335&320.</i>
	RO	8. CHECK 1-HIC-62-93A in AUTO. <i>RO checks that 1-HIC-62-93A, CHARGING FLOW PZR LEVEL CONTROL, was placed in AUTO as a result of performing Attachment 1, "ALIGNMENT OF CHARGING AND LETDOWN."</i>

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>1</u>	Page	<u>6</u>	of	<u>43</u>
Event Description: 1-LT-68-339, PZR LEVEL fails low. Requires entry into AOI-20, "Malfunction of Pressurizer Level Control System." Requires return of letdown flowpath to normal. FINAL SUBMITTAL Requires a Tech Spec evaluation.									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>9. REFER TO the following Tech Specs:</p> <ul style="list-style-type: none"> • 3.3.1, Reactor Trip System (RTS) Instrumentation. <p>Function 9 Pressurizer Water Level - High, Condition X, With one channel inoperable, place the failed channel in trip within 72 hours OR reduce THERMAL POWER to <P-7 within 78 hours.</p> <ul style="list-style-type: none"> • 3.3.3, Post Accident Monitoring (PAM) Instrumentation. <p>Function 13, RCS Pressurizer Level, Condition A, With one or more Functions with one required channel inoperable, restore required channel to OPERABLE status within 30 days.</p> <ul style="list-style-type: none"> • 3.4.9 Pressurizer - not applicable • 3.5.2, Emergency Core Cooling Systems (ECCS) not applicable • TR 3.1.4 Charging Pump, Operating - not applicable
	SRO	<p>10. NOTIFY Work Control to remove any failed channel from service.</p> <p>When the SRO contacts Work Control, the Console Operator will repeat back request to remove the failed channel from service.</p>
	SRO	<p>11. INITIATE repairs to failed instrument/circuitry.</p> <p>When the SRO contacts Work Control, the Console Operator will repeat back request for a troubleshooting and repair package for 1-LT-68-339, PZR LEVEL.</p>
	SRO	12. RETURN TO instruction in effect.
EXAMINER: The crew briefing is optional. The next event may be entered prior to the brief, at the discretion of the Chief Examiner.		
	SRO	Crew Brief would typically be conducted for this event as time allows prior to the next event.

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>1</u>	Page	<u>7</u>	of	<u>43</u>
Event Description:		1-LT-68-339, PZR LEVEL fails low. Requires entry into AOI-20, "Malfunction of Pressurizer Level Control System." Requires return of letdown flowpath to normal.							
FINAL		Requires a Tech Spec evaluation.							
SUBMITTAL									
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).							
If not already cued, Console Operator will check with Chief Examiner prior to inserting Event 2.									

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>2</u>	Page	<u>8</u>	of	<u>43</u>
Event Description:		T-avg control signal 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," Section 3.2, "Uncontrolled Rod Rod Bank Movement." Requires manual control of 1-FCV-62-93, CHARGING FLOW PZR LEVEL CONTROL.							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

Indications:		
94-A AUCT TAVG-TREF DEVIATION		
94-B LOOP TAVG & AUCT TAVG DEVN		
	RO	Diagnoses and announces the failure of the Auctioneered Tavg signal.
	RO	Takes the IMMEDIATE ACTION of AOI-2, "Malfunction of Reactor Control System," Section 3.2, "Uncontrolled Rod Bank Movement," by placing 1-RBSS ROD BANK SELECT in MAN and determining that rod motion has stopped.
	SRO	Enters and directs actions of AOI-2, "Malfunction of Reactor Control System," Section 3.2, "Uncontrolled Rod Bank Movement."
AOI-2		The following actions are taken from AOI-2, "Malfunction of Reactor Control System," Section 3.2, "Uncontrolled Rod Bank 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>

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>2</u>	Page	<u>9</u>	of	<u>43</u>
Event Description:		T-avg control signal 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," Section 3.2, "Uncontrolled Rod Rod Bank Movement." Requires manual control of 1-FCV-62-93, CHARGING FLOW PZR LEVEL CONTROL.							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	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.
<p>EXAMINER: AOI-2, "Malfunction of Reactor Control System," Attachment 1, "Reactor Power VS T-avg/T-ref Temperature and PZR Level," is included as Attachment 1 to this scenario.</p>		
	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 off-scale high on 1-TR-68-2B, TREF & AUCT TAVG - °F.</i></p>
	RO	<p>4. RESPONSE NOT OBTAINED:</p> <p>CONTROL PZR level in MAN with 1-FCV-62-93 and 1-FCV-62-89. (Reference Attachment 1)</p> <p><i>RO places 1-HIC-62-93A CHARGING FLOW PZR LEVEL CONTROL in MAN. Since the PZR level program is "capped" at 60%, no adjustment is expected.</i></p>
	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 100% power.)</i></p>

Op Test No.: 2 Scenario # 4 Event # 2 Page 10 of 43

Event Description: T-avg control signal 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," Section 3.2, "Uncontrolled Rod Rod Bank Movement." Requires manual control of 1-FCV-62-93, CHARGING FLOW PZR LEVEL CONTROL.

**FINAL
SUBMITTAL**

Time	Position	Applicant's Actions or Behavior
	RO	<p>6. CHECK the following:</p> <ul style="list-style-type: none">• Turbine impulse pressure channel 1-PI-1-73, NORMAL. <p>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 NORMAL.</p> <ul style="list-style-type: none">• T-ref and Auct T-avg NORMAL on 1-TR-68-2B (Reference Attachment 1). <p>RO observes that the GREEN pen (Tavg) is off-scale high on 1-TR-68-2B, TREF & AUCT TAVG - °F.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>2</u>	Page	<u>11</u>	of	<u>43</u>
Event Description:		T-avg control signal 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," Section 3.2, "Uncontrolled Rod Rod Bank Movement." Requires manual control of 1-FCV-62-93, CHARGING FLOW PZR LEVEL CONTROL.							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>6. RESPONSE NOT OBTAINED:</p> <p>PLACE steam dumps in pressure mode as follows:</p> <p>a. PLACE steam dumps to OFF.</p> <p>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.</p> <p>b. PLACE mode selector HS to STEAM PRESS.</p> <p>BOP rotates 1-HS-1-103D, STEAM DUMP MODE to the right to the STEAM PRESS position.</p> <p>c. ADJUST steam dump demand to zero.</p> <p>BOP observes 1-XI-1-33, STEAM DUMP DEMAND dropping to zero.</p> <p>d. PLACE steam dumps to ON.</p> <p>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.</p> <p>e. ENSURE controller set at 84% (1092 psig).</p> <p>BOP observes that 1-PIC-1-33, STM DUMP PRESS CONTROL dial is set to 84%.</p> <p>f. WHEN conditions allow, THEN REFER TO SOI-1.02 and PLACE steam dumps in TAVG Mode.</p> <p>SRO maintains this step open until repairs are made.</p>
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Op Test No.: 2 Scenario # 4 Event # 2 Page 12 of 43

Event Description: T-avg control signal 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," Section 3.2, "Uncontrolled Rod Rod Bank Movement." Requires manual control of 1-FCV-62-93, CHARGING FLOW PZR LEVEL CONTROL.

FINAL SUBMITTAL

Time	Position	Applicant's Actions or Behavior
	SRO	7. MONITOR core power distribution parameters: <ul style="list-style-type: none"> • Power range channels • Δ Flux Indicators • T-ave • Loop ΔT • Incore TCs • Feed flow/Steam flow
	SRO	8. INITIATE repairs to failed equipment. <i>When the SRO contacts Work Control, the Console Operator will repeat back request to prepare a troubleshooting and repair package for the Tavg auctioneering circuit.</i>
EXAMINER: Since the auctioneering circuit effects <u>control functions only</u> , Tech Specs are not applicable.		
	SRO	9. REFER TO Tech Specs: Not applicable
	SRO	10. NOTIFY Chemistry of any reactor power changes greater than 15% in one hour.
	SRO	11. WHEN ready to restore repaired ΔT and loop T-avg channels, THEN: <i>SRO determines that the conditions of the step cannot be made and continues to the next step.</i>
<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>		

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>2</u>	Page	<u>13</u>	of	<u>43</u>
Event Description:		T-avg control signal 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," Section 3.2, "Uncontrolled Rod Rod Bank Movement." Requires manual control of 1-FCV-62-93, CHARGING FLOW PZR LEVEL CONTROL.							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	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, at the discretion of the Chief Examiner.		
	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).
If not already cued, Console Operator will check with Chief Examiner prior to contacting the crew as the Operations Superintendent and directing a plant shutdown using AOI-39, "Rapid Load Reduction" to 75% at 3%/min.		

Op Test No.: <u>2</u>	Scenario # <u>4</u>	Event # <u>3</u>	Page <u>14</u> of <u>43</u>
Event Description: Operations Superintendent contacts the control room and states that the 1A MFP is to be taken out of service. Power is to be reduced at 3%/min to 75% using AOI-39, "Rapid Load Reduction," Section 3.3, "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 3.3, "Reactor power is greater than 50%."	
CAUTION			
Over boration may result in excessive rod withdrawal, T-avg lower than desired, and AFD oscillations.			
NOTE			
<ul style="list-style-type: none">• 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.			

Op Test No.: <u>2</u>	Scenario # <u>4</u>	Event # <u>3</u>	Page <u>15</u> of <u>43</u>
Event Description: Operations Superintendent contacts the control room and states that the 1A MFP is to be taken out of service. Power is to be reduced at 3%/min to 75% using AOI-39, "Rapid Load Reduction," Section 3.3, "Reactor power is greater than 50%." FINAL SUBMITTAL			
Time	Position	Applicant's Actions or Behavior	
	RO	<p>1. INITIATE a manual boration:</p> <p>a. DETERMINE recommended boration flow rate and volume from Reactivity Briefing Sheet:</p> <p><i>RO determines the recommended boration flow rate to be 40 gpm (for 3%/Min or greater) and the volume to add to be 341 gallons of boron.</i></p> <p>b. INITIATE normal boration:</p> <p>1) ADJUST BA flow controller, 1-FC-62-139, to desired flow rate.</p> <p><i>RO adjusts 1-FC-62-139 to 100% which corresponds to 40 gpm.</i></p> <p>2) ADJUST BA batch counter 1-FQ-62-139 to required quantity.</p> <p><i>RO adjusts 1-FQ-62-139 BA BATCH COUNTER as follows:</i></p> <p>1. <i>Depresses and holds the black pushbutton.</i></p> <p>2. <i>While holding the pushbutton, the applicant raises the red translucent cover.</i></p> <p>3. <i>While still holding the pushbutton, the applicant enters "000341" in the display.</i></p> <p>4. <i>While still holding the pushbutton, the applicant lowers the red translucent cover, and then releases the pushbutton.</i></p> <p>3) PLACE mode selector 1-HS-62-140B to BOR.</p> <p><i>RO rotates 1-HS-62-140B, VCT MAKEUP MODE from AUTO to the right to BOR position.</i></p> <p>4) (p) PLACE VCT makeup control 1-HS-62-140A, to START.</p> <p><i>RO rotates 1-HS-62-140A, VCT MAKEUP CONTROL to the right to the START position.</i></p> <p>5) VERIFY desired boric acid flow indicated on 1-FI-62-139.</p> <p><i>RO observes approximately 40 gpm flow on 1-FI-62-139, BA TO BLENDER FLOW.</i></p>	

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>3</u>	Page	<u>16</u>	of	<u>43</u>
Event Description: Operations Superintendent contacts the control room and states that the 1A MFP is to be taken out of service. Power is to be reduced at 3%/min to 75% using AOI-39, "Rapid Load Reduction," Section 3.3, "Reactor power is greater than 50%."									
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							
CAUTION									
<ul style="list-style-type: none"> • 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	<p>2. ESTABLISH a turbine load reduction, to less than or equal to 76% power, at a rate greater than or equal to 2%/min, and less than 5%/min:</p> <p style="margin-left: 20px;">a. PLACE turbine in IMP IN.</p> <p style="margin-left: 20px;"><i>BOP depresses the "IMP IN" pushbutton and observes the transfer from "IMP OUT" to "IMP IN" control complete.</i></p> <p style="margin-left: 20px;">b. SET a desired load in the SETTER with the REFERENCE CONTROL.</p> <p style="margin-left: 20px;"><i>BOP depresses the reference control ▽ (down) button to reduce the setter display to less than 75% load as directed by the SRO.</i></p> <p style="margin-left: 20px;">c. SET the LOAD RATE at greater than or equal to 2%/min, and less than 5%/min.</p> <p style="margin-left: 20px;"><i>BOP selects the load reduction rate directed by the SRO using the LOAD RATE % PER MIN thumbwheel selector. It is expected that the load reduction rate of 3%/minute, specified by the Operations Superintendent will be used.</i></p> <p style="margin-left: 20px;">d. (p) DEPRESS GO pushbutton.</p> <p style="margin-left: 20px;"><i>BOP depresses the REFERENCE CONTROL "GO" button.</i></p>							
NOTE									
AFD green target band can be monitored using ICS Turn On code DOGHOUSE.									

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>3</u>	Page	<u>17</u>	of	<u>43</u>
Event Description: Operations Superintendent contacts the control room and states that the 1A MFP is to be taken out of service. Power is to be reduced at 3%/min to 75% using AOI-39, "Rapid Load Reduction," Section 3.3, "Reactor power is greater than 50%."									
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							
	RO	3. MONITOR rod position: <ul style="list-style-type: none"> • Rods above Lo-Lo insertion limit • AFD within Target Band 							
	SRO	4. REFER TO EPIP-1, Emergency Plan Classification Flowchart <i>When the SRO contacts Shift Manager, the Console Operator will repeat back the request to evaluate conditions using EPIP-1, Emergency Plan Classification Flowchart.</i>							
	SRO	5. NOTIFY the Load Coordinator of the required load reduction and expected ramp rate. <i>When the SRO contacts Load Coordinator, the Console Operator will repeat back the information provided.</i>							
	RO	6. MONITOR T-avg and T-ref: <ul style="list-style-type: none"> • T-ave trending to T-ref. • Mismatch less than 5°F. 							
	SRO	7. CHECK rate of power reduction is rapid enough for existing plant conditions.							
	BOP	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. <i>When the SRO contacts Chemistry, the Console Operator will repeat back the request.</i>							
EXAMINER: At the Chief Examiner's discretion after power has been dropped to 95%, cue the Console Operator to initiate Event 4.									

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>4 and 5</u>	Page	<u>18</u>	of	<u>43</u>
<p>Event Description: 4. At 95% power, 1A Main Feedwater pump trips due to low oil pressure. Requires entry into AOI-16, "Loss of Normal Feedwater," Sub Section 3.4, "TDMFWP Trip OR Loss of Flow GREATER than or equal to 800 MWe (67% Turbine Load)." Requires a Tech Spec evaluation of Axial Flux Difference. Requires a boration to return AFD to target band.</p> <p>5. 1-FCV-2-205, MFPT "A" CONDENSER CNDS OUTLET and 1-FCV-2-210, MFPT "A" CONDENSER CNDS INLET fail to close automatically. Requires the BOP to manually close valves.</p>									
<p>FINAL SUBMITTAL</p>									
Time	Position	Applicant's Actions or Behavior							

<p>Indications:</p> <p>50-A MFPT 1A ABNORMAL</p> <p>51-A MFPT 1A TRIPPED</p>		
	BOP	Diagnoses and announces the trip of the 1A Main Feedwater pump.
	BOP	May determines MFWP turbine condenser valves did not automatically close and closes them manually
	SRO	Enters and directs actions of AOI-16, "Loss of Normal Feedwater," Section 3.4, "TDMFWP Trip OR Loss of Flow GREATER than or equal to 800 MWe (67% Turbine Load)."
AOI-16		The following actions are taken from AOI-16, "Loss of Normal Feedwater," Section 3.4, "TDMFWP Trip OR Loss of Flow GREATER than or equal to 800 MWe (67% Turbine Load)."
	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 determines from SG level trends that loss of SG level is NOT imminent.</i></p>

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>4 and 5</u>	Page	<u>19</u>	of	<u>43</u>
<p>Event Description: 4. At 95% power, 1A Main Feedwater pump trips due to low oil pressure. Requires entry into AOI-16, "Loss of Normal Feedwater," Sub Section 3.4, "TDMFWP Trip OR Loss of Flow GREATER than or equal to 800 MWe (67% Turbine Load)." Requires a Tech Spec evaluation of Axial Flux Difference. Requires a boration to return AFD to target band.</p> <p>5. 1-FCV-2-205, MFPT "A" CONDENSER CNDS OUTLET and 1-FCV-2-210, MFPT "A" CONDENSER CNDS INLET fail to close automatically. Requires the BOP to manually close valves.</p>									
<p>FINAL SUBMITTAL</p>									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>2. ENSURE failed MFP TRIPPED.</p> <p><i>BOP determines that 1-HS-46-9A, MFPT A TRIP - RESET, RED indicating light is DARK and GREEN indicating light is LIT.</i></p> <p><i>If contacted as the Turbine Building AUO, console operator will repeat back request to investigate the cause of the 1A MFP trip. Report that the oil leak caused the trip and that Fire Op's is on the scene containing the oil. Report that there is no fire.</i></p>
	BOP	<p>3. CHECK turbine load less than or equal to 1000 MWe (85%).</p> <p><i>BOP observes 1-EI-57-16A, MEGAWATTS or the MEGAWATT meter on 1-XX-47-2000 EHC DISPLAY less than 1000 MWe.</i></p>
	BOP	<p>4. PLACE tripped MFP recirc valve controller in MANUAL, and CLOSE recirc valve.</p> <p><i>BOP places 1-FIC-3-70, MFWP A RECIRC CONTROL, in MANUAL and presses and holds the close pushbutton until the red arrow indicates 100% (as read on the controller).</i></p>
	BOP	<p>5. CHECK turbine load less than 800 MWe (67%).</p> <p><i>BOP observes 1-EI-57-16A, MEGAWATTS or the MEGAWATT meter on 1-XX-47-2000 EHC DISPLAY greater than 800 MWe.</i></p>
	BOP	<p>5. RESPONSE NOT OBTAINED:</p> <p>ENSURE Standby MFWP running. (p) IF Standby MFWP NOT available, THEN REDUCE turbine load to less than 800 MWe with valve position limiter.</p> <p><i>BOP verifies the Standby MFWP is running.</i></p>

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>4 and 5</u>	Page	<u>20</u>	of	<u>43</u>
<p>Event Description: 4. At 95% power, 1A Main Feedwater pump trips due to low oil pressure. Requires entry into AOI-16, "Loss of Normal Feedwater," Sub Section 3.4, "TDMFWP Trip OR Loss of Flow GREATER than or equal to 800 MWe (67% Turbine Load)." Requires a Tech Spec evaluation of Axial Flux Difference. Requires a boration to return AFD to target band.</p> <p>5. 1-FCV-2-205, MFPT "A" CONDENSER CNDS OUTLET and 1-FCV-2-210, MFPT "A" CONDENSER CNDS INLET fail to close automatically. Requires the BOP to manually close valves.</p>									
<p>FINAL SUBMITTAL</p>									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>6. ENSURE MFWP speed rising to control S/G Δ-P and levels on program.</p> <p><i>BOP verifies MFPT B SPEED 1-SI-46-20B is rising or stable, and #1 HTR INLET PRESS 1-PI-3-1 is indicating greater than MAIN STEAM PRESS 1-PI-1-33.</i></p>
<p style="text-align: center;">CAUTION</p> <p>Continued load reductions below 800 MWe should be done using normal turbine controls at less than or equal to 5% min.</p>		
<p style="text-align: center;">NOTE</p> <p>Load will not change until VALVE POS LIMIT light is cleared.</p>		
	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 verifies feed flow greater than steam flow for all steam generators, and all steam generator levels are rising or stable.</i></p>
	RO	8. MONITOR T-avg trending to within 3°F of T-ref.
	SRO	<p>9. MAINTAIN AFD within limits (p) INITIATE boration as required REFER TO ATTACHMENT 1, Manual Boration.</p> <p><i>Based on the power reduction, LCO 3.2.3, Axial Flux Difference (AFD) Condition A, must be entered. With AFD not within limits, reduce THERMAL POWER to < 50% RTP within 30 minutes.</i></p>
<p>EXAMINER: AOI-16, "Loss of Normal Feedwater," Attachment 1, "Manual Boration," is included as Attachment 2 to this scenario.</p>		

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>4 and 5</u>	Page	<u>21</u>	of	<u>43</u>
<p>Event Description: 4. At 95% power, 1A Main Feedwater pump trips due to low oil pressure. Requires entry into AOI-16, "Loss of Normal Feedwater," Sub Section 3.4, "TDMFWP Trip OR Loss of Flow GREATER than or equal to 800 MWe (67% Turbine Load)." Requires a Tech Spec evaluation of Axial Flux Difference. Requires a boration to return AFD to target band.</p> <p>5. 1-FCV-2-205, MFPT "A" CONDENSER CNDS OUTLET and 1-FCV-2-210, MFPT "A" CONDENSER CNDS INLET fail to close automatically. Requires the BOP to manually close valves.</p>									
<p>FINAL SUBMITTAL</p>									
Time	Position	Applicant's Actions or Behavior							

EXAMINER: Event 5 will cause the 1A MFWP turbine condenser valves fail to automatically close when the 1A MFW pump trips. The BOP must close valves 1-FCV-2-205 and 1-FCV-2-210 manually.

	BOP	<p>10. ENSURE tripped MFWP turbine condenser valves CLOSED:</p> <ul style="list-style-type: none"> • Pump A, 1-FCV-2-205 and 210 <p>OR</p> <ul style="list-style-type: none"> • Pump B, 1-FCV-2-211 and 216 <p><i>BOP determines MFWP turbine condenser valves did not automatically close and closes them manually by rotating MFPT 'A' CONDENSER CNDS INLET 1-HS-2-210A and MFPT 'A' CONDENSER CNDS OUTLET 1-HS-2-205A switches to the left to CLOSE and verifying the GREEN indicating lights are LIT and the RED indicating lights are DARK.</i></p>
	BOP	<p>11. MONITOR reg valves controlling S/G levels on program.</p>
	BOP	<p>12. LOCALLY MAINTAIN oil temp between 110 to 130°F on running Standby MFP using 1-THV-24-948.</p> <p><i>When the BOP contacts the AUO to perform this step, the Console Operator will repeat back the request.</i></p>

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>4 and 5</u>	Page	<u>22</u>	of	<u>43</u>
<p>Event Description: 4. At 95% power, 1A Main Feedwater pump trips due to low oil pressure. Requires entry into AOI-16, "Loss of Normal Feedwater," Sub Section 3.4, "TDMFWP Trip OR Loss of Flow GREATER than or equal to 800 MWe (67% Turbine Load)." Requires a Tech Spec evaluation of Axial Flux Difference. Requires a boration to return AFD to target band.</p> <p style="text-align: center;">FINAL SUBMITTAL</p> <p>5. 1-FCV-2-205, MFPT "A" CONDENSER CNDS OUTLET and 1-FCV-2-210, MFPT "A" CONDENSER CNDS INLET fail to close automatically. Requires the BOP to manually close valves.</p>									
Time	Position	Applicant's Actions or Behavior							

EXAMINER: Since the steam dump controls are in "STEAM PRESSURE" mode at this time, the SRO may elect to:

1.) Not reset C-7 interlock OR

2.) Direct the BOP to place the steam dump controls in OFF prior to resetting C-7.

	BOP	<p>13. ENSURE reset of C-7:</p> <p style="padding-left: 20px;">a. CHECK C-7 LOSS OF LOAD STM DUMP INTERLOCK annunciator LIT. [66-E]</p> <p>BOP will verify C-7 LOSS OF LOAD STM DUMP INTERLOCK (66-E) is LIT.</p> <p style="padding-left: 20px;">b. ENSURE steam dump valves have zero demand.</p> <p>BOP will verify STEAM DUMP DEMAND 1-XI-1-33 indicates zero.</p> <p style="padding-left: 20px;">c. RESET loss-of-load interlock with steam dump mode switch.</p> <p>BOP will rotate STEAM DUMP MODE switch 1-HS-1-103D to the left and verify C-7 LOSS OF LOAD STM DUMP INTERLOCK (66-E) is DARK.</p>
	BOP	<p>14. ENSURE Condensate System Pumps in service as necessary:</p> <p style="padding-left: 20px;">• REFER TO GO-4, Normal Power Operation.</p> <p>BOP verifies all condensate pumps are running and MFW PMPS SUCT PRESS adequate.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>4 and 5</u>	Page	<u>23</u>	of	<u>43</u>
<p>Event Description: 4. At 95% power, 1A Main Feedwater pump trips due to low oil pressure. Requires entry into AOI-16, "Loss of Normal Feedwater," Sub Section 3.4, "TDMFWP Trip OR Loss of Flow GREATER than or equal to 800 MWe (67% Turbine Load)." Requires a Tech Spec evaluation of Axial Flux Difference. Requires a boration to return AFD to target band.</p> <p style="text-align: right;">5. 1-FCV-2-205, MFPT "A" CONDENSER CNDS OUTLET and 1-FCV-2-210, MFPT "A" CONDENSER CNDS INLET fail to close automatically. Requires the BOP to manually close valves.</p>									
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	SRO	<p>15. IF reactor power dropped by greater than or equal to 15% in one hour, THEN NOTIFY Chemistry to initiate power change sampling requirements.</p> <p><i>When SRO contacts Chemistry to initiate sampling, console operator will acknowledge the request.</i></p>
	BOP	<p>16. CHECK VALVE POS LIMIT LIT.</p>
	SRO	<p>17. RETURN valve position limiter to normal:</p> <p style="margin-left: 20px;">a. ENSURE TURBINE in IMP OUT.</p> <p style="margin-left: 20px;">b. (p) REDUCE turbine load setpoint using REFERENCE CONTROL ▽ (lower) AND GO button until VALVE POS LIMIT LIGHT not LIT.</p> <p style="margin-left: 20px;">c. SET valve position limiter to 95%.</p>
	SRO	<p>18. INITIATE repairs on failed pump.</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 1A Main Feedwater Pump.</i></p>
	SRO	<p>19. RETURN TO Instruction in effect.</p>
<p>EXAMINER: The crew briefing is optional. The next event may be entered prior to the brief, at the discretion of the Chief Examiner.</p>		
	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>4</u>	Event #	<u>4 and 5</u>	Page	<u>24</u>	of	<u>43</u>
Event Description:		4. At 95% power, 1A Main Feedwater pump trips due to low oil pressure. Requires entry into AOI-16, "Loss of Normal Feedwater," Sub Section 3.4, "TDMFWP Trip OR Loss of Flow GREATER than or equal to 800 MWe (67% Turbine Load)." Requires a Tech Spec evaluation of Axial Flux Difference. Requires a boration to return AFD to target band.							
FINAL SUBMITTAL		5. 1-FCV-2-205, MFPT "A" CONDENSER CNDS OUTLET and 1-FCV-2-210, MFPT "A" CONDENSER CNDS INLET fail to close automatically. Requires the BOP to manually close valves.							
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>
<p>If not already cued, Console Operator will check with Chief Examiner prior to inserting Event 6.</p>		

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>25</u>	of	<u>43</u>
Event Description:		1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

Indications:		
62-C SG 3 STM-FW FLOW MISMATCH		
63-F SG 3 LEVEL LO		
	BOP	Diagnoses and announces the failure of 1-LCV-3-90 SG 3 MFW REG VLV closed.
	BOP	May recommend to the SRO that a reactor trip be initiated based on imminent loss of SG level.
	BOP	May attempt to open 1-LCV-3-90 manually, in an attempt to recover feedwater flow.
	SRO	May direct the RO to manually trip the reactor based on loss of SG level.
	SRO	Enters and directs the actions of E-0, "Reactor Trip or Safety Injection."
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. 		
EXAMINER: The next step (E-0 Step 1) assumes the reactor is manually tripped prior to entering E-0 completing Critical Task 1. If Reactor has not been manually tripped, Critical Task 1 will be accomplished in E-0 step 1 Response Not Obtained column. as indicated below.		

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>26</u>	of	<u>43</u>
Event Description:		1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>1. ENSURE reactor trip:</p> <ul style="list-style-type: none"> Reactor trip and bypass breakers OPEN. <p>RO checks 1-52RTB, RX TRIP BKR A GREEN indicating light LIT on panel 1-M-4.</p> <p>RO checks 1-52RTB, RC TRIP BKR B GREEN indicating light LIT on panel 1-M-4.</p> <p>RO checks 1-52BYA, BYPASS BKR A lights DARK.</p> <p>RO checks 1-52BYB, BYPASS BKR B lights DARK.</p> <ul style="list-style-type: none"> RPIs at bottom of scale. <p>RO normally 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.</p> <p>Note: CERPI Monitors are not working due to power loss.</p> <ul style="list-style-type: none"> Neutron flux DROPPING. <p>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.</p>
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Event Description: 1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.

**FINAL
SUBMITTAL**

Time

Position

Applicant's Actions or Behavior

Critical Task 1

Manually trip the reactor from the control room upon recognition of the failure of the automatic trip circuit.

Critical Task 1	RO	<p>1. RESPONSE NOT OBTAINED:</p> <p>Manually TRIP reactor.</p> <p><i>If RO rotates 1-RT-1 on 1-M-4, REACTOR TRIP to the right to the TRIP position the reactor will NOT Trip. The RO will be required to rotate 1-RT-2 on 1-M-6, REACTOR TRIP to the right to the TRIP position to trip the reactor.</i></p> <p>IF reactor will NOT trip, THEN ** GO TO FR-S.1, Nuclear Power Generation / ATWS.</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>

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>28</u>	of	<u>43</u>
Event Description:	1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>3. CHECK 6.9 kV shutdown boards:</p> <p>a. At least one board energized from:</p> <p>CSST (offsite),</p> <p>OR</p> <p>D/G (blackout).</p> <p><i>At the trip, the 1B-B 6.9 KV Shutdown Board suffers a differential relay operation causing the board to be lost.</i></p> <p><i>When dispatched as an AUO to the 1B-B 6.9 KV Shutdown Board, console operator will state that the board tripped on differential relay operation. State that the board is damaged severely, and that there is NO fire.</i></p>
	RO	<p>4. CHECK SI actuated:</p> <p>a. Any SI annunciator LIT.</p> <p><i>RO checks window 70-A, SI ACTUATED; 76-G SI MANUAL; 77-G IS PZR PRESS LO; SI CNTMT PRESS HI; and SI STM PRESS LO DARK.</i></p>

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>29</u>	of	<u>43</u>
Event Description:	1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	RO	<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, OR <p>RO observes SG pressures greater than 675 psig (stable, at approximately 1092 psig.)</p> <ul style="list-style-type: none"> • RCS press less than 1870 psig, OR <p>RO observes RCS pressure greater than 1870 psig (approximately 2235 psig.)</p> <ul style="list-style-type: none"> • Contmt press greater than 1.5 psig <p>RO observes containment pressure less than 1.5 psig (approximately 0 psig.)</p> <p>THEN ACTUATE SI manually.</p> <p>IF SI NOT required, THEN ** GO TO ES-0.1, Reactor Trip Response.</p> <p>SRO determines that SI is NOT required and transitions to ES-0.1, Reactor Trip Response."</p>
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Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>30</u>	of	<u>43</u>
Event Description:	1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

ES-0.1		The following actions are taken from ES-0.1, "Reactor Trip Response."
CAUTION		
Plant conditions, AFW pump start signals and flow requirements should be evaluated as time allows.		
	RO	1. MONITOR SI actuation criteria: • IF SI actuation occurs during the performance of this Instruction, THEN ** GO TO E-0, Reactor Trip or Safety Injection.
		2. CHECK Generator PCBs OPEN. <i>BOP observes that 1-HS-57-26, PCB 5044 MAIN GENERATOR 500 KV BUS red INDICATING LIGHT IS DARK and GREEN INDICATING LIGHT IS lit. BOP observes 1-HS-57-24, PCB 5088 MAIN GENERATOR 500 KV BUS red INDICATING LIGHT IS DARK and GREEN INDICATING LIGHT IS lit.</i>
		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.

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>31</u>	of	<u>43</u>
Event Description:	1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

		<p>4. ENSURE AFW operation:</p> <p>a. AFW established:</p> <ul style="list-style-type: none"> Both MD AFW pumps RUNNING. <p>BOP determines that 1A-A MD AFW pump is running but not pumping forward. BOP dispatches an AUO to locally inspect the 1A-A MD AFW pump.</p> <p>When dispatched as an AUO, console operator will report that the 1A-A MD AFW pump shaft appears to be broken.</p> <p>1B-B MD AFW pump has no power due to the loss of 1B-B 6.9 KV Shutdown board.</p> <ul style="list-style-type: none"> TD AFW pump RUNNING. <p>BOP determines that the TD AFW pump is running but has no discharge flow. BOP dispatches an AUO to inspect the TD AFW pump locally.</p> <p>When dispatched as an AUO to the TD AFW pump, console operator will state that the discharge piping and pump casing are very hot. If requested to vent the pump, console operator will report back that the vent valve is stuck and that assistance from Maintenance has been requested.</p> <ul style="list-style-type: none"> LCVs in AUTO or controlled in MANUAL.
	RO	<p>4. a. RESPONSE NOT OBTAINED:</p> <p>ESTABLISH feed flow from AFW or MFW as necessary.</p> <p>SRO may direct the BOP to attempt to restore MFW.</p>
	RO	<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%.

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>32</u>	of	<u>43</u>
Event Description:	1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	RO	4. b. RESPONSE NOT OBTAINED: IF heat sink can NOT be established, THEN GO TO FR-H.1, Loss Of Secondary Heat Sink.

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>33</u>	of	<u>43</u>
Event Description: 1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.									
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

FR-H.1		The following steps are taken from E-2, "Faulted Steam Generator Isolation."
CAUTION		
<ul style="list-style-type: none"> If total feed flow CAPABILITY of 410 gpm is available, this Instruction should NOT be performed. If an Intact S/G is available, feed flow should NOT be reestablished to any faulted S/G. 		
	BOP	1. CHECK if secondary heat sink is required: <ul style="list-style-type: none"> a. RCS pressure greater than any Intact S/G pressure. b. RCS temperature greater than 375°F [360°F ADV]. <i>RO determines that both of the conditions requiring a heat sink exist.</i>
	BOP	2. ENSURE at least one charging pump RUNNING. <i>RO reports that NO charging pumps are running or available to be placed in service.</i>
	BOP	2. RESPONSE NOT OBTAINED: IF at least one charging pump NOT RUNNING, THEN STOP all RCPs AND GO TO Cautions prior to Step 18 to initiate RCS bleed and feed.
CAUTION		
<ul style="list-style-type: none"> Step 18 Through 20 must be performed quickly in order to establish RCS heat removal by RCS bleed and feed. Termination of bleed and feed is required prior to transitioning out of FR-H.1 when heat sink is restored. 		

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Event Description: 1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.

**FINAL
SUBMITTAL**

Time	Position	Applicant's Actions or Behavior
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Critical Task 2

Initiate RCS bleed and feed so that the RCS depressurizes sufficiently for safety injection pumps to inject into the RCS.

Critical Task 2 Begin	RO	18. ACTUATE SI. <i>RO rotates 1-HS-63-133B SI ACTUATE TR A & B to the right to the "ACTUATE" position. RO observes window 70-A SI ACTUATED light is LIT. RO observes that window 76-G, SI MANUAL is LIT.</i>
Critical Task 2	RO	19. ENSURE at least one of the following RCS feed paths: <ul style="list-style-type: none"> • At least one charging pump injecting thru BIT, OR <ul style="list-style-type: none"> • At least one SI Pump running with its injection valves open. <i>RO determines that the 1A-A SI pump is running and its discharge valve is open.</i>

CAUTION

- When the reactor vessel head vent block valve is opened, the throttle valve will cycle open and closed.
- Slowly opening (5 seconds stroke time) the head vent valve will prevent water hammer and pipe damage.

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>35</u>	of	<u>43</u>
Event Description: 1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.									
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

Critical Task 2 END	RO	20. ENSURE adequate RCS bleed path: a. ENSURE all pzz PORVs and pzz PORV block valves OPEN. <i>RO rotates 1-HS-68-340AA, PZR PORV 340A to the right to the OPEN position. RO observes the Red indicating light LIT, GREEN indicating light DARK.</i> <i>RO rotates 1-HS-68-334A, PZR PORV 334 to the right to the OPEN position. RO observes the Red indicating light LIT, GREEN indicating light DARK.</i> <i>RO observes 1-HS-68-333A, BLOCK VLV FOR PORV 340A RED indicating light LIT, GREEN indicating light DARK.</i> <i>RO observes 1-HS-68-332A, BLOCK VLV FOR PORV 334 RED and GREEN indicating lights are DARK due to power loss. RO reports that the last position of 1-HS-68-332A was OPEN.</i>
		CAUTION WHEN feedwater source is AVAILABLE, THEN feed rate will be controlled by Steps 30 and 31.
		NOTE The details of Steps 4 through 15 may be referred to as necessary to establish feed flow in the following step but procedure performance must continue to terminate RCS bleed and feed.
		EXAMINER: The applicants are expected to refer to FR-H.1 Steps 4 through 15, to establish Main feedwater using the Standby Main Feedwater Pump. Steps 4 through 15 along with Appendix A, "Establishing MFW Following Reactor Trip," are contained in Attachment 3 to this scenario.

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>36</u>	of	<u>43</u>
Event Description:		1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>21. RESET SI, AND CHECK the following:</p> <p>RO depresses 1-HS-63-134A, SI RESET TR A, and depresses 1-HS-63-134B SI RESET TR B.</p> <ul style="list-style-type: none"> • SI ACTUATED permissive DARK. <p>RO observes window 70-A SI ACTUATED is DARK on Panel 1-XX-55-4A.</p> <ul style="list-style-type: none"> • AUTO SI BLOCKED permissive LIT. <p>RO observes window 70-B AUTO SI BLOCKED is LIT on Panel 1-XX-55-4A.</p>
	RO	<p>22. RESET Containment Isolation Phase A and Phase B.</p> <p>RO depresses 1-HS-30-63D, ϕA CNTMT ISOL RESET TR-A and 1-HS-30-63E, ϕA CNTMT ISOL RESET TR-B and observes RED ϕA lights on 1-XX-55-6C MASTER ISOL STATUS PNL and 1-XX-55-6D are DARK.</p> <p>RO depresses 1-HS-30-64D, ϕB CNTMT ISOL RESET TR-A and 1-HS-30-64E, ϕB CNTMT ISOL RESET TR-B.</p> <p>If the ϕB signal was present then the RO will observe RED ϕB lights on 1-XX-55-6C MASTER ISOL STATUS PNL and 1-XX-55-6D DARK.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>37</u>	of	<u>43</u>
Event Description:	1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>23. ENSURE cntmt air in service:</p> <p>a. Aux air press greater than 75 psig [M-15].</p> <p>RO observes 1-PI-32-104A AUX AIR A PRESS indicating approximately 95-100 psig.</p> <p>RO observes 1-PI-32-105A AUX AIR B PRESS indicating approximately 95-100 psig.</p> <p>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>BOP observes the RED indicating lights are LIT and the GREEN indicating lights are DARK on 1-HS-32-80A, AUX AIR TO RX BLDG TR A CIV-φB/70 PSI D/S CLOSES, 1-HS-32-102A, AUX AIR TO RX BLDG TR B CIV-φB/70 PSI D/S CLOSES, and 1-HS-32-110A, NON ESS AUX AIR TO RX BLDG CIV-φB/70 PSI D/S CLOSES.</p>
	RO	<p>24. PERFORM Steps 1 through 6 of E-0, REACTOR TRIP OR SAFETY INJECTION, while continuing with this Instruction.</p> <p>SRO assigns BOP to perform Steps 1-6 of E-0, "Reactor Trip or Safety Injection."</p>
	RO	<p>25. MAINTAIN RCS bleed and feed paths:</p> <ul style="list-style-type: none"> • MAINTAIN charging pump injection thru BIT. <p>Charging flow is NOT available.</p> <ul style="list-style-type: none"> • MAINTAIN SI pump flow. • MAINTAIN both pzzr PORVs and block valves OPEN.

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Event Description: 1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.

**FINAL
SUBMITTAL**

Time

Position

Applicant's Actions or Behavior

CAUTION

If containment pressure rises to greater than 2.8 psig, containment spray should be verified.

	RO	26. DETERMINE if cntmt spray should be stopped: a. Spray pumps running. b. MONITOR cntmt pressure less than 2.0 psig. c. RESET containment spray signal. d. STOP cntmt spray pumps AND PLACE in A-AUTO. e. CLOSE cntmt spray discharge valves 1-FCV-72-2 and 1-FCV-72-39.
	RO	27. WHEN RWST level is less than 34%, THEN ** GO TO ES-1.3, TRANSFER TO RHR CONTAINMENT SUMP.
	RO	28. ENSURE CCS alignment for RHR operation: a. RHR heat exchanger B outlet 1-FCV-70-153 OPEN. b. RHR heat exchanger A outlet 1-FCV-70-156 OPEN. c. SFP heat exchanger A supply 0-FCV-70-197 CLOSED.

NOTE

The details of Steps 4 through 15 may be referred to as necessary to establish feed flow in the following step but procedure performance must continue to terminate RCS bleed and feed.

EXAMINER: The applicants are expected to refer to FR-H.1 Steps 4 through 15, to establish Main feedwater using the Standby Main Feedwater Pump. Steps 4 through 15 along with Appendix A, "Establishing MFW Following Reactor Trip," are contained in Attachment 3 to this scenario.

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>39</u>	of	<u>43</u>
Event Description:	1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>29. EVALUATE the following to restore level in at least one S/G:</p> <ul style="list-style-type: none"> a. AFW pumps. b. MFW pumps. c. Condensate pumps. d. ERCW valves to AFW suction. e. HPFP spool piece (AOI-7.06).
CAUTION		
Feedwater flow rates should be controlled to prevent excessive RCS cooldown.		
NOTE		
If possible, a S/G should be selected to feed which has WR level greater than 15% [25% ADV] and RCS Loop WR hot leg temperature less than 550°F.		
<p>EXAMINER: See Attachment 3 Step 11, 12, and Appendix A as required for SI/Trip interlocks reset to support restart of the Standby Main Feedwater pump.</p>		

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>40</u>	of	<u>43</u>
Event Description:	1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

EXAMINER: Reactor Trip Breakers will have to be cycled locally to clear Feedwater isolation signal and establish Standby Feed flow.

When contacted to cycle the reactor trip breakers locally acknowledge the request then wait 3 min prior to entering simulator event 25 and event 26.

To cycle the trip breakers enter Event 25 to close the "A" reactor trip breaker, verify the red indicating light is lit, then immediately modify the override to open the "A" reactor trip breaker and verify the green light is lit.

To cycle the trip breakers enter Event 26 to close the "B" reactor trip breaker, verify the red indicating light is lit, then immediately modify the override to open the "B" reactor trip breaker and verify the green light is lit.

EXAMINER: If/when notified as Work Control OR Instrument Maintenance to block auto SI using IMI-99.040, AUTO SI Block the Console Operator will repeat back the request.

The Console Operator will wait 10 minutes or until prompted by the Chief Examiner and then insert remote functions rpr18, block train a auto si and rpr19, block train b auto si. Console Operator will then report back that IMI-99.040 is complete.

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>41</u>	of	<u>43</u>
Event Description:	1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.								
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

Critical Task 3

Initiate RCS bleed and feed prior to reaching hot conditions in the Steam Generators.

FR-H.1 Steps 30.b and 30.c:

- *Selected S/G WR level - less than 15% [25% ADV].*
- *Selected S/G RCS Loop hot leg temperature - greater than 550°F*

Critical Task 3	RO	(See Critical Task 2 for specific Bleed and Feed Actions)
	RO	<p>30. ESTABLISH feedflow to one Selected S/G:</p> <p>a. Feed source - AVAILABLE</p> <p><i>RNO leading to Step 33 will be required until Standby Main Feedwater Pump is in service</i></p> <p>b. Selected S/G WR level - less than 15% [25% ADV]</p> <p><i>When Standby Main Feedwater Pump is in service, RNO for this step is expected leading to Step 31.</i></p> <p>c. Selected S/G RCS Loop WR hot leg temperature - greater than 550°F</p> <p>d. Core exit TCs - RISING</p> <p>e. ESTABLISH feedflow to selected S/G at maximum rate.</p>

Op Test No.: 2 Scenario # 4 Event # 6 Page 42 of 43

Event Description: 1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.

**FINAL
SUBMITTAL**

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

	RO	<p>30. RESPONSE NOT OBTAINED:</p> <p>a. GO TO Step 33.</p> <p>b. ESTABLISH feedflow to selected S/G at a rate which causes S/G WR level to rise and RCS Loop WR hot leg temperature to drop. **GO TO Step 31.</p> <p>c. ESTABLISH feedflow to selected S/G at a rate which causes S/G WR level to rise and RCS Loop WR hot leg temperature to drop. **GO TO Step 31.</p> <p>d. ESTABLISH feedflow to selected S/G at less than 100 GPM (40,000 PPH) UNTIL selected S/G WR level is greater than 15% [25% ADV], THEN ADJUST feedflow as necessary to obtain S/G NR level greater than 29% [39% ADV]. **GO TO Step 31.</p>
	RO	<p>31. CHECK Selected S/G:</p> <p>a. Selected S/G RCS Loop WR hot leg temperature - less than 550°F</p> <p><i>RNO for this step is expected when Standby Main Feedwater Pump is in service.</i></p>
	RO	<p>31.a. RESPONSE NOT OBTAINED:</p> <p>MAINTAIN feedflow to selected S/G at rate established in Step 30.</p> <p>WHEN selected S/G RCS Loop Hot Leg temperature less than 550°F, THEN PERFORM Steps 31b, c and d. **GO TO Step 33.</p>

Op Test No.:	<u>2</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>43</u>	of	<u>43</u>
Event Description:		1-LCV-3-90, SG 3-MFW REG VLV fails to 25% position causing SG 3 level to drop. Requires a manual trip of the reactor from 1-M-6. E-0, "Reactor Trip or Safety Injection" will be entered, and a transition to ES-0.1, "Reactor Trip Response" will be made. At the trip, the TDAFW pump becomes steam bound and the 1A MDAFW pump shaft shears. 1B-B 6.9 KV Shutdown Board trips due to differential relay operation. This results in a loss of secondary heat sink. FR-H.1, "Loss of Secondary Sink" will be entered either from the Status Tree evaluation OR at ES-0.1 Step 4.							
FINAL SUBMITTAL									
Time	Position	Applicant's Actions or Behavior							

	RO	33. CHECK all RCS bleed and feed termination criteria met: <ul style="list-style-type: none"> • At least one S/G NR level greater than 29% [39% ADV]. • Incore T/C dropping. • T-hot dropping.
	RO	33. RESPONSE NOT OBTAINED: CONTINUE RCS bleed and feed UNTIL all criteria met. CONTINUE actions to restore secondary heat sink. GO TO Note prior to Step 29.
EXAMINER: When the SRO enters Step 33 RNO <u>with the Standby Main Feedwater Pump in service</u> and states that a return to Step 29 is required, direct the Console Operator to place the simulator in STOP and inform the applicants that the scenario is terminated.		
END OF SCENARIO		

SHIFT TURNOVER CHECKLIST

Page 1 of 2

SHIFT TURNOVER CHECKLIST			
		Page <u>1</u> of <u>1</u>	
<input type="checkbox"/> SM <input checked="" type="checkbox"/> US/MCR <input type="checkbox"/> UO <input type="checkbox"/> AUO <input type="checkbox"/> STA (STA Function)	Unit <u>1</u> 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: 1A-A CCP is tagged for motor bearing replacement. LCO 3.5.2 and TR 3.1.4 were entered 8 hours ago. Protected equipment signs have been posted for 1B-B CCP. Standby Main Feedwater pump is in service. _____ _____ • SI/Test in progress/planned: (including need for conduct of evolution briefings) _____ _____ _____ • Major Activities/Procedures in progress/planned: Train A/Channel 1 Work Week. An oil leak on the 1A-MFP was identified last shift, and Operations Management is meeting to determine whether the pump will be removed from service. The TB AUO is monitoring the 1A MFP every 30 minutes. Current direction is to maintain current plant conditions. _____ _____ • 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"/> SM <input type="checkbox"/> US/MCR <input checked="" type="checkbox"/> UO <input type="checkbox"/> AUO <input type="checkbox"/> STA (STA Function)	Unit <u>1</u> Unit _____ Station _____ _____	_____ <u>Off-going - Name</u> _____ <u>On-coming - Name</u>	
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: 1A-A CCP is tagged for motor bearing replacement. LCO 3.5.2 and TR 3.1.4 were entered 8 hours ago. Protected equipment signs have been posted for 1B-B CCP. Standby Main Feedwater pump is in service. _____ _____ • SI/Test in progress/planned: (including need for conduct of evolution briefings) _____ _____ _____ • Major Activities/Procedures in progress/planned: Train A/Channel 1 Work Week. An oil leak on the 1A-MFP was identified last shift, and Operations Management is meeting to determine a plan for repairs. The TB AUO is monitoring the 1A MFP every 30 minutes. Current direction is to maintain current plant conditions. _____ _____ • 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 4

Attachment 1

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

Attachment 1

WBN Unit 1	Malfunction of Reactor Control System	AOI-2 Rev. 0038
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**Attachment 1
(Page 1 of 1)**

Reactor Power VS T-avg/T-ref 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	29.8 %
16%	561.7 °F	30.5 %
18%	562.3 °F	31.2 %
20%	562.8 °F	31.9 %
22%	563.4 °F	32.6 %
24%	564.0 °F	33.3 %
26%	564.6 °F	34.0 %
28%	565.2 °F	34.7 %
30%	565.8 °F	35.4 %
32%	566.3 °F	36.1 %
34%	566.9 °F	36.8 %
36%	567.5 °F	37.5 %
38%	568.1 °F	38.1 %
40%	568.7 °F	38.8 %
42%	569.3 °F	39.5 %
44%	569.8 °F	40.2 %
46%	570.4 °F	40.9 %
48%	571.0 °F	41.6 %
50%	571.6 °F	42.3 %

RX POWER	TAVE- TREF	PZR LEVEL
52%	572.2 °F	43.0 %
54%	572.8 °F	43.7 %
56%	573.4 °F	44.4 %
58%	573.9 °F	45.1 %
60%	574.5 °F	45.8%
62%	575.1 °F	46.5 %
64%	575.7 °F	47.1 %
66%	576.3 °F	47.8 %
68%	576.9 °F	48.5 %
70%	577.4 °F	49.2 %
72%	578.0 °F	49.9 %
74%	578.6 °F	50.6 %
76%	579.2 °F	51.3 %
78%	579.8 °F	52.0 %
80%	580.4 °F	52.7 %
82%	580.9 °F	53.4 %
84%	581.5 °F	54.1 %
86%	582.1 °F	54.8 %
88%	582.7 °F	55.4 %
90%	583.3 °F	56.1 %
92%	583.9 °F	56.8 %
94%	584.4 °F	57.5 %
96%	585.0 °F	58.2 %
98%	585.6 °F	58.9 %
100%	586.2 °F	59.6 %

Scenario 4 Attachment 2

AOI-16, "Loss of Normal
Feedwater"

Attachment 1

WBN Unit 1	Loss of Normal Feedwater	AOI-16 Rev. 0033
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**Attachment 1
(Page 1 of 2)**

Manual Boration

1.0 MANUAL BORATION METHODS

NOTE

The required Boric Acid needed to compensate for a runback may be obtained from Reactivity Briefing Sheet

A. **INITIATE** boration of RCS to restore AFD to normal using Section 1.2 OR 1.3.

1.2 Normal Manual Boration

A. **INITIATE** normal boration to change CB as necessary:

1. **PLACE** BA flow controller 1-FC-62-139, to desired flow rate.
2. **ADJUST** BA batch counter 1-FQ-62-139 to ensure boration continues.
3. **PLACE** mode selector 1-HS-62-140B to BOR.
4. **PLACE** VCT makeup control 1-HS-62-140A to START.
5. **VERIFY** boric acid flow indicated on 1-FI-62-139.
6. **WHEN** adequate amount of boric acid injected,
THEN
CONTINUE with this instruction.
7. **PLACE** 1-H-62-140A, VCT Makeup Control to STOP.
8. **VERIFY** 1-FI-62-139 Boric Acid to Blender, indicating ZERO.
9. **ENSURE** 1-FC-62-142, PW to Blender on 35% (70gpm), and Manual-Auto toggle in AUTO.
10. **ADJUST** 1-FC-62-139, BA to Blender, to new RCS C_B.
11. **PLACE** 1-HS-62-140B, VCT MAKEUP MODE, in AUTO.
12. **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL, to START, and **VERIFY** red light lit.

WBN Unit 1	Loss of Normal Feedwater	AOI-16 Rev. 0033
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**Attachment 1
(Page 2 of 2)**

1.3 Emergency Boration

- A. **IF** manual boration unavailable, **THEN**
ESTABLISH required emergency boration flow:
1. **PLACE** both BA pumps in FAST speed.
 2. **ADJUST** emergency borate valve 1-FCV-62-138 to obtain required flow.
 3. **CHECK** emergency borate flow on 1-FI-62-137A.
 4. **WHEN** adequate amount of boric acid injected,
THEN
CONTINUE with this instruction.
 5. **PLACE** both BA pumps in SLOW speed.
 6. **CLOSE** emergency borate valve 1-FCV-62-138.
 7. **VERIFY** emergency borate flow 1-FI-62-137A, indicating zero flow.

Scenario 4 Attachment 3

FR-H.1, "LOSS OF
SECONDARY HEAT SINK."

Steps 4-15
and
Appendix A

WBN Unit 1	Loss of Secondary Heat Sink	FR-H.1 Rev. 0018
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Step	Action/Expected Response	Response Not Obtained
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- | | | |
|----|---|---|
| 4. | ENSURE S/G blowdown ISOLATED. | Manually CLOSE valves. |
| 5. | MONITOR CST volume greater than 200,000 gal. | INITIATE CST refill USING SOI-59.01, Demineralized Water System. |

IF CST volume drops to less than 5000 gal, **THEN**

MONITOR AFW pumps to ensure suction transfer.

NOTE If the use of condensate flow is anticipated, then a higher pzs level will better accommodate the level shrink from S/G cooldown and depressurization.

- | | |
|----|---|
| 6. | CONTROL pzs level between 29% and 63% [47% and 58% ADV]. |
|----|---|

WBN Unit 1	Loss of Secondary Heat Sink	FR-H.1 Rev. 0018
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Step	Action/Expected Response	Response Not Obtained
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7. **ESTABLISH MD AFW pump flow:**

- | | |
|--|---|
| <p>a. CHECK MD AFW pump AVAILABLE.</p> <p>b. ENSURE both MD AFW pumps RUNNING.</p> <p>c. ENSURE MD AFW LCVs OPEN.</p> <p>d. CHECK MD AFW pump flow greater than 410 gpm.</p> <p>e. CHECK NR level in at least one S/G greater than 29% [39% ADV].</p> | <p>a. ** GO TO Step 8.</p> <p>b. START pumps from the shutdown boards.</p> <p>c. OPEN MD LCVs from the auxiliary control room,</p> <p>OR</p> <p>Locally OPEN MD LCVs and manual isolation valves USING SOI-3.02, Auxiliary Feedwater System.</p> <p>d. ENSURE AFW valve alignment USING SOI-3.02, Auxiliary Feedwater System.</p> <p>e. MAINTAIN total feed flow to S/Gs greater than 410 gpm UNTIL NR level in at least one S/G greater than 29% [39% ADV].</p> <p>WHEN NR level in at least one S/G greater than 29% [39% ADV],
THEN</p> <p>RETURN TO instruction in effect.</p> <p>** GO TO Step 8.</p> |
|--|---|
- f. **RETURN TO** Instruction in effect.

WBN Unit 1	Loss of Secondary Heat Sink	FR-H.1 Rev. 0018
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Step	Action/Expected Response	Response Not Obtained
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8. **ESTABLISH TD AFW pump flow:**

- | | |
|--|--|
| <p>a. CHECK TD AFW pump AVAILABLE.</p> <p>b. ENSURE turbine steam supply valves OPEN:</p> <ul style="list-style-type: none"> • Either 1-FCV-1-15 or 1-FCV-1-16. • 1-FCV-1-17 and 1-FCV-1-18 • Trip and throttle valve. <p>c. ENSURE TD AFW LCVs OPEN.</p> <p>d. CHECK TD AFW pump speed NORMAL.</p> <p>e. CHECK TD AFW pump flow greater than 410 gpm.</p> | <p>a. ** GO TO Step 9.</p> <p>b. OPEN steam supply valves from reactor MOV boards.</p> <p>IF trip and throttle valve 1-FCV-1-51 closed, THEN</p> <p>CHECK the following:</p> <ul style="list-style-type: none"> • Valve latched to motor operator. • Mechanical overspeed reset. • Thermal overloads reset. <p>c. OPEN TD LCVs at auxiliary control panel [TD pump room, 692],</p> <p>OR</p> <p>Locally OPEN TD LCVs and manual isolation valves:</p> <ul style="list-style-type: none"> • S/G 1 and 4 [south vlv room]. • S/G 2 and 3 [Aux Bldg 737]. <p>d. Locally CONTROL TD AFW pump.</p> <p>e. ENSURE AFW valves aligned USING SOI-3.02, Auxiliary Feedwater System.</p> |
|--|--|

Step continued on next page

WBN Unit 1	Loss of Secondary Heat Sink	FR-H.1 Rev. 0018
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Step	Action/Expected Response	Response Not Obtained
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8. (continued)

f. **CHECK** NR level in at least one S/G greater than 29% [39% ADV].

f. **MAINTAIN** total feed flow to S/Gs greater than 410 gpm UNTIL NR level in at least one S/G greater than 29% [39% ADV].

WHEN NR level in at least one S/G greater than 29% [39% ADV],
THEN

RETURN TO Instruction in effect.

**** GO TO** Step 9.

g. **RETURN TO** Instruction in effect.

9. **STOP** all four RCPs.

10. **IF** Secondary pumps will be used to feed S/Gs, **THEN**

REFER TO Appendix A (FR-H.1), Establishing MFW following Reactor Trip, while continuing this Instruction.

WBN Unit 1	Loss of Secondary Heat Sink	FR-H.1 Rev. 0018
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Step	Action/Expected Response	Response Not Obtained
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- CAUTION**
- If offsite power is lost after SI reset, manual action will be required to restart the SI pumps and RHR pumps due to loss of SI start signal.
 - If plant conditions degrade after automatic SI is blocked, manual actuation may be required.

NOTE After the low steamline pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.

11. **BLOCK** SI signals:

a. **INITIATE** RCS depressurization to less than 1912 psig:

1) **IF** letdown in service, **THEN**

ALIGN aux spray USING Appendix B (FR-H.1), **ALIGN** AUX SPRAY.

1) **IF** letdown is **NOT** in service, **THEN**

USE one pzs PORV.

b. **BLOCK** auto SI actuation signals [68-B], and [69-B]:

1) **NOTIFY** IMs to block auto SI USING IMI-99.040, **AUTO** SI Block.

2) **WHEN** RCS pressure is less than 1962 psig (P-11), **THEN**

- **BLOCK** low pzs pressure SI.
- **BLOCK** low steam pressure SI.

Step continued on next page

WBN Unit 1	Loss of Secondary Heat Sink	FR-H.1 Rev. 0018
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Step	Action/Expected Response	Response Not Obtained
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11. (continued)

- c. **ENSURE** high cntmt pressure SI signal CLEARED [78-G].
- d. **CHECK** SI actuated. d. **** GO TO** Substep 11f.
- e. **RESET SI, AND**
CHECK the following:
 - SI ACTUATED permissive DARK.
 - AUTO SI BLOCKED permissive LIT.
- f. **MAINTAIN** RCS pressure less than 1912 psig.

WBN Unit 1	Loss of Secondary Heat Sink	FR-H.1 Rev. 0018
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Step	Action/Expected Response	Response Not Obtained
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NOTE

- Cycling reactor trip breakers to allow MFW Isolation reset is required if SI, HI-HI S/G level, or Valve Vault Room Flooding has occurred.
- If any valid SI signal has occurred since SI reset, cycling reactor trip breakers will initiate SI.

12. **PREPARE** for MFW startup:

a. **PLACE** MFW pump controllers in
MANUAL, **AND**

SET to zero.

b. **PLACE** MFW reg valve
controllers in MANUAL, **AND**

SET to zero.

c. **PLACE** MFW reg bypass valve
controllers in MANUAL, **AND**

SET to zero.

Step continued on next page.

WBN Unit 1	Loss of Secondary Heat Sink	FR-H.1 Rev. 0018
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Step	Action/Expected Response	Response Not Obtained
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12. (continued)

d. **CHECK** FW bypass isolation valves OPEN.

d. **PERFORM** the following:

1) **WHEN** SI signals are blocked or cleared, **THEN**

CYCLE reactor trip breakers to allow MFW Isolation reset.

2) **RESET** MFW isolation:

- **PLACE** both MFW isol reset switches to RESET [M-3].
- **ENSURE** MFW isol signal clears [M-6 Master Panel].
- **PUSH** MFW isol reset pushbuttons [M-3].
- **ENSURE** MFW bypass isol valves OPEN.

3) **PLACE** 1-HS-3-45 in LONG CYCLE RECIRC.

IF no FW bypass isolation valve can be opened, **THEN**

**** GO TO** Step 17.

WBN Unit 1	Loss of Secondary Heat Sink	FR-H.1 Rev. 0018
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Step	Action/Expected Response	Response Not Obtained
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NOTE If the standby feed pump will be used, only the hotwell pumps should be started to prevent an overpressure condition.

13. **ESTABLISH** feedwater flow:

- | | |
|--|--|
| <p>a. START secondary plant pumps as necessary:</p> <ol style="list-style-type: none"> 1) Hotwell pumps. 2) Condensate booster pumps. 3) Cond DI booster pumps. <p>b. CHECK MSIVs OPEN.</p> <p>c. ESTABLISH MFW pump flow:</p> <ol style="list-style-type: none"> 1) START MFW pump turbine or standby feed pump. 2) CONTROL MFW pump and bypass reg valve(s) to restore S/G level(s). | <p>a. IF secondary plant pumps are NOT available, THEN</p> <p>** GO TO Step 17.</p> <p>b. IF MSIVs can be OPENED, THEN:</p> <ol style="list-style-type: none"> 1) OPEN MSIV bypass valves. 2) OPEN MSIVs as necessary. <p>c. IF MFW pump flow is NOT established, THEN:</p> <ul style="list-style-type: none"> • START additional secondary plant pumps as necessary. • ** GO TO Step 15. |
|--|--|

WBN Unit 1	Loss of Secondary Heat Sink	FR-H.1 Rev. 0018
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Step	Action/Expected Response	Response Not Obtained
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14. **CHECK** secondary heat sink restored:

a. NR level in at least one S/G greater than 29% [39% ADV].

a. **IF** feed flow established to at least one S/G:

- S/G Wide Range level rising,

OR

- Incore T/C dropping.

THEN

MAINTAIN flow to restore NR level to greater than 29% [39% ADV].

IF feed flow **NOT** established to at least one S/G, **THEN**

**** GO TO** Step 15.

b. **RETURN TO** Instruction in effect.

WBN Unit 1	Loss of Secondary Heat Sink	FR-H.1 Rev. 0018
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Step	Action/Expected Response	Response Not Obtained
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15. **ESTABLISH** condensate flow:

- a. **ENSURE** condensate aligned to S/Gs:
 - 1) **OPEN** MFW pump bypass valve 1-FCV-3-86.
 - 2) **THROTTLE OPEN** bypass reg valves.

- b. **DEPRESSURIZE** at least one S/G at maximum rate (25% demand) USING steam dump to condenser UNTIL condensate flow established.

- b. **IF** condenser **NOT** available, **THEN**

USE S/G PORV(s) for at least one intact S/G at maximum rate.

- c. **WHEN** condensate flow is established, **THEN**

STOP S/G depressurization
AND

MAINTAIN S/G press (using steam dump or PORV) low enough to ensure condensate flow is maintained.

WBN Unit 1	Loss of Secondary Heat Sink	FR-H.1 Rev. 0018
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Appendix A
(Page 1 of 1)

Establishing MFW Following Reactor Trip

1.0 INSTRUCTIONS

CAUTIONS

- 1) Rx trip breakers must be cycled to allow reset of MFW when isolated by SI or HI-HI S/G level or Valve Vault Room level switches.
- 2) If any valid SI signal has occurred since SI reset, cycling Rx trip breakers may initiate SI actuation, if signal has **NOT** yet been blocked by IMs.

- A. **ENSURE** MFW reg valves controllers in MANUAL, **AND**
SET to ZERO demand.
- B. **ENSURE** bypass reg valves controllers in MANUAL, **AND**
SET to ZERO demand.
- C. **WHEN** SI signals blocked **OR** cleared, **THEN**
CYCLE reactor trip breakers to allow MFW Isolation reset.
- D. **RESET** MFW isolation:
 1. **PLACE** both MFW isolation reset switches to RESET [M-3].
 2. **ENSURE** MFW isolation signal clears [M-6 Master Panel].
 3. **PUSH** MFW isolation reset push-buttons [M-3].
- E. **ENSURE** MFW mode switch 1-HS-3-45 in LONG CYCLE RECIRC.
- F. **ENSURE** MFW bypass isolation valves OPEN.
- G. **ENSURE** standby MFW pump RUNNING, if available, **AND**
CONTROL S/G levels with MFW bypass reg controllers.