FACILITY NAME: Watts Bar Section 10

REPORT NUMBER: 2009-302

FINAL SIMULATOR SCENARIOS

CONTENTS:

- ☑ **Final Simulator Scenarios**
  - **'As given' with changes made during administration annotated**
  - **Each containing ES-D-1 "Scenario Outline"**
  - **Each containing ES-D-2 "Required Operator Actions"**

Location of Electronic Files:

Submitted By: Edwin Lea, Jr. Verified By: Mark J. Riches

Facility:	**Watts Bar Fall NRC Exam 2009**	Scenario No.: **1**	Op Test No.: **1**
Examiners:		Operators:	**SRO**
			RO
			BOP

Initial Conditions: 100% power, MOL. RCS boron is 877 ppm. Control Bank D is at 220 steps. Train A/Channel 1 Work Week.

Turnover: 1A Containment Spray System (CSS) pump is out of service for bearing replacement, and is currently disassembled. LCO 3.6.6, Containment Spray System, Condition A was entered 6 hours ago. The 1A CSS pump is expected to be returned to service in 16 hours. Maintain 100% power. Current RCS boron concentration is 877 ppm. Train A/Channel I Work Week.

Event No.	Malf. No.	Event Type*	Event Description
1	RX24	I-BOP	1-PT-3-1, Main Feedwater Header Pressure Transmitter fails HIGH. BOP takes manual control of MFP Master Controller to restore feedwater flow to normal. Enter AOI-16, "Loss of Normal Feedwater."
2	NI07D	I-RO TS-SRO	Power Range N-44 channel fails high. RO takes manual control of rods to terminate the transient. Enters AOI-4 "Nuclear Instrumentation Malfunctions," or AOI-2, "Malfunction of Reactor Control System." Requires Tech Spec evaluation.
3	RW16A	C-BOP TS-SRO	1A ERCW supply header breaks in the Yard. Requires entry into AOI-13, "Loss of Essential Raw Cooling Water (ERCW)." Requires Tech Spec evaluation of ERCW system.
4	CV17B	C-RO	Number 1 seal on #2 RCP develops a leak, requiring entry into AOI-24, and a plant power reduction using AOI-39, "Rapid Load Reduction."
5	N/A	R-RO N-BOP	Plant shutdown using GO-4/AOI-39, in response to the RCP seal leak.
6	TH03B TH02B	M-ALL	RCS leak which progresses to a small break LOCA, requiring entry into E-0, "Reactor Trip or Safety Injection," and subsequent transition to E-1, "Loss of Reactor or Secondary Coolant."
7	CS12B CS06G/H	C-BOP	1B CSS pump trips. Containment Air Return fans fail to auto start. Requires entry into FR-Z.1 on an ORANGE path condition.
8	RP02B	C-BOP	SI fails to auto actuate.

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

Scenario 1 - Summary

Initial Condition	100% power, MOL. RCS boron concentration is 877 ppm. Control Bank D is at 220 steps. Train A/Channel 1 Work Week.

Turnover	1A Containment Spray System (CSS) pump is out of service for bearing replacement, and is currently disassembled. LCO 3.6.6, Containment Spray System, Condition A was entered 6 hours ago. The 1A CSS pump is expected to be returned to service in 16 hours. Maintain 100% power. Current RCS boron concentration is 877 ppm. Train A/Channel I Work Week.

Event 1	1-PT-3-1, Main Feedwater Header Pressure Transmitter fails HIGH. Requires BOP to take manual control of MFP Master Controller to restore feedwater flow to normal. Requires entry into AOI-16, "Loss of Normal Feedwater."
Event 2	Power Range N-44 channel fails HIGH. RO takes manual control of rods to terminate the transient. Enters AOI-4 "Nuclear Instrumentation Malfunctions." Requires Tech Spec evaluation.
Event 3	1A ERCW supply header breaks in the Yard. Requires entry into AOI-13, "Loss of Essential Raw Cooling Water (ERCW)." Requires Tech Spec evaluation of ERCW system when cross-connected.
Event 4	Number 1 seal on #2 RCP develops a leak, requiring entry into AOI-24, and a plant power reduction. RCP seal leakage worsens during the subsequent shutdown.
Event 5	Plant shutdown using GO-4/AOI-39, in response to the RCP seal leak.
Event 6	RCS leak develops after transition is made to ES-01, "Reactor Trip Response," requiring manual SI initiation (since auto SI is failed) and entry into E-0, "Reactor Trip or Safety Injection." RCS leak progresses to a small break LOCA, requiring entry into E-1, "Loss of Reactor or Secondary Coolant."
Event 7	1B CSS pump shaft seizes. Requires entry into FR-Z.1 on an ORANGE path condition, since NO CS pumps are running.
Event 8	SI fails to auto actuate. Requires manual initiation.

Critical Task 1	*Manually actuate at least one train of SIS-actuated safeguards before any of the following: Transition to any E-1 series, E-2 series, or E-3 series procedure or transition to any FRG Completion of step 5.a of ES-0.1.*
Critical Task 2	*Trip all RCPs due to loss of cooling as a result of the Phase B actuation.*
Critical Task 3	*Manually start Containment Air Return fans to control containment pressure.*

SIMULATOR SETUP INFORMATION

1. **ENSURE NRC Examination Security has been established.**

2. **Right click on 347, and then select RESET.**

3. **Enter the password.**

4. **Select "Yes" on the INITIAL CONDITION RESET pop-up window.**

5. **ENSURE the following information appears on the Director Summary Screen:**

	Key		Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
	hs-72-27a-1	06020 cntmt spray pump a mtr sw	R		00:00:00		00:00:00		Off	Off
	cs06h	air return fan b-b fail to start on phase b	M		00:00:00		00:00:00		Active	Active
	cs06g	air return fan a-a fail to start on phase b	M		00:00:00		00:00:00		Active	Active
	hs-72-22a-1	05020 rwst spray hdr a fcv	R		00:00:00		00:00:00		Off	Off
	hs-72-39a-1	05080 cs hdr a isol vlv sw.	R		00:00:00		00:00:00		Off	Off
	hs-72-34a-1	05060 cs pump a recirc fcv	R		00:00:00		00:00:00		Off	Off
	hs-72-44a-1	05040 cntmt sump hdr a fcv	R		00:00:00		00:00:00		Off	Off
	rp02b	auto si initiation signal failure	M		00:00:00		00:00:00		Active	Active
	rx24	feed water header pressure transmitter pt-3-1 fail to position	M	1	00:00:00		00:00:00		100	76.549
	cs01b	containment spray system pump b trip	M	13	00:04:00		00:00:00		Active	InActive
	ni07d	pr channel output signal failure pr chnl 4	M	2	00:00:00		00:00:00		120	100.618
	rwr05	power to appendix r valve 67-22	R	20	00:00:00		00:00:00		close	open
	rwr03	power to appendix r valve 67-81	R	21	00:00:00		00:00:00		on	off
	rwr12	power to appendix r valve 67-147	R	22	00:00:00		00:00:00		on	off
	rw16a	ercw supply header 1-a break in yard	M	3	00:00:00		00:00:00		50	0
	cv17b	rcp1 seal failure rcp #2	M	4	00:00:00		00:02:30		0.115	0
	th03b	loca - small leak loop 2	M	5	00:00:00		00:03:00		15	0
	th02b	loca - cold leg loop 2	M	19	00:00:00		00:02:30		2	0

SIMULATOR SETUP INFORMATION

6. Place simulator in RUN and acknowledge any alarms.

7. Place 1B-B Containment Spray pump handswitch in the STOP-PULL-TO-LOCK position. Hang HOLD NOTICE cards on handswitches 1-FCV-72-27A, 1-FCV-72-39A and 1-FCV-72-44A. Place PROTECTED EQUIPMENT (Pink Tag) on 1B-B CSS handswitch.

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

9. Place simulator in FREEZE.

EVENT INITIATION AND ROLE PLAY

Exam Event	Simulator Event	DESCRIPTION/ROLE PLAY
1	1	1-PT-3-1, Main Feedwater Header Pressure Transmitter fails HIGH ***ROLE PLAY: As work control, when contacted, inform the MCR that it will be an hour or more before the work package to trouble shoot and repair the failed channel is complete.***
2	2	Power Range N-44 channel fails high. ***ROLE PLAY: As work control, when contacted, inform the MCR that it will be an hour or more before the work package to trouble shoot and repair the failed channel is complete.*** ***ROLE PLAY: As work control, when contacted to initiate performance of IMI-160, reply that the instrument shop will be notified and instructed to contact the control room before the IMI is to be performed.***
3	3	1A ERCW supply header breaks in the Yard. Requires entry into AOI-13, "Loss of Essential Raw Cooling Water (ERCW)." ***ROLE PLAY: As Control Building AUO, inform the BOP operator that you are standing by for breaker manipulations.*** ***Enter EVENT 20 then modify to CLOSE to restore power to 1-FCV-67-22.*** ***Enter EVENT 21 then modify to ON to restore power to 1-FCV-67-81.*** ***Enter EVENT 22 then modify to ON to restore power to 1-FCV-67-147.*** ***ROLE PLAY: As Outside AUO, report a large amount of water in the yard.***
4	4	Number 1 seal on #2 RCP develops a leak. ***ROLE PLAY: As System Engineer, when contacted, inform the MCR that RCP #2 needs to be removed from service in the next 2 hours.*** ***ROLE PLAY: As Operations Superintendent, concur with the System Engineer request to remove RCP #2 in the next 2 hours.***

EVENT INITIATION AND ROLE PLAY

Exam Event	Simulator Event	DESCRIPTION/ROLE PLAY
5	NONE	Plant shutdown using GO-4/AOI-39, in response to the RCP seal leak. ***ROLE PLAY: None.***
		Number 1 seal on #2 RCP leak becomes worse, requiring a reactor trip and stopping of RCP #2. ***ROLE PLAY: None.***
6	19	RCS leak which progresses to a small break LOCA, requiring entry into E-1, "Loss of Reactor or Secondary Coolant." ***ROLE PLAY: None.***
7	13	1B CSS pump trips. Requires entry into FR-Z.1 on an ORANGE path condition. ***ROLE PLAY: As Auxiliary Building AUO, when contacted, inform the MCR that the 1B-B Containment Spray motor has signs of an electrical fault and the room smells of burnt insulation.*** ***ROLE PLAY: As Control Building AUO, when contacted, inform the MCR that the breaker for 1B-B Containment Spray pump tripped on instantaneous overcurrent.***

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

Event Description: 1-PT-3-1, Main Feedwater Header Pressure Transmitter fails HIGH. Requires BOP to take manual control of MFP Master Controller to restore feedwater flow to normal. Requires entry into AOI-16, "Loss of Normal Feedwater."

Time	Position	Applicant's Actions or Behavior
Simulator Operator enters Event 1.		
Indications: 63-F SG LEVEL DEVIATION ICS Point U1168, "Thermal Mismatch" 1A and 1B MFP speed indications dropping. 1A and 1B MFP discharge flow dropping. ALL Main feedwater regulating valves full open. All SG levels dropping.		
	BOP	Diagnoses and announces failure of 1-PT-3-1, Main Feed Header Pressure transmitter, input to Master Main Feed Water Pump Speed Controller, 1-PC-46-20. May be done prior to receipt of any alarm.
	BOP	May take actions given in ARI 63-F, "SG LEVEL DEVIATION."
	BOP	May take manual control of Master Controller to return MFP speed to pre-event speed.
	SRO	Enters AOI-16, "Loss of Normal Feedwater," and directs crew actions.
EXAMINER: The following actions are from ARI-63-F, "SG LEVEL DEVIATION." The operator MAY NOT implement these steps. SRO may implement AOI-16 first.		
	BOP	**[1] DETERMINE** which S/G has abnormal level.
	BOP	**[2] CHECK** steam flow/feed flow instrumentation to **VERIFY** level controls are restoring S/G levels to **NORMAL**.
	BOP	**[3] IF** level controls have malfunctioned, **THEN** **[a] PLACE** FW controls in manual. **[b] RESTORE** S/G level to normal and **GO TO** AOI-16, *LOSS OF NORMAL FEEDWATER.*
	BOP	**[4] IF** MFPT speed controls have malfunctioned, **THEN** **[a] PLACE** MFPT speed controls in manual. **[b] RESTORE** MFW/MS ΔP to program AND **GO TO** AOI-16, *LOSS OF NORMAL FEEDWATER.*
	SRO	**[5] INITIATE** WO for corrective action, if necessary.
EXAMINER: The following actions are from AOI-16, "Loss of Normal Feedwater," Subsection 3.7, "MFW Pump speed Control Circuit Failure."		
	BOP	1. **CHECK** MFWPT speed controller(s) NORMAL.

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Event Description: 1-PT-3-1, Main Feedwater Header Pressure Transmitter fails HIGH. Requires BOP to take manual control of MFP Master Controller to restore feedwater flow to normal. Requires entry into AOI-16, "Loss of Normal Feedwater."

Time	Position	Applicant's Actions or Behavior
	BOP	1. **RESPONSE NOT OBTAINED**. **CONTROL** MFP speed using MANUAL control of master controller or individual controller(s) as required.
	RO	2. **PLACE** control rods in MANUAL.
	BOP	3. **CHECK** MFW pumps recirc valves NORMAL.
	RO	4. **ENSURE** T-avg and T-ref within 3°F.
	BOP	5. **MAINTAIN** MFWP discharge press on PROGRAM.
	BOP	6. **ENSURE** S/G levels return to PROGRAM.
	BOP	7. **CHECK** steam dump mode in T-AVG position.
	BOP	8. **INITIATE** repairs to failed equipment.
	SRO	9. **IF** desired to place control rods in AUTO, **THEN ENSURE** T-avg and T-ref within 1°F and **PLACE** control rods in auto.
	SRO	10. **WHEN** MFP pump control repairs completed, **THEN, PLACE** MFP speed control in AUTO. ***With 1-PT-3-1, Main Feed Header Pressure failed, MFP speed control must remain in MANUAL.***
	SRO	11. **RETURN TO** Instruction in effect.
	SRO	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	SRO	**Notifications** should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Simulator operator enters Event 2		

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Event Description: Power Range N44 fails high, requiring entry into AOI-4, "Nuclear Instrumentation Malfunctions."

Time	Position	Applicant's Actions or Behavior
Indications: 1-M-4B 83-A, POWER RANGE OVERPOWER ROD WD STOP 1-M-4B 83-E, POWER RANGE CHANNEL DEVIATION 1-M-6A 115-C, POWER RANGE FLUX HI 1-M-6A 115-E, POWER RANGE FLUX RATE HI Rods inserting at 72 steps/minute with no corresponding drop in megawatt load.		
	RO	Diagnoses and announces failure of Power Range Channel N44.
	SRO	Enter and direct actions of AOI-4, "Nuclear Instrumentation Malfunctions," Section 3.4, "Power Range Monitor (PRM) Failure" and directs crew actions.
EXAMINER: The following actions are from AOI-4, "Nuclear Instrumentation Malfunctions," Section 3.4, "Power Range Monitor (PRM) Failure."		
	RO	1. **PLACE** control rods in MANUAL.
	RO	2. **CHECK** rod motion STOPPED.
CAUTION		**N41 controls S/G 1 and S/G 4 MFW reg valves.** **N42 controls S/G 2 and S/G 3 MFW reg valves.**
NOTE All four bypass reg valves are controlled by auctioneered high nuclear power as an anticipatory input.		
	RO	3. **CHECK** N41 and N42 NORMAL.
NOTE Control rod withdrawal may not be possible if a PRM has failed high due to the 103% Rod Withdrawl Stop (C-2).		
	SRO/RO	4. **MAINTAIN** T-avg and T-ref within 3°F.
	RO	5. **ENSURE** 1-NR-92-145 recording operable power range channel.
NOTE Inputs to 1-TR-68-2A include power range monitor, pressurizer pressure, ΔT and Tavg. Selection of an operable channel should consider other failures in addition to the failed power range monitor channel.		
	RO	6. **ENSURE** 1-TR-68-2A placed to operable ΔT/OTΔT/OPΔT channel using 1-XS-68-2B, ΔT RCDR TR-68-2A LOOP SELECT [1-M-5].
	RO	7. **DEFEAT** affected PRM functions: • **REFER TO** Attachment 1, PRM Function At NIS Rack.

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Event Description: Power Range N44 fails high, requiring entry into AOI-4, "Nuclear Instrumentation Malfunctions."

Time	Position	Applicant's Actions or Behavior
		EXAMINER: The following steps are from AOI-4, Attachment 1, "PRM Function at NIS Rack."
		NOTE The following annunciators may be affected by defeating a PRM channel: • [66-C, 67-C, 68-C, 69-C] N-(#) OVERPOWER ROD STOP BYPASSED. • [82-E] NIS CHANNEL IN TEST. • [83-A] POWER RANGE OVERPOWER ROD WD STOP. • [83-E] POWER RANGE CHANNEL DEVIATION. • [115-C] POWER RANGE FLUX HI. • [115-E] POWER RANGE FLUX RATE HI.
	RO	1. **PERFORM** the following steps for the affected PRM:
	RO	a. **PLACE** DETECTOR CURRENT COMPARATOR switch for UPPER SECTION to failed channel. (N44)
	RO	b. **PLACE** DETECTOR CURRENT COMPARATOR switch for LOWER SECTION to failed channel. (N44)
		NOTE On the following step, annunciator window 83-A, POWER RANGE OVERPOWER ROD WD STOP will clear (if channel failure was high) and window 66-C, 67-C, 68-C OR 69-C, N-(#) OVERPOWER ROD STOP BYPASSED, will come into alarm depending on which channel is bypassed.
	RO	c. **PLACE** ROD STOP BYPASS switch to failed channel. (N44)
	RO	d. **PLACE** POWER MISMATCH BYPASS switch to failed channel. (N44)
		NOTE On the following step, annunciator window 83-E, POWER RANGE CHANNEL DEVIATION, will clear and annunciator window 82-E, NIS CHANNEL IN TEST, will come into alarm.
	RO	e. **PLACE** COMPARATOR CHANNEL DEFEAT switch to failed channel. (N44)
		NOTE On the following step, annunciator window 115-E, POWER RANGE FLUX RATE HI, will clear if the positive rate trip light is LIT.
	RO	f. **IF** POSITIVE RATE TRIP is LIT, **THEN RESET** RATE MODE switch.
		EXAMINER: The crew must return to AOI-4, Section 3.4, Step 8 to complete required actions. The following continues with Step 8.
		CAUTION Allowing at least 5 minutes between any rod control input (i.e., T-avg, T-ref, or NIS) change and placing rods in AUTO, will help prevent undesired control rod movement.

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Event Description: Power Range N44 fails high, requiring entry into AOI-4, "Nuclear Instrumentation Malfunctions."

Time	Position	Applicant's Actions or Behavior
	RO	8. **WHEN** failed PRM defeated **AND** AUTO rod control desired, **THEN:** a. **ENSURE** T-avg and T-ref within 1°. b. **ENSURE** zero demand on control rod position indication [1-M-4]. c. **PLACE** control rods in AUTO.
	SRO	9. **INITIATE** repairs on failed channel.
	SRO	10. **NOTIFY** Work Control to have IM trip failed channel bistables.
CAUTION Power fuses should not be removed during the performance of IMI-160 until affected S/G level controls are in manual at either the SG LEVEL - NIS BIAS controller(s) or the MFW reg valve controllers.		
	SRO	11. **WHEN** notified bistables are tripped, **CHECK** lights and alarms referenced in Appendix A are LIT.
	SRO	12. **REFER TO** Tech Specs: 3.3.1-1, "Rx Trip System (RTS)" 2.a. Power Range Neutron Flux - High ***Condition D. One Power Range Neutron Flux-High channel inoperable. Place channel in trip within 72 hours AND Reduce THERMAL POWER to ≤ 75% RTP within 78 hours; OR Place channel in trip within 72 hours AND Perform SR 3.2.4.2 every 12 hours OR be in Mode 3 within 78 hours.*** 2.b. Power Range Neutron Flux - Low ***Condition E. With one channel inoperable, place the channel in trip within 72 hours OR be in Mode 3 in 78 hours.*** 3.a. Power Range Neutron Flux Rate - High Positive Rate ***Condition E. With one channel inoperable, place the channel in trip within 72 hours OR be in Mode 3 in 78 hours.*** 6. Overtemperature ΔT ***Condition W. Place channel in trip within 72 hours OR be in Mode 3 within 78 hours.*** **EXAMINER**: P-7 not necessary due to cascading from P-10. 16.c. Power Range Neutron Flux, P-8 ***Condition S. With ONE channel inoperable, verify the interlock is in required state for existing unit conditions within 1 hour OR be in Mode 2 within 7 hours.*** 16.d. Power Range Neutron Flux, P-9 ***Condition S. With ONE channel inoperable, verify the interlock is in required state for existing unit conditions within 1 hour OR***

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Event Description: Power Range N44 fails high, requiring entry into AOI-4, "Nuclear Instrumentation Malfunctions."

Time	Position	Applicant's Actions or Behavior
		be in Mode 2 within 7 hours. 16.e. Power Range Neutron Flux, P-10 ***Condition R. With ONE channel inoperable, verify the interlock is in required state for existing unit conditions within 1 hour OR be in Mode 3 within 7 hours.***
	SRO	13. **NOTIFY** Operations Duty Manager and Rx Engineering of failed channel.
	SRO	14. **DO NOT CONTINUE** with this Instruction UNTIL failed PRM repair is completed.
	CREW	**Crew Brief** would typically be conducted for this event as time allows prior to the next event.
	CREW	**Notifications** should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. Operations Management - Shift Manager. Maintenance Personnel –Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Simulator operator enters Event 3		

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Event Description: 1A ERCW supply header breaks in the Yard. Requires entry into AOI-13, "Loss of Essential Raw Cooling Water (ERCW)." Requires Tech Spec evaluation of ERCW system when cross-connected.

Time	Position	Applicant's Actions or Behavior
		Indications: 223-A ERCW HDR A SUP PRESS LO 223-B ERCW PMP A-A DISCH PRESS LO 226-B ERCW PMP D-A DISCH PRESS LO 223-C ERCW HDR 1A STRAINER ΔP HI 225-E-TR-A/B ERCW TO C&SS COMPR FLOW HI 0-PI-67-18A, A ERCW SUP HDR PRESS indicating approximately 50 psig. 1-FI-67-61, 1A ERCW SUP HDR FLOW indicating approximately 500 gpm.
	BOP	Diagnose and announce failure to the crew. May dispatch operators to determine the location of the leak.
	SRO	Enters AOI-13, "Loss of Essential Raw Cooling Water," and directs actions.
EXAMINER: The following actions are from AOI-13, "Loss of Essential Raw Cooling Water (ERCW)," Sub section 3.4, "Supply Header Rupture in Yard or Plugged Strainer."		
	SRO	1. **CHECK** supply header pressure high with any strainer DP alarm LIT.
	SRO	1. **RESPONSE NOT OBTAINED: GO TO** Step 3.
	BOP	3. **CHECK** hdr press lo alarm, DARK: ERCW HDR A SUP PRESS LO [223-A] ERCW HDR B SUP PRESS LO [229-A]
	BOP	3. **RESPONSE NOT OBTAINED: START** additional pumps as required, AND **DISPATCH** personnel to determine location of rupture.
	BOP	4. **DISPATCH** AUO, with radio, to the Rx MOV Bds.
NOTE 1 □ All supply headers may return normal if supply header pressure was initially high with strainer backwash being successful in reducing supply header pressure and restoring affected supply header flow. **NOTE 2** □ Both Train A Supply Headers may indicate below normal pressure, visual verification may be required. **NOTE 3** □ MOVs with power normally removed may not travel to full closed position under high flow conditions; local verification of isolation may be required.		
	BOP	5. **CHECK** Supply Header 1A flow at expected value for existing plant conditions.

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Event Description: 1A ERCW supply header breaks in the Yard. Requires entry into AOI-13, "Loss of Essential Raw Cooling Water (ERCW)." Requires Tech Spec evaluation of ERCW system when cross-connected.

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Actions or Behavior</th></tr>
<tr><td></td><td>BOP</td><td>5. <u>RESPONSE NOT OBTAINED:</u> PERFORM the following:
a. UNLOCK, and CLOSE bkr on Rx MOV Bd 1A2-A, c/7B, 1-FCV-67-22.
b. UNLOCK, and CLOSE bkr on Rx MOV Bd 1A2-A c/8A, 1-FCV-67-81.
c. UNLOCK, and CLOSE bkr on Rx MOV Bd 1A2-A c/11B, 1-FCV-67-147.
d. ENSURE 2-FCV-67-147, CCS Hx C Sup From Hdr 2B, OPEN.
e. OPEN 1-FCV-67-147, CCS Hx C Sup From Hdr 1A.
f. CLOSE 1-FCV-67-22, Strainer 1A-A Inlet.
g. CLOSE 1-FCV-67-81, AB Supply Hdr 1A.
h. GO TO Step 9.</td></tr>
<tr><td></td><td>BOP</td><td>9. ALIGN ERCW to affected DGs:
<table>
<tr><th>HEADER LOST</th><th>DGs AFFECTED</th><th>BACKUP VALVE</th><th>POSITION</th></tr>
<tr><td>1A</td><td>1A-A
2A-A</td><td>1-FCV-67-68
2-FCV-67-68</td><td>OPEN
OPEN</td></tr>
<tr><td>1B</td><td>1B-B
2B-B</td><td>1-FCV-67-65
2-FCV-67-65</td><td>OPEN
OPEN</td></tr>
</table></td></tr>
<tr><td></td><td>SRO</td><td>10. CHECK in-service ERCW header pressures and flows return to expected values for existing plant conditions.</td></tr>
<tr><td></td><td>BOP</td><td>11. CHECK pump amps NORMAL.</td></tr>
<tr><td></td><td>SRO</td><td>12. REFER TO Tech Specs:
3.7.8, Essential Raw Cooling Water System (ERCW).
Action A, and determines that the break location does not cause diesel generators to be INOPERABLE.
Since the ERCW headers are cross-tied, entry into LCO 3.0.3 is required.</td></tr>
<tr><td></td><td>SRO</td><td>13. INITIATE repair.</td></tr>
<tr><td></td><td>SRO</td><td>14. IF ERCW to in-service CCS heat exchanger was interrupted, THEN NOTIFY Duty System Engineer to initiate evaluation for effect on CCS equipment and piping.</td></tr>
<tr><td></td><td>SRO</td><td>15. REFER TO SOI-67.01, Essential Raw Cooling Water System, for system realignment.</td></tr>
<tr><td></td><td>BOP</td><td>16. RETURN TO Instruction in effect.</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

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Event Description: 1A ERCW supply header breaks in the Yard. Requires entry into AOI-13, "Loss of Essential Raw Cooling Water (ERCW)." Requires Tech Spec evaluation of ERCW system when cross-connected.

Time	Position	Applicant's Actions or Behavior
	SRO	**Crew Brief** would typically be conduced for this event as time allows prior to the next event.
	SRO	**Notifications** should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Simulator operator enters Event 4		

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Event Description: Number 1 seal on #2 RCP develops a leak, requiring entry into AOI-24, and AOI-39, "Rapid Load Reduction."

Time	Position	Applicant's Actions or Behavior
Indications: 100-D RCP SEAL LEAKOFF FLOW HI 1-FR-62-24 SEAL LEAKOFF - HI RANGE Green pen indicates a rising trend.		
	RO	Diagnoses and announces the problem with RCP 2 #1 Seal Leakoff flow.
	SRO	Enters and directs actions contained in AOI-24, "RCP Malfunctions During Pump Operation."
EXAMINER: The following steps are from AOI-24, "RCP Malfunctions During Pump Operation," Section 3.3.		
CAUTION A seal leakoff rise to greater than 2.0 gpm AFTER experiencing low leakoff of less than 0.8 gpm may indicate seal degradation. Plant Management should be notified of leakoff trends.		
NOTE 1 Anytime #1 seal leakoff flow exceeds the values shown on Attachment 1, system engineering should be requested to perform an evaluation of the #1 seal condition. **NOTE 2** During plant startup after seal maintenance, the #1 seal may require 24 hours of run time before the seal seats fully and operates normally. **NOTE 3** The #1 seal return should be isolated between 3 and 5 minutes after tripping an RCP to allow for pump coastdown.		
	RO	1. **MONITOR** #1 seal leakoff equal to or greater than 6.0 gpm.
	RO	2. **MONITOR** RCPs lower bearing and #1 seal outlet temp STABLE or DROPPING.
	SRO	3. **REFER TO** appropriate instruction to initiate a controlled shutdown to Mode 3 while continuing with this instruction: • AOI-39, Rapid Load Reduction. • GO-4, Normal Power Operation. • GO-5, Unit Shutdown From 30% Reactor Power to Hot Standby.
NOTE RCP shutdown time is based on an orderly reactor shutdown and may be delayed or expedited based on ongoing evaluations of current plant conditions, other pump parameters and efforts to restore seal leakoff flows to normal.		
		4. **REMOVE** RCP from service: • Within 8 hrs, OR • As directed by Plant Management.

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Event Description: Number 1 seal on #2 RCP develops a leak, requiring entry into AOI-24, and AOI-39, "Rapid Load Reduction."

Time	Position	Applicant's Actions or Behavior
	RO	5. **MONITOR** RCP immediate shutdown required: • **REFER TO** ATTACHMENT 2, RCP Immediate Shutdown Criteria. ** **GO TO** Subsection 3.2, Step 2.
		5. <u>RESPONSE NOT OBTAINED</u> GO TO** Step 6.
	RO	6. **ADJUST** seal injection flow to exceed total #1 seal leakoff rate.
	SRO	7. **CONTACT** System Engineer for further guidance WHILE continuing this Instruction: • Recommendations for continued RCP operation. • Installation of alternate flow measuring equipment (flows greater than 6 gpm).
	RO	8. **CHECK** seal injection flow between 8 and 13 gpm/RCP.
	RO	9. **CONTROL** VCT outlet temp less than 123°F: • **ADJUST** 1-HS-62-78A. • **ADJUST** charging and letdown flow to reduce regen heat-exchanger outlet temp.
	RO	10. **CHECK** VCT pressure between 15 and 30 psig.
	RO	11. **MONITOR** RCP lower bearing and #1 seal outlet temp: • Less than or equal to 180°F. • STABLE or DROPPING.
	SRO	12. **INITIATE** repairs as required.
	SRO	13. **RETURN TO** Instruction in effect.

<u>EXAMINER</u>: The following actions are from AOI-39, "Rapid Load Reduction," Section 3.2.

CAUTION Condenser Backpressure limits are on previous page.

CAUTION TURBINE MANUAL Operation requires continuous operator monitoring and control.

CAUTION LOSS OF CONDENSER VACUUM may be made worse if steam dumps are actuated. AOI-11 requires T-ave and T-ref be maintained within 3°F.

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

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Event Description: Number 1 seal on #2 RCP develops a leak, requiring entry into AOI-24, and AOI-39, "Rapid Load Reduction."

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Actions or Behavior</th></tr>
<tr><td></td><td>BOP</td><td>1. ESTABLISH a turbine load reduction rate less than or equal to 5%/min:
a. SET a desired load in the SETTER with the REFERENCE CONTROL.
b. SET the LOAD RATE at less than or equal to 5%/min.
c. DEPRESS GO pushbutton.</td></tr>
<tr><td colspan="3">CAUTION Over boration may result in excessive rod withdrawal or Tavg lower than desired for at power conditions.</td></tr>
<tr><td colspan="3">NOTE 1 Rod Control should remain in automatic for Tavg Control.</td></tr>
<tr><td colspan="3">NOTE 2 The following Table assumes ~ 1/3 reactivity by rod insertion during the load reduction. The RCS boron concentration may be adjusted should ΔI or RILs criteria be approached.</td></tr>
<tr><td></td><td>RO</td><td>2. INITIATE a manual boration:
a. DETERMINE recommended boration flowrate and volume from table below.
<table>
<tr><th>TURBINE LOAD REDUCTION RATE (%/min)</th><th>BORATION FLOWRATE (gal/min)</th><th>BORIC ACID VOLUME TO REDUCE POWER FROM 100% TO 20%</th></tr>
<tr><td>2%</td><td>20 GPM</td><td rowspan="3">~ 800 GALs TOTAL</td></tr>
<tr><td>3%</td><td>30 GPM</td></tr>
<tr><td>≥4%</td><td>40 GPM</td></tr>
</table>
b. INITIATE boration to maintain control rods above low-low insertion limit:
1) ADJUST BA flow controller, 1-FC-62-139, to desired flow rate.
2) ADJUST BA batch counter 1-FQ-62-139 to required quantity.
3) PLACE mode selector 1-HS-62-140B to BOR.
4) PLACE VCT makeup control 1-HS-62-140A, to START.
5) VERIFY desired boric acid flow indicated on 1-FI-62-139.</td></tr>
<tr><td></td><td>SRO</td><td>3. REFER TO EPIP-1, Emergency Plan Classification Flowchart.</td></tr>
<tr><td></td><td>SRO</td><td>4. NOTIFY the Load Coordinator of the required load reduction and expected ramp rate.</td></tr>
<tr><td colspan="3"><u>EXAMINER</u>: After sufficient load reduction is accomplished, cue Simulator Operator to insert Event 5. Conditions will degrade and warrant initiation of a reactor trip and entry into E-0, "Reactor Trip or Safety Injection." When the crew trips the reactor, an RCS leak develops, requiring a safety injection.</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

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Event Description: During load reduction, an RCS leak develops requiring the crew to evaluate plant conditions, initiate a manual reactor trip and safety injection. Entry into E-0 will be followed by entry into E-1, "Loss of Reactor or Secondary Coolant."

Time	Position	Applicant's Actions or Behavior
	RO	Diagnoses and announces the conditions have worsened.
		144-A, "ICE COND INLET DOOR OPEN," alarms.
	SRO	Enters and directs the actions of AOI-6, "Small Reactor Coolant System Leak."
EXAMINER: The following actions are from AOI-6.		
		NOTE During performance of this instruction the need for a rapid load reduction or Unit trip should be continuously evaluated
	RO	1. **CHECK** pzr level DROPPING. ** **GO TO** Step 4.
	SRO	4. **IF** RHR Shutdown Cooling mode in service, **THEN GO TO** AOI-14, Loss of RHR Shutdown Cooling.
	SRO	**5. MAKE** plant announcement via PA: "Attention plant personnel. A primary system leak has developed. Any personnel located either inside containment or in the Auxiliary Building should exit the area immediately." (Repeat)
	SRO	6. **MONITOR** pzr level STABLE or RISING. RNO: **IF** loss of pzr level is IMMINENT, RISING. **THEN:** a. **TRIP** Rx. b. **INITIATE** SI. c. ** **GO TO** E-0, Rx Trip or Safety Injection.
	SRO	Directs a manual reactor trip based on PZR level response.
	SRO	Directs a manual safety injection based on change in containment conditions after the reactor trip.
EXAMINER: The following actions are from E-0, "Reactor Trip or Safety Injection."		
	RO	1. **ENSURE** reactor trip:
	RO	2. **ENSURE** Turbine Trip:
	RO	3. **CHECK** 6.9 kV shutdown boards:
CRITICAL TASK	RO	4. **CHECK** SI actuated: Notes SI did NOT auto actuate, and manually actuates SI (if not previously manually initiated).
	BOP	5. **EVALUATE** support systems: • **REFER TO** Appendixes A and B (E-0), Equipment Verification pages 15-28.
EXAMINER: Appendixes A and B are at the back of this Scenario Guide.		
	SRO	6. **ANNOUNCE** reactor trip and safety injection over PA system.
	RO	7. **ENSURE** secondary heat sink available with either:

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Event Description: During load reduction, an RCS leak develops requiring the crew to evaluate plant conditions, initiate a manual reactor trip and safety injection. Entry into E-0 will be followed by entry into E-1, "Loss of Reactor or Secondary Coolant."

Time	Position	Applicant's Actions or Behavior
		• Total AFW flow greater than 410 gpm,OR • At least one S/G NR level greater than 29% [39% ADV].
	RO	8. **MONITOR** RCS temp stable at or trending to 557°F: • **IF** any RCP running, **THEN MONITOR** RCS Loop T-avg trending to 557°F. OR • **IF** NO RCP running, **THEN MONITOR** RCS Loop T-cold trending to 557°F.
	RO	9. **ENSURE** excess letdown valves CLOSED: • 1-FCV-62-54 • 1-FCV-62-55
	RO	10. **CHECK** pzr PORVs and block valves: a. Pzr PORVs CLOSED. b. At least one block valve OPEN.
	RO	11. **CHECK** pzr safety valves CLOSED: • **EVALUATE** tailpipe temperatures and acoustic monitors.
	RO	12. **CHECK** pzr sprays CLOSED.
NOTE Seal injection flow should be maintained to all RCPs.		
CRITICAL TASK	RO	13. **CHECK** if RCPs should remain in service: a. Phase B signals DARK [MISSP]. b. RCS pressure greater than 1500 psig.
	RO	14. **CHECK** S/G pressures: • All S/G pressures controlled or rising. • All S/G pressures greater than 120 psig.
	RO	15. **CHECK** for RUPTURED S/G • All S/Gs narrow range levels CONTROLLED or DROPPING. • Secondary side radiation NORMAL from Appendix A.

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Event Description: During load reduction, an RCS leak develops requiring the crew to evaluate plant conditions, initiate a manual reactor trip and safety injection. Entry into E-0 will be followed by entry into E-1, "Loss of Reactor or Secondary Coolant."

Time	Position	Applicant's Actions or Behavior
	BOP	16. **CHECK** cntmt conditions: • Cntmt pressure NORMAL. • Radiation NORMAL from Appendix A. • Cntmt sump level NORMAL. • Cntmt temp ann window DARK [104-B].
	SRO	16. **RESPONSE NOT OBTAINED**: ** **GO TO** E-1, Loss of Reactor or Secondary Coolant.
EXAMINER: 1B Containment Spray pump will trip, resulting in an ORANGE path condition on Containment Status Tree. The SRO will implement FR-Z.1 "High Containment Pressure," based on plant conditions.		
EXAMINER: The following actions are from FR-Z.1 "High Containment Pressure."		
CAUTION If ECA-1.1, Loss of RHR Sump Recirculation, is in effect, the number of cntmt spray pumps to be operated is directed in ECA-1.1 rather than in this instruction.		
NOTE Adverse containment setpoints [ADV] should be used where provided due to Phase B actuation.		
	RO	1. **ENSURE** cntmt spray operation: a. Cntmt spray signal ACTUATED. b. Cntmt spray pumps RUNNING. c. Cntmt spray valves 1-FCV-72-2 and 1-FCV-72-39 OPEN. d. Cntmt spray pump suction valves OPEN: • Valves from RWST: 1) 1-FCV-72-21 and 2) 1-FCV-72-22. OR • Valves from cntmt sump: 1) 1-FCV-72-44 and 2) 1-FCV-72-45. e. Cntmt spray flow: • • 1-FI-72-34. • • 1-FI-72-13.
	SRO	1. **RESPONSE NOT OBTAINED: ESTABLISH** at least one train of cntmt spray flow. ***Since there are NO containment spray pumps available at this***

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Event Description: 1B CS pump shaft seizes. Requires entry into FR-Z.1 on an ORANGE path condition, since NO CS pumps are running. Containment Air Return fans fail to auto start. SI fails to auto actuate.

Time	Position	Applicant's Actions or Behavior
		time the SRO will continue procedure performance.
	RO	2. **ENSURE** cntmt isolation: a. Phase A isolation: • Train A GREEN. • Train B GREEN. b. Cntmt vent isolation: • Train A GREEN. • Train B GREEN. c. Phase B isolation: • Train A GREEN. • Train B GREEN.
	BOP	3. **ENSURE** MSIVs and bypasses CLOSED.
	BOP	4. **PLACE** steam dump controls OFF: • 1-HS-1-103A, STEAM DUMP FSV "A." • 1-HS-1-103B, STEAM DUMP FSV "B."
	RO	5. **ENSURE** all four RCPs STOPPED.
	BOP	6. **MONITOR** EGTS operation: a. EGTS fans RUNNING. b. Filter bank dp between 5 and 9 inches of water.
	BOP	7. **ENSURE** ABGTS operation: a. ABGTS fans RUNNING. b. ABGTS dampers OPEN: • FCO-30-146A. • FCO-30-146B. • FCO-30-157A. • FCO-30-157B.

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Event Description: 1B CS pump shaft seizes. Requires entry into FR-Z.1 on an ORANGE path condition, since NO CS pumps are running. Containment Air Return fans fail to auto start. SI fails to auto actuate.

Time	Position	Applicant's Actions or Behavior
CRITICAL TASK	BOP	8. **WHEN** 10 minutes has elapsed since Phase B actuation, **THEN ENSURE** cntmt air return fans start, as directed by E-0, Appendix B, or FR-Z.1. (Note: Fans did NOT auto start, but were previously started manually.)
• **CAUTION RCS cooldown requires the availability of at least one S/G.**		
If ALL S/Gs are Faulted, at least a minimum detectable feed flow to each S/G is required to limit thermal stress during subsequent S/G feed operations.		
	BOP	9. **CHECK** S/G pressures: • All S/G pressures controlled or rising. • All S/G pressures greater than 120 psig.
	RO	10. **DETERMINE** if RHR spray should be placed in service: a. **CHECK** the following conditions: • At least one hour has elapsed since the beginning of the accident. • Cntmt pressure is greater than 9.5 psig. • RHR suction is aligned to cntmt sump. • At least one charging pump and one SI pump running.
	SRO	10.a. **RESPONSE NOT OBTAINED**: a. **WHEN** all conditions met, **THEN PERFORM** Sub step 10b. ** **GO TO** Step 11.
	SRO	11. **RETURN TO** Instruction in effect.
EXAMINER: SRO will return to E-1,"Loss of Reactor or Secondary Coolant."		
NOTE Seal injection flow should be maintained to all RCPs.		
	SRO	1. **CHECK** if RCPs should remain in service: a. Phase B DARK [MISSP]. b. RCS pressure greater than 1500 psig.
	SRO	2. **REFER TO** EPIP-1, Emergency Plan Classification Flowchart.
NOTE Time since initiation of event is defined by performance of Step 3.		
	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.

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Event Description: 1B CS pump shaft seizes. Requires entry into FR-Z.1 on an ORANGE path condition, since NO CS pumps are running. Containment Air Return fans fail to auto start. SI fails to auto actuate.

Time	Position	Applicant's Actions or Behavior
	BOP	5. **MAINTAIN** Intact S/G NR levels: a. **MONITOR** levels greater than 29% [39% ADV]. b. **CONTROL** intact S/G levels between 29% and 50% [39% and 50% ADV].
	BOP	6. **CHECK** secondary radiation: • S/G discharge monitors NORMAL. • Condenser vacuum exhaust rad monitors NORMAL. • S/G blowdown rad monitor recorders NORMAL trend prior to isolation.
	BOP	7. **ENSURE** cntmt hydrogen analyzers in service: • **PLACE** 1-HS-43-200A in ANALYZE [M-10]. • **PLACE** 1-HS-43-210A in ANALYZE [M-10]. • **CHECK** low flow lights not lit [M-10]. • Locally **CHECK** low analyzer temp lights NOT lit [North wall of Train A 480V SD Bd rm].
	RO	8. **MONITOR** pzr PORVs and block valves: a. Pzr PORVs CLOSED. b. At least one block valve OPEN.
	RO	9. **DETERMINE** if cntmt spray should be stopped: a. **MONITOR** cntmt pressure less than 2.0 psig. b. **CHECK** at least one cntmt spray pump RUNNING. c. **RESET** cntmt spray signal. d. **STOP** cntmt spray pumps, and **PLACE** in A-AUTO. e. **CLOSE** cntmt spray discharge valves 1-FCV-72-2 and 1-FCV-72-39.
	BOP	10. **ENSURE** both pocket sump pumps STOPPED [M-15]: • 1-HS-77-410. • 1-HS-77-411.

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Event Description: 1B CS pump shaft seizes. Requires entry into FR-Z.1 on an ORANGE path condition, since NO CS pumps are running. Containment Air Return fans fail to auto start. SI fails to auto actuate.

Time	Position	Applicant's Actions or Behavior
	SRO	11. **CHECK** SI termination criteria: a. **CHECK** RCS subcooling greater than 65°F [85°F ADV].
	SRO	11.a. **RESPONSE NOT OBTAINED:** a. ** **GO TO** Caution prior to Step 12.
CAUTION If offsite power is lost after SI reset, manual action will be required to restart the SI pumps and RHR pumps due to loss of SI start signal.		
	RO	12. **RESET** SI and **CHECK** the following: • SI ACTUATED permissive DARK. • AUTO SI BLOCKED permissive LIT.
	SRO	13. **DETERMINE** if RHR pumps should be stopped: a. **CHECK** RCS pressure greater than 150 psig. b. **CHECK** RHR suction aligned from RWST. c. **CHECK** RCS pressure stable or rising. d. **STOP** RHR pumps and **PLACE** in A-AUTO. e. **MONITOR** RCS pressure greater than 150 psig.
	BOP	14. **CHECK** pressure in all S/Gs controlled or rising.
	RO	15. **CHECK** RCS pressure stable or dropping.
	BOP	16. **MONITOR** electrical board status: a. **CHECK** offsite power available. b. **CHECK** all shutdown boards ENERGIZED by offsite power. c. **PLACE** any unloaded D/G in standby USING SOI-82 Diesel Generators.
	BOP	17. **INITIATE** BOP realignment: • **REFER TO** AOI-17, Turbine Trip. (Note: See detailed steps at the back of this Scenario Guide.)

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Event Description: 1B CS pump shaft seizes. Requires entry into FR-Z.1 on an ORANGE path condition, since NO CS pumps are running. Containment Air Return fans fail to auto start. SI fails to auto actuate.

Time	Position	Applicant's Actions or Behavior
	BOP	18. **INITIATE** 480V board room breaker alignments USING the following: • Appendix A (E-1), CLA Breaker Operation. • Appendix B (E-1), Ice Condenser AHU Breaker Operation. • Appendix C (E-1), 1-FCV-63-1 Breaker Operation. • Appendix D (E-1), 1-FCV-63-22 Breaker Operation. (NOTE: Detailed steps at the back of this Scenario Guide.)
	BOP	19. **DETERMINE** if hydrogen igniters should be energized: a. **CHECK** hydrogen analyzers in service. b. **CHECK** cntmt hydrogen less than 5% [M-10]. c. **ENERGIZE** hydrogen igniters [M-10]: • 1-HS-268-73 ON. • 1-HS-268-74 ON.
	SRO	20. **ENSURE** RHR available for cntmt sump recirculation: • Power to at least one operable RHR pump AVAILABLE. • Cntmt sump valve 1-FCV-63-72 or 1-FCV-63-73 to operable RHR pump AVAILABLE.
	SRO	21. **EVALUATE** plant equipment status: • **REFER TO** Appendix E (E-1), Equipment Evaluation.
	BOP	22. **CHECK** Aux Bldg radiation for loss of RCS inventory outside cntmt: a. Area monitor recorders 1-RR-90-1 and 0-RR-90-12A Aux Bldg points NORMAL. b. Vent monitor recorder 0-RR-90-101 NORMAL trend prior to isolation.
	SRO	23. **NOTIFY** Chemistry of event status and plant conditions.
	SRO	24. **DETERMINE** if RCS cooldown and depressurization is required: a. **CHECK** RCS pressure greater than 150 psig.

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Event Description: 1B CS pump shaft seizes. Requires entry into FR-Z.1 on an ORANGE path condition, since NO CS pumps are running. Containment Air Return fans fail to auto start. SI fails to auto actuate.

Time	Position	Applicant's Actions or Behavior
		b. **GO TO** ES-1.2, Post LOCA Cooldown and Depressurization.
EXAMINER: When the decision is made to transition to ES-1.2, "Post LOCA Cooldown and Depressurization," inform the applicants that "Another crew will continue from here" and cue the Simulator Operator to stop simulation.		
END OF SCENARIO		

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

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

Step	Action/Expected Response	Response Not Obtained

APPENDIX A
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EQUIPMENT VERIFICATION

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

Step	Action/Expected Response	Response Not Obtained

APPENDIX A
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EQUIPMENT VERIFICATION

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

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

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

Step	Action/Expected Response	Response Not Obtained

APPENDIX A
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EQUIPMENT VERIFICATION

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

Step	Action/Expected Response	Response Not Obtained

APPENDIX A
(E-0)
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EQUIPMENT VERIFICATION

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

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

13. **CLOSE** CCS HX C DISCH TO HDR A, 0-FCV-67-144.

14. **MONITOR** EGTS operation:
    - EGTS fans RUNNING.
    - **ENSURE** dampers OPEN VERIFY filter bank dp between 5 and 9 inches of water.

    Manually **START** fans OPEN dampers.

15. **ENSURE** CCS pumps RUNNING:
    - 1A-A CCS pump.
    - 1B-B CCS pump.
    - C-S OR 2B-B CCS pump.

    Manually **START** pumps as necessary.

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

16. **CHECK** CNTMT PURGE fans STOPPED:

    STOP fans and PLACE handswitch in PULL-TO-LOCK.

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

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

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

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

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

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

Step	Action/Expected Response	Response Not Obtained

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EQUIPMENT VERIFICATION

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

Step	Action/Expected Response	Response Not Obtained

APPENDIX B
(E-0)
Page 1 of 1

PHASE B PIPE BREAK CONTINGENCIES

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

ATTACHMENT 1
Page 1 of 3

TURBINE BUILDING NAUO DUTIES FOLLOWING A TURBINE TRIP

NOTE: Steps 1, 2, 3, and 4 shall be given priority. Step 1 shall be performed as soon as the #3 HDTPS are secured. The remainder of the steps duties may be performed in any order with the UO notified when work is complete.

1. **WHEN** #3 HDTPs are removed from service, **THEN**
   BYPASS #3 HDT to condenser:

   PRESS MANUAL button on 1-LIC-6-105, #3 HEATER DRAIN TANK LEVEL [708/east end of #3 HDT], **AND**
   VERIFY MANUAL button is LIT.

   PRESS the ∧ (raise) button until controller output indicates 100%.

   VERIFY 1-LCV-6-105A and -105B, #3 HEATER DRAIN TANK BYPASS TO CONDENSER, are OPEN [685/T3E].

2. **ENSURE** the following valves are **OPEN** to unisolate #2 Feedwater Heater Hi-level bypass to condenser LCVs [685/T3E].
   1-ISV-6-22, MFW HTR A2 COND BYP DNSTR ISOL
   1-ISV-6-23, MFW HTR B2 COND BYP DNSTR ISOL
   1-ISV-6-24, MFW HTR C2 COND BYP DNSTR ISOL

3. **RESTORE** air to the # 2 Feedwater Heater Hi-level bypass to condenser LCVs by **OPENING** the following valves [708 T1D]:
   1-ISV-32-9131, CONTROL AIR ISOLATION VALVE TO LIC-6-1988
   1-ISV-32-9132, CONTROL AIR ISOLATION VALVE TO LIC-6-1989
   1-ISV-32-9133, CONTROL AIR ISOLATION VALVE TO LIC-6-1990

4. **CLOSE** MSR HP drains to #1 heaters [El 708/Turb Bldg south end of #1 heaters]:

   MFW HEATER A1 SHELL SIDE INLET ISOL, 1-ISV-6-575
   MFW HEATER B1 SHELL SIDE INLET ISOL, 1-ISV-6-576.
   MFW HEATER C1 SHELL SIDE INLET ISOL, 1-ISV-6-577.

5. **STOP** turbine EHC pumps USING 1-HS-47-9 EH FLUID PUMP 1A and 1-HS-47-14, EH FLUID PUMP 1B by placing both pumps in STOP/PULL-TO-LOCK beginning with standby pump first [at EHC mezzanine, TB, el. 740].

6. **PLACE** 1-HS-5-94, EX STM LOW POINT DRN COMMON CNTL SW to OPEN, [locally on LP Heater deck, T6H/724].

ATTACHMENT 1
Page 2 of 3

TURBINE BUILDING NAUO DUTIES FOLLOWING A TURBINE TRIP (continued)

7. **OPEN** MSR Startup vent isolation valves [located at high press. end of MSR]:

   ISOLATION VALVE FOR MSR 1A-1 STARTUP VENT, 1-ISV-6-2040
   ISOLATION VALVE FOR MSR 1B-1 STARTUP VENT, 1-ISV-6-2041
   ISOLATION VALVE FOR MSR 1C-1 STARTUP VENT, 1-ISV-6-2042
   ISOLATION VALVE FOR MSR 1A-2 STARTUP VENT, 1-ISV-6-2043
   ISOLATION VALVE FOR MSR 1B-2 STARTUP VENT, 1-ISV-6-2044
   ISOLATION VALVE FOR MSR 1C-2 STARTUP VENT, 1-ISV-6-2045

NOTE 1 Coordinate with UO based on plant conditions and planned evolutions.

NOTE 2 If the unit is to remain in Hot Standby in the following step, re-alignment of main steam traps may not be required.

8. **REALIGN** main steam trap drains USING SOI-1.01, Main Steam System, if required by plant conditions.

9. **ENSURE** the hydrogen seal oil system and stator cooling water system operating normally with system temp maintaining between 95° and 105°F (may require RCW isolation if TCV has excessive leakage). Refer to SOI-35.02 and SOI-35.03 respectively for guidance.

   1-TI-35-264, H2 SIDE OIL FILTER OUT. TEMP.
   1-TI-35-251, AS OIL FILTER OUTLET TEMP.
   1-TI-35-97, STAT COIL WTR INL TEMP [755/SW GEN SKIRT].

   OR

   1-TIC-24-73, AIR SIDE SEAL OIL CLR TEMP IND CNTLR.
   1-TIC-24-74, H_2 SIDE SEAL OIL CLR TEMP IND CNTLR

10. **AFTER** turbine drops to less than 600 rpm,
    THEN
    ENSURE turning gear oil pump, seal oil backup pump and bearing lift oil pump has started as required and pump press are normal.

    1-HS-47-62, TURNING GEAR OIL PUMP.
    1-HS-47-61B, TURBINE SEAL OIL BACK-UP PUMP.
    1-HS-47-108, BEARING LIFT OIL PUMP.

11. **AFTER** turbine drops to zero rpm,
    THEN
    ENSURE turbine is on turning gear with no turbine abnormalities observed.

ATTACHMENT 1
Page 3 of 3

TURBINE BUILDING NAUO DUTIES FOLLOWING A TURBINE TRIP (continued)

12. **ENSURE** selected MFP HP Steam Supply valves CLOSED:

    1-ISV-1-611, MFPT 1A HP STEAM SUPPLY ISOL.
    1-ISV-1-612, MFPT 1B HP STEAM SUPPLY ISOL.

13. **AFTER** main feed pump (MFP) turbine drops to zero rpm,
    THEN
    ENSURE MFP turbine is on turning gear with no turbine abnormalities observed.

NOTE: The following step will isolate main steam from the building heat exchangers on a trip to prevent the vacuum breakers on the heat exchangers from opening and allowing O^2 intrusion into the hotwell.

14. IF Building Heat is in service from #3 extraction, **THEN**

    a. **NOTIFY** Control Room to evaluate shutdown of Aux Building Supply and Exhaust Fans.

    b. **ISOLATE** steam from building heat exchangers using SOI-44.01 section for Removing BHS Hx From Service When From # 3 Extraction.

    c. **PLACE** Aux Boilers in service.

    d. **WHEN** Aux. Boilers placed in service, **THEN**
    PLACE building heat exchangers in service, if required, using SOI-44.01 section for Placing Building Heating System Heat Exchangers In Service.

15. IF Steam Generator Blowdown is secured,
    THEN
    PERFORM shutdown of SGBD Radiation Monitors 1-RM-90-120/121 in accordance with SOI-15.01.

16. IF Condensate Demineralizer(s) in service,
    THEN
    ENSURE polisher flow meets minimum flow requirement or secure polisher in accordance with SOI-14.01

17. **ISOLATE** injection water to the following pumps per SOI-54.01 to prevent water intrusion into the oil:

    - #3 Heater Drain Tank Pumps.
    - #7 Heater Drain Tank Pumps.
    - Condensate Booster Pumps.

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CLA
BREAKER OPERATION

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

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

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ICE CONDENSER AHU BREAKER OPERATION

OPEN the following to remove power from ice condenser air handling units:

BOARD	COMPT	NOMENCLATURE
480 V Reactor Vent Board 1A-A	13D	1-BKR-232-A/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-A/14D ICE COND 1-AHU-61-3/7/11/13/15/19/23/27
480 V Reactor Vent Board 1B-B	13D	1-BKR-232-B/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-B/14D ICE COND 1-AHU-61-5/9/13/17/21/25/29

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1-FCV-63-1
BREAKER OPERATION

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

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

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1-FCV-63-22
BREAKER OPERATION

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

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

SHIFT TURNOVER CHECKLIST
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SHIFT TURNOVER CHECKLIST

Page _____ of _____

☐ SM
☒ US/MCR Unit _____ _____
☐ UO Unit _____ Off-going - Name
☐ AUO Station _____ _____
☐ STA (STA Function) On-coming - Name

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

- Abnormal equipment lineup/conditions:
  1A Containment Spray System (CSS) pump is out of service for bearing replacement, and is currently disassembled. LCO 3.6.6, Containment Spray System, Condition A was entered 6 hours ago. The 1A CSS pump is expected to be returned to service in 16 hours.

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

- Major Activities/Procedures in progress/planned:
  Maintain 100% power. Current RCS boron concentration is 877 ppm. Train A/Channel I Work Week. Control Bank D is at 220 steps. Train A/Channel I Work Week.

- Radiological changes in plant during shift:
  None planned

Part 2 - Performed by on-coming shift

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

Review the following programs for changes since last shift turnover:

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

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

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

Relief Time: _____ Relief Date: _____

SHIFT TURNOVER CHECKLIST
Page 2 of 2

SHIFT TURNOVER CHECKLIST

Page _____ of _____

☐ SM
☐ US/MCR Unit _____
☒ UO Unit _____ Off-going - Name
☐ AUO Station _____
☐ STA (STA Function) On-coming - Name

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

- Abnormal equipment lineup/conditions:
  1A Containment Spray System (CSS) pump is out of service for bearing replacement, and is currently disassembled. LCO 3.6.6, Containment Spray System, Condition A was entered 6 hours ago. The 1A CSS pump is expected to be returned to service in 16 hours.

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

- Major Activities/Procedures in progress/planned:
  Maintain 100% power. Current RCS boron concentration is 877 ppm. Train A/Channel I Work Week.
  Control Bank D is at 220 steps. Train A/Channel I Work Week.

- Radiological changes in plant during shift:

Part 2 - Performed by on-coming shift

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

Review the following programs for changes since last shift turnover:

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

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

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

Relief Time: _____ Relief Date: _____

Facility:	**Watts Bar Fall NRC Exam 2009**	Scenario No.: **2**	Op Test No.: **1**
Examiners:		Operators:	**SRO**
			RO
			BOP

Initial Conditions: 88% power, MOL. Boron concentration is 951 ppm. Control Bank "D" is at 193 steps.

Turnover: 1A MD AFW Pump tagged for pump bearing replacement. Tech Spec 3.7.5.b was entered 6 hours ago. Expected return-to-service in 16 hours. The unit is returning to power following 1-B MFP trip 8 hours ago. The pre-conditioned power level is 96%. Power escalation to 95% is in progress. Continue power escalation. Train A Week Channel I.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R-RO N- BOP	Power escalation to 95%.
2	RX11A 100	C-RO TS-SRO	1-PT-1-73 fails HIGH, causing continuous rod withdrawal. RO places rod control in MANUAL. Enter AOI-2, "Malfunction of Reactor Control System." Requires Tech Spec evaluation.
3	FW51B	C-BOP	1B Main Feed Pump shaft shears. BOP manually trips the 1B MFP in order to initiate the required turbine runback. Enter AOI-16, "Loss of Normal Feedwater."
4	RC07B 25	C-RO TS-SRO	1-PCV-68-340, Pressurizer PORV fails partially open, causing a rapid RCS pressure reduction. RO manually closes PORV and its block valve. Enter AOI-18, "Malfunction of Pressurizer Pressure Control System." Requires Tech Spec evaluation.
5	ED07D	C-BOP	1D 6.9 KV Unit Board trips. Loss of the Standby MFP requires a load reduction to less than 800 MWE. Enter AOI-16, "Loss of Normal Feedwater," for loss of the Standby MFP.
6	FW20A 50	M - ALL	Feedwater break outside containment. Enter E-0, "Reactor Trip or Safety Injection."
7	FW50B 80 FW22C	M-ALL	Loss of Heat Sink, requiring entry into FR-H.1.

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

Scenario 2 - Summary

Initial Condition	88% power, MOL. Boron concentration is 951 ppm. Control Bank "D" is at 193 steps.

Turnover	1A MD AFW Pump tagged for pump bearing replacement. Tech Spec 3.7.5.b was 1 entered 6 hours ago. Expected return-to-service in 16 hours. The unit is returning to power following 1-B MFP trip 8 hours ago. The pre-conditioned power level is 96%. Power escalation to 95% is in progress. Continue power escalation. Train A Week Channel I.

Event 1	Power Escalation to 95%.
Event 2	1-PT-1-73 fails HIGH, causing continuous rod withdrawal. Requires the RO to place rod control in MANUAL. Requires entry into AOI-2, "Malfunction of Reactor Control System." Requires Tech Spec evaluation.
Event 3	1B Main Feed Pump shaft shears. Requires the BOP operator to manually trip the 1B MFP in order initiate the required turbine runback. Requires entry into AOI-16, "Loss of Normal Feedwater."
Event 4	1-PCV-68-340, Pressurizer PORV fails partially open, causing a rapid RCS pressure reduction. Requires RO to manually close PORV and its block valve. Requires entry into AOI-18, "Malfunction of Pressurizer Pressure Control System." Requires Tech Spec evaluation.
Event 5	1D Unit Board trips. This results in the loss of the 1C Hotwell Pump, 1C #3 Heater Drain Pump and the Standby MFP. Loss of the Standby MFP requires a load reduction to less than 800 MWE. Requires entry into AOI-16, "Loss of Normal Feedwater," to address actions for the loss of the Standby MFP.
Event 6	Feedwater break inside containment, requiring the crew to make the decision to trip the reactor and manually isolate the feedwater and condensate systems. Requires the crew to enter E-0, "Reactor Trip or Safety Injection," transition to E-2, "Faulted Steam Generator Isolation," and then terminate the SI using ES-1.1, "SI Termination."
Event 7	Loss of Heat Sink, requiring entry into FR-H.1. After BOP requests venting of the TDAFW pump, the pump will be made available. This will allow for exit of FR-H.1.

Critical Task 1	*Establish feedwater flow into at least one SG before RCS bleed and feed is required.*
Critical Task 2	*Establish the minimum required feedwater flow rate to the SGs before SG dryout.*

SIMULATOR SETUP INFORMATION

1. ENSURE NRC Examination Security has been established.

2. Right click on 348, and then select RESET.

3. Enter the password.

4. Select "Yes" on the INITIAL CONDITION RESET pop-up window.

5. ENSURE the following information appears on the Director Summary Screen:

	Key	Description	Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
	hs-3-355	intentionally left blank	R		00:00:00		00:00:00		close	close
	hs-3-355-2	hs-3-355 indicating lights	R		00:00:00		00:00:00		Off	Off
	fw07a	electric afw pump a trip	M		00:00:00		00:00:00		InActive	Active
	hs-3-118a	hs-3-118a auxiliary feedwater pump a-a motor sw	R		00:00:00		00:00:00		ptlock	ptlock
	hs-3-118a-1	01160 aux fw pmp a-a motor sw	R		00:00:00		00:00:00		Off	Off
	hs-3-355-1	hs-3-355 indicating lights	R		00:00:00		00:00:00		Off	Off
	fw50b	afw pump b bearing wear	M		00:00:00		00:00:00		80	80
	fw22c	airbound tdafw pump	M		00:00:00		00:00:00		InActive	Active
	rx11a	impulse pressure transmitter 1-73 fail to position	M	1	00:00:00		00:00:00		100	91.0044
	fw18b	feed water pump turbine vibration pump b	M	2	00:00:00		00:00:00		60	0
	fw51b	main fw pump b sheared shaft	M	2	00:00:10		00:00:00		Active	InActive
	rc07b	przr porv pcv-68-340 fail to any position	M	3	00:00:00		00:00:15		25	0
	ed07d	loss of 6.9 kv unit board 1d	M	4	00:00:00		00:00:00		Active	InActive
	fw20	feed water line break	M	5	00:00:00		00:02:00		10	0

6. Place simulator in RUN and acknowledge any alarms.

7. Place 1-HS-3-118A, AFW PUMP A-A handswitch in the STOP-PULL-TO-LOCK position. Hang HOLD NOTICE card on handswitch. Hang HOLD NOTICE card on 1-HS-3-355, MD AFWP 1-A RECIRC VALVE.

8. ENSURE Rod Bank Update reflects current step counter positions, in order to clear 83-D Computer alarm.

SIMULATOR SETUP INFORMATION

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

10. Open Insight Files "Exam Data" and "auo", and display on second simulator computer monitor in the booth.

11. Place simulator in FREEZE.

EVENT INITIATION AND ROLE PLAY

Exam Event	Simulator Event	DESCRIPTION/ROLE PLAY
1		Power escalation to 100%.
2	1`	1-PT-1-73 fails HIGH. ***ROLE PLAY: As work control, when contacted, inform the MCR that it will be an hour or more before the work package to trouble shoot and repair the failed channel is complete.*** ***ROLE PLAY: As work control, when contacted to initiate performance of IMI-160, reply that the instrument shop will be notified and instructed to contact the control room before the IMI is to be performed.***
3	2	1B Main Feed Pump shaft shears. ***ROLE PLAY: As the Turbine Building AUO, state that the shaft on the MFP has sheared.*** ***ROLE PLAY: As work control, when contacted, inform the MCR that it will be an hour or more before the work package to trouble shoot and repair the failed channel is complete.***
4	3	1-PCV-68-340, Pressurizer PORV fails open. ***ROLE PLAY: As work control, when contacted, inform the MCR that it will be an hour or more before the work package to trouble shoot the PORV and its circuit.***
5	4	1D 6.9 KV Unit Board trips. ***ROLE PLAY: As Turbine Building AUO, when contacted, state that there is no apparent damage to any of the pumps lost when the 1D Unit board tripped.*** ***ROLE PLAY: As the Support Operator, when contacted state that the breaker for the 1D Unit board tripped on instantaneous overcurrent.***
6	5	Feedwater break inside containment. ***ROLE PLAY: NONE***

EVENT INITIATION AND ROLE PLAY

Exam Event	Simulator Event	DESCRIPTION/ROLE PLAY
7	6	1B MD AFW trips. ***ROLE PLAY: As the Control Building AUO. when requested state that the 1B MD AFW pump tripped on instantaneous overcurrent.***
8	7	TD AFW pump steam bound. ***ROLE PLAY: As the Auxiliary Building AUO, state that the TD AFW Pump casing and discharge line are extremely hot to the touch.*** ***When requested report that venting of the pump will begin.*** ***Report that venting of the TD AFW pump is successful.***

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

Event Description: Commence power escalation to 95%.

Time	Position	Applicant's Actions or Behavior
		EXAMINER: Crew will continue power increase from 88% by periodically performing GO-4, "Normal Power Operation," Section 5.2 Step [39.1]. The plant is currently at 88%, so the crew is waiting for power to reach 95% to perform Step [41].
	BOP	Increase turbine load as directed.
	BOP	Start secondary equipment as directed.
	RO	Withdraw control rods as directed.
	RO	Perform dilutions as directed.
	SRO	Direct reactivity manipulations.
		EXAMINER: The following actions are from SOI-62.02, "Boron Concentration Control," Section 6.6, Minor Dilution.
		NOTES 1) Section 6.6, Minor Dilution, may be reproduced, laminated, displayed, reused, etc. as desired.
		2) Minor Dilution is defined as the addition of Primary Water done several times each shift to compensate for fuel burn-up, and maintain Tavg on program.
	RO	[1] **ENSURE** 1-HS-68-341H, BACKUP HEATER C, is ON, to equalize Pzr-RCS CB.
	RO	[2] **ADJUST** 1-FQ-62-142, PW BATCH COUNTER, for required quantity.
	RO	[3] **PLACE** 1-HS-62-140B, VCT MAKEUP MODE in DIL.
	RO	[4] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL, to START. [4.1] **CHECK** Red light is LIT.
	RO	[5] **MONITOR** the following parameters:
		1-PI-62-122 / 1-M-6 / VCT PRESS
		1-LI-62-129A / 1-M-6 / VCT LEVEL
		1-FI-62-142 / 1-M-6 / PW TO BLENDER FLOW
		1-FQ-62-142 / 1-M-6 / PW BATCH COUNTER
		1-FQ-62-139 / 1-M-6 / PW BATCH COUNTER
	RO	[6] **WHEN** dilution is COMPLETE, AND 1-FCV-62-128 is closed, **THEN PLACE** 1-HS-62-140B, VCT MAKEUP MODE, in AUTO.
	RO	[7] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL, to START. [7.1] **CHECK** Red light is LIT
		EXAMINER: The following actions are from GO-4, "Normal Power Operation," Section 5.2 at Step [40].
	SRO	[40] **IF** startup is following refueling, **THEN CONTINUE** ascension to 90% RTP by performing the following::

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

Event Description: Commence power escalation to 95%.

Time	Position	Applicant's Actions or Behavior
1) Power escalation should be per the most conservative of either the fuel pre-conditioning guidelines of TI-45 or the Turbine loading recommendations of SOI-47.02.		
2) Turbine load change may be stopped by depressing the HOLD push button, using VPL, or by depressing the MANUAL push button		
	BOP	[40.1] **IF** during any of the following steps the REFERENCE changes in an undesired manner **THEN ADJUST VPL** to stop turbine load rise. **OR PUSH** TURBINE MANUAL to place the turbine control mode in manual mode and proceed to section 5.6
	BOP	[40.2] **SET** VALVE POSITION LIMIT at 95% or as desired above the Gov Control Indication.
	BOP	[40.3] **SET** LOAD RATE at predetermined value.
	BOP	[40.4] **PUSH** REFERENCE CONTROL Δ (raise) button to set desired load in SETTER display.
NOTE RCS should be diluted to raise TAVG, then Turbine load raised along with TAVG. Control rods will be used along with dilution to maintain ΔI and, if needed, for temperature.		
		[40.5] **PUSH** GO button.
		[40.6] **MONITOR** Generator Megawatts RISING.
		[40.7] **CHECK** that load rise has **STOPPED** when reference display equals setter **OR** **IF** desired to stop the load change **THEN STOP** the load change by depressing the HOLD pushbutton.
		[40.8] **WHEN** desired to resume the load change, **THEN PRESS** the GO push button and continue to monitor load.
		[41] **BEFORE** raising above 80% power, **THEN ENSURE** the following: [41.1] 1-LCV-6-106A controlling properly. [41.2] 1-LCV-6-105A and 105B are **NOT** open. ***Since power is above 80% this step is CIRCLED AND SLASHED in GO-4, indicating that it has already been performed.***
NOTES 1) **After operations less than 85% Reactor power for more than 2 weeks, Reactor Engineering evaluation of Hot Channel Factors per 1-SI-0-20 is required, before exceeding 90% power.** 2) **Performing NIS check and adjustment relatively close to 100% power may eliminate the need to RE-PERFORM these actions upon reaching 100% power.**		

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Event Description: Commence power escalation to 95%.

Time	Position	Applicant's Actions or Behavior
		[42] **WHEN** power is at or above 95%, **THEN PERFORM** the following [42.1] **ADJUST** PR NIS per 1-SI-92-1, NIS Daily Comparison. [42.2] **IF** evaluation of Hot Channel Factors is required, **THEN ENSURE** 1-SI-0-20, COMPLETE. [42.3] **ENSURE** MIG performs 1-SI-68-30 within 24 hours after power stabilizes at 90% or above (N/A if NOT applicable). [42.4] **ENSURE** the following level controllers maintaining levels within normal ranges: A. Feedwater heaters. B. MSR drain tanks
Simulator operator enters Event 2.		

Op Test No.: NRC Scenario # 2 Event # 2 Page 4 of 25

Event Description: 1-PT-1-73 Turbine Impulse Pressure Transmitter fails HIGH.

Time	Position	Applicant's Actions or Behavior
Indications available: 94-A TAVG-T REF DEVIATION Control Rods withdraw at 72 steps/minute.		
	RO	Diagnose and announce failure.
	RO	May place Control Rods in Manual, after monitoring the generator megawatt meter and determining that no legitimate load rejection/turbine runback is in progress.
	SRO	Enter and direct actions of AOI-2, "Malfunction Of Reactor Control System", Section 3.2, "Continuous Rod Withdrawal/Insertion" and directs crew actions.
EXAMINER: The following actions are from AOI-2,"Malfunction of Reactor Control System," Sub Section 3.2,"Continuous Rod Withdrawal/Insertion."		
	RO	1. **PLACE** control rods in MAN.
	RO	2. **CHECK** control rod movement STOPPED.
	RO	3. **MAINTAIN** T-avg on PROGRAM. (Reference Attachment 1) **USE** control rods. OR **ADJUST** turbine load.
	RO	4. **CHECK** loop T-avg channels NORMAL.
	RO	5. **CHECK** Auct Tavg NORMAL on 1-TR-68-2B.
	RO	6. **CHECK** NIS power range channels NORMAL.
	BOP	7. **CHECK** the following: • Turbine impulse pressure channel 1-PI-1-73, NORMAL. • Tref and Auct Tavg NORMAL on 1-TR-68-2B (Reference Attachment 1)
	BOP	7. **RESPONSE NOT OBTAINED** **PLACE** steam dumps in pressure mode as follows: a. **PLACE** steam dumps to OFF. b. **PLACE** mode selector HS to STEAM PRESS. c. **ADJUST** steam dump demand to zero. d. **PLACE** steam dumps to ON. e. **ENSURE** controller set at 84% (1092 psig). f. **WHEN** conditions allow, **THEN REFER TO** SOI-1.02 and **PLACE** steam dumps in TAVG Mode.

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Event Description: 1-PT-1-73 Turbine Impulse Pressure Transmitter fails HIGH.

Time	Position	Applicant's Actions or Behavior
	RO	8. **MONITOR** core power distribution parameters: • Power range channels. • Δ Flux Indicators. • T-avg. • Loop ΔT. • Incore TCs. • Feed flow/Steam flow.
	SRO	**9. INITIATE** repairs to failed equipment. ***Contacts Work Control to initiate troubleshooting and repairs to 1-PT-1-73, Turbine Impulse Pressure Transmitter.***
	SRO	10. REFER TO Tech Specs: 3.3.1-1, **16.f. <u>Turbine Impulse Pressure, P-13,</u> Condition S. Verify interlock is in required state for existing unit conditions, within 1 hour OR be in Mode 2 within 7 hours.**
CAUTION		**Allowing at least 5 minutes between any rod control input (i.e., T-avg, T-ref, or NIS) change and placing rods in AUTO, will help prevent undesired control rod movement.**
	SRO	11. **NOTIFY** Chemistry of any reactor power changes greater than 15% in one hour. **(Step is N/A since the power change experienced did not exceed 15%)**
	SRO	12 **IF** loop ΔT and loop Tavg channels were defeated due to Tavg channel failure, and Tavg channel has been repaired, **THEN** ... **(Step is conditional and will be N/A'ed)**
	SRO	13 .**WHEN** conditions allow auto rod control, **THEN**: **(Step is conditional and will be N/A'ed)**
	SRO	14. **WHEN** conditions allow auto pzr level control, **THEN ... (Step is conditional and will be N/A'ed)**
	SRO	15. **RETURN TO** Instruction in effect.
	SRO	**Crew Brief -** conduct 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.

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Event Description: 1-PT-1-73 Turbine Impulse Pressure Transmitter fails HIGH.

Time	Position	Applicant's Actions or Behavior
	SRO	Operations Management - Shift Manager. Maintenance Personnel – Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Simulator operator enters Event 3		

Op Test No.: NRC Scenario # 2 Event # 3 Page 7 of 25

Event Description: 1B MFP shaft shears.

Time	Position	Applicant's Actions or Behavior
Indications: 50-B, MFPT 1B ABNORMAL 53-D TURBINE VIBRATION HI 54-D PUMP VIBRATION HI 57-B, #3 HEATERS FW SUPPLY PRESS HI 58-A MFP 1B FLOW LO 58-B, SG FEEDWATER FLOW HI 63-F SG LEVEL DEVIATION		
	BOP	Diagnose and announce failure as sheared shaft on the 1B MFP.
	SRO	Enter and direct actions of AOI-16, "Loss of Normal Feedwater", Subsection 3.5, "Loss of MFWP Greater than or Equal to 800 MWe (67% Turbine Load.)"
	SRO	May direct the BOP to manually trip the 1B MFP to initiate the runback per ARI 58-A Corrective Actions.
	RO	When the 1B MFWP is tripped, the RO inserts control rods manually, due to the previous failure of 1-PT-1-73.
EXAMINER: The following actions are from ARI 58-A, MFP 1B FLOW LO		
	BOP	**[1] CHECK** MFP 1B flow on 1-FI-3-84 [1-M-3] to confirm alarm.
	BOP	**[2] CHECK** the following instruments on 1-M-3 for indication of failure: • 1-PI-1-33, MAIN STEAM PRESS • 1-PI-3-1, #1 HTR INLET PRESS
	SRO	**[3] IF** instrument failure, **THEN...** ***STEP is N/A since there is no instrument failure.***
	BOP	**[4] IF** flow less than or equal to 1.72 X 106 lbs/hr, **THEN:** **[a] ENSURE** 1-FCV-3-84, MAIN FW PUMP B FLOW CONTROL VLV, **OPEN**. **[b] IF** both Main Feed Pumps are in service, **THEN TRIP** the 1B Main Feed Pump.
	SRO	**[5] REFER TO** AOI-16,"Loss of Normal Feedwater", if necessary.
EXAMINER: The following actions are from AOI-16, "Loss of Normal Feedwater," Section 3.5, "Loss of MFWP Greater Than or Equal to 800 MWe (67% Turbine Load.)."		
	SRO	1. **IF** loss of S/G level is imminent, **THEN TRIP** reactor, and ** **GO TO** E-0, Reactor Trip or Safety Injection.
	SRO	2. **CHECK** turbine load less than or equal to 1000 MWe (85%).

Op Test No.: NRC Scenario # 2 Event # 3 Page 8 of 25

Event Description: 1B MFP shaft shears.

Time	Position	Applicant's Actions or Behavior
	BOP	3. **PLACE** tripped MFP recirc valve controller in MANUAL, and **CLOSE** recirc valve.
	BOP	4. **CHECK** turbine load less than 800 MWe (67%)
	SRO	4. **RESPONSE NOT OBTAINED** ENSURE Standby MFWP running.
	BOP	5. **ENSURE** MFWP speed rising to control S/G ΔP and levels on program.
CAUTION Continued load reductions below 800 MWe should be done using normal turbine controls at less than or equal to 5% min.		
	SRO	6. **ENSURE** adequate feed flow for existing conditions: • Feed flow greater than or equal to steam flow. • S/G levels returning to program.
	RO	7. **ENSURE** T-avg and T-ref within 3°. ***With 1-PT-1-73 failed, the RO must use AOI-2 Attachment 1 to determine the correct Tref for the current Tavg.***
CAUTION Runback may result in exceeding Tech Spec 3.2.3 limits on Axial Flux Difference (AFD).		
EXAMINER: It is possible for the crew to cause RCS pressure to drop below 2214 psig, which requires entry into LCO 3.4.1, DNB, Condition A, Restore parameter within 2 hours.		
	RO	8. **MONITOR** AFD within limits of LCO 3.2.3.
	RO	8. **RESPONSE NOT OBTAINED** INITIATE boration to return AFD within limits. Note: See SOI-62.02, Section 6.7, "Minor Boration" steps at the back of this Scenario Guide.
	BOP	9. **IF** feed flow greater than 40%, **THEN ENSURE** tripped MFWP turbine condenser valves CLOSED: • Pump A, 1-FCV-2-205 and -210, OR • Pump B, 1-FCV-2-211 and -216.
	BOP	10. **MONITOR** reg valves controlling S/G levels on program.
	BOP	11. **IF** C-7 LOSS OF LOAD STM DUMP INTERLOCK annunciator LIT [66E], **THEN** a. **ENSURE** steam dump valves have zero demand. b. **RESET** loss-of-load interlock with steam dump mode switch.
	SRO	12. **ENSURE** Condensate System Pumps in service as necessary: • **REFER TO** GO-4, Normal Power Operation.

Op Test No.: NRC Scenario # 2 Event # 3 Page 9 of 25

Event Description: 1B MFP shaft shears.

Time	Position	Applicant's Actions or Behavior
	SRO	13. **IF** reactor power dropped by greater than or equal to 15% in one hour, **THEN NOTIFY** Chemistry to initiate power change sampling requirements. **(Step is N/A since the power change experienced did not exceed 15%)**
	BOP	14. **CHECK** VALVE POS LIMIT LIT.
	BOP	15. **REDUCE** turbine load setpoint using REFERENCE CONTROL ▽ (lower) AND GO button until VALVE POS LIMIT LIGHT not LIT, **THEN SET** valve position limiter to 95%.
	SRO	16. **INITIATE** repairs on failed pump.
	SRO	17. **RETURN TO** Instruction in effect.
	CREW	**Crew Brief -** conduct for this event as time allows prior to the next event.
	CREW	**Notifications** should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. Operations Management - Shift Manager. Maintenance Personnel – Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Simulator operator enters Event 4		

Op Test No.: NRC Scenario # 2 Event # 4 Page 10 of 25

Event Description: 1-PCV-68-340, Pressurizer Power Operated Relief valve fails partially open.

Time	Position	Applicant's Actions or Behavior
91-A PZR PORV/SAFETY OPEN 89-A PZR PORV LINE TEMP HI 90-B PZR PRESS LO-DEVN BACKUP HTRS ON		
	BOP	Diagnose and announce failure.
	SRO	May direct the RO to manually close 1-PT-68-340 and its associated block valve per ARI 91-A PZR PORV/SAFETY OPEN Corrective Actions.
	SRO	Enter and direct actions of AOI-18, "Pressurizer Pressure Control Malfunctions," or AOI-6, "Small Reactor Coolant System Leak." Either instruction will provide actions to address the failure of the PORV.
EXAMINER: The following actions are from ARI 91-A, PZR PORV/SAFETY VALVE OPEN.		
		[1] CHECK PZR pressure to determine if PZR PORV/Safety should be open.
		[2] CHECK other indications to determine if PZR PORV or Safety is open: • Windows 89-A and 89-B • 1-TI-68-330 [1-M-4] - Safety • 1-TI-68-329 [1-M-4] - Safety • 1-TI-68-328 [1-M-4] - Safety • 1-TI-68-331 [1-M-4] - PORV
		[3] ENSURE PZR PORV and Safeties **CLOSED** when PZR pressure is below lift setpoint.
CRITICAL TASK to perform prior to Rx trip or SI.		**[4] IF** PZR PORV is NOT closed when PZR pressure is below lift setpoint, **THEN** **[a] CLOSE** associated PZR PORV block valve. **[b] NOTIFY** SRO. **[c] REFER TO** Tech Specs.
		Note: The DNB LCO may be entered and exited once the PORV block is closed.
EXAMINER: The following actions are from AOI-18, "Malfunction of Pressurizer Pressure		

Op Test No.: NRC Scenario # 2 Event # 4 Page 11 of 25

Event Description: 1-PCV-68-340, Pressurizer Power Operated Relief valve fails partially open.

Time	Position	Applicant's Actions or Behavior
Control System." This is also an ACCEPTABLE procedure path.		
NOTE 120 AC VITAL PWR BD 1-IV [breaker 2] supplies the plugmold power strip associated with both PZR spray valves and several other instruments required to respond to this event.		
	RO	1. **CHECK** pressurizer pressure stable or trending to desired pressure: • 1PI-68-340A, • 1-PI-68-334, • 1-PI-68-323, • 1-PI-68-322.
	SRO/RO	1. **RESPONSE NOT OBTAINED** PLACE pzr master controller 1-PIC-68-340A in MANUAL and RESTORE press to normal.
	RO	2. **CHECK** 1-XS-68-340D selected to a failed controlling or backup channel.
	SRO/RO	2. **RESPONSE NOT OBTAINED** IF pzr press is abnormally low, THEN ** GO TO Step 6.
	SRO/RO	**6. CHECK** pzr spray valves CLOSED: • Green indicating lights LIT. • Pzr spray demand meters, 1-PIC-68-340B and 1-PIC-68-340D indicating ZERO [1-M-4].
	RO	**7. CHECK** pzr PORVs CLOSED: • EVALUATE tailpipe temperatures and acoustic monitor.
	RO	**7. RESPONSE NOT OBTAINED** CLOSE associated block valve.
	BOP	**8. CHECK** pzr Safeties CLOSED: • EVALUATE tailpipe temperatures and acoustic monitor.
	RO	**9. ENSURE** pzr heaters on as required: • Control Group on at 2220 psig. • Backup Groups on at 2210 psig.
	RO	**10. CHECK** aux spray, 1-FCV-62-84, CLOSED.
	RO	**11. CHECK** pzr press STABLE or RISING.
	SRO	**12. ** GO TO** Step 16.

Op Test No.: NRC Scenario # 2 Event # 4 Page 12 of 25

Event Description: 1-PCV-68-340, Pressurizer Power Operated Relief valve fails partially open.

Time	Position	Applicant's Actions or Behavior
	SRO	**16. WHEN** pressurizer pressure stable and equipment status supports returned to normal, **THEN ENSURE** the following in AUTO: • Pzr Master controller, • Pzr spray controllers, • All heater groups.
	SRO	**17. REFER TO the following Tech Specs:** **3.4.11, Pressurizer Power - Operated Relief Valves. Action B. *With one PORV inoperable and not capable of being manually cycled, close the associated block valve within 1 hour and remove power from the associated block valve and restore the PORV to OPERABLE status within 72 hours.*** **(NOTE: RO provides block valve breaker number by checking number above handswitch and providing to SRO when asked. SRO will direct removing power to the breaker utilizing NAUO.)** **3.4.12, Cold Overpressure Mitigation System (COMS). *Tracking Only.*** **3.4.1 DNB**
	SRO	18. **INITIATE** repairs to failed equipment.
	SRO	19. **RETURN TO** Instruction in effect.
EXAMINER: The following actions are from AOI-6, "Small Reactor Coolant System Leak" if the SRO elects to implement AOI-6 in response to the PORV failure.		
NOTE During performance of this instruction the need for a rapid load reduction or Unit trip should be continuously evaluated.		
	RO	1. **CHECK** pzr level DROPPING.
	SRO	1. **RESPONSE NOT OBTAINED:** ** **GO TO** Step 4.
	SRO	4. **IF** RHR Shutdown Cooling mode in service, **THEN** ** **GO TO** AOI-14, Loss of RHR Shutdown Cooling. ***(This step is N/A.)***
	SRO	5. **MAKE** plant announcement via PA: "Attention plant personnel. A primary system leak has developed. Any personnel located either inside containment or in the Auxiliary Building should exit the area immediately." (Repeat)
	RO	6. **MONITOR** pzr level STABLE or RISING.
CAUTION Attempts to quantify leak rate should not delay performance of the remaining steps.		

Op Test No.: NRC Scenario # 2 Event # 4 Page 13 of 25

Event Description: 1-PCV-68-340, Pressurizer Power Operated Relief valve fails partially open.

Time	Position	Applicant's Actions or Behavior
	RO	7. **IF** pzr level STABLE or RISING and time permits, **THEN STABILIZE** the plant to quantify the leak rate: • **STOP** pzr heater/spray operation. • **STOP** any heatup/cooldown in progress
	BOP	8. **CHECK** secondary plant radiation normal: • Condenser exhaust monitors. • S/G blowdown monitors. • Main steam line monitors.
	RO	9. **CHECK** safety valves CLOSED: • **EVALUATE** tailpipe temp and acoustic monitors.
	RO	10. **CHECK** PORVs CLOSED: • **EVALUATE** tailpipe temp and acoustic monitors.
	RO	**10. <u>RESPONSE NOT OBTAINED:</u> CLOSE** leaking PORV block valve. **REFER TO** Tech Spec 3.4.11, Pressurizer Power Operated Relief Valves. **GO TO** Step 20. ***RO informs SRO that tailpipe temperature is elevated, and that the block valve has been closed.***
	RO	20. **MAINTAIN** pzr level on program.
	SRO	21. **REFER TO** EPIP-1, Emergency Plan Classification Flowchart: a. **DETERMINE** classification of event, and b. **INITIATE** manning the TSC. (if necessary)
NOTE The following steps check indications to locate the leak and identify affected areas.		
	SRO	22. **NOTIFY** RADCON for support to locally IDENTIFY and ISOLATE leak.
	RO/BOP	23. **CHECK** cntmt conditions NORMAL: • Lower cntmt temperature. • Radiation monitors. • Rx bldg sumps.
	BOP	24. **INITIATE** 1-SI-68-32, Reactor Coolant System Water Inventory Balance.

Op Test No.: NRC Scenario # 2 Event # 4 Page 14 of 25

Event Description: 1-PCV-68-340, Pressurizer Power Operated Relief valve fails partially open.

Time	Position	Applicant's Actions or Behavior
	BOP	25. **CHECK** aux bldg radiation for RCS leakage paths: • Area monitor recorders 1-RR-90-1 and 0-RR-90-12A aux bldg points NORMAL. • Vent monitor recorder 0-RR-90-101 NORMAL
	BOP	26. **CHECK** TURB/AUX/RX BLDG FLOODED annunciator [167-D] DARK.
	RO	27. **CHECK** 1-TI-68-21, Flange Leakoff Temp, less than 120°F.
	RO	28. **CHECK** vessel head vent NORMAL: • 1-FSV-68-394 and 68-395 CLOSED or power removed. • 1-TI-68-398, RX HEAD VENT TEMP at AMBIENT. • RX HEAD VENT TEMP HI annunciator [88-E] DARK.
	RO	29. **CHECK** RCP thermal barrier flows NORMAL [0-M-27B]: • Less than 50 gpm per RCP. • Return temp less than 115°F.
	RO	30. **CHECK** excess letdown normal: • Outlet temperature, less than or equal to 200°F.
	SRO	31. **INITIATE** leak repair.
	SRO	32. **EVALUATE** continued operation: • Cntmt conditions. • RCP status. • Leakage within Tech Spec 3.4.13, RCS Operational Leakage limits. • S/G and secondary plant leakage.
	SRO	33. **RETURN TO** Instruction in effect.
	CREW	**Crew Brief -** conduct for this event as time allows prior to the next event.
	CREW	**Notifications** should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. Operations Management - Shift Manager. Maintenance Personnel – Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Simulator operator enters Event 5		

Op Test No.: NRC	Scenario # 2	Event # 5	Page 15 of 25
Event Description:	1D 6.9 KV Unit Board Trips, resulting in the loss of the Standby MFP, 1C Hotwell Pump and 1C #3 HDT pump.		

Time	Position	Applicant's Actions or Behavior
Indications: 9-D 480V UNIT BD 1A UV/FAILURE/TRANSFER 11-B 6.9 UNIT BD 1D UV/CONTROL PWR FAILURE 14-E M-1 THRU M-6 MOTOR TRIPOUT 63-F SG LEVEL DEVIATION 165-B CCW/HPFP/RCW MOTOR TRIPOUT		
	BOP	Diagnoses and announces failures.
	SRO	Determines that the loss of the Standby Main Feed pump is the failure that must be addressed first, based on the response of the SG water level control system.
	SRO	Enters and directs actions of AOI-16, "Loss of Normal Feedwater," Subsection 3.3, "Standby MFP trip with Main Turbine in service."
EXAMINER: The following actions are from AOI-16, "Loss of Normal Feedwater," Subsection 3.3, "Standby MFP trip with Main Turbine in service."		
	SRO	1. **IF** loss of S/G level is imminent, **THEN TRIP** reactor, and ** **GO TO** E-0, Reactor Trip or Safety Injection.
	SRO	2. **IF** both MFWPs in service, **THEN:** ***Step is N/A since conditions are not met.***
	BOP	3. **CHECK** one MFWP in service.
	BOP	4. **CHECK** turbine load less than 800 MWe (67%).
	BOP	4. **RESPONSE NOT OBTAINED REDUCE** turbine load to within MFWP capability with valve position limiter.
	RO	5. **MONITOR** reactor power controlled to match turbine power.
	BOP	6. **ENSURE** adequate feed flow for existing conditions: • Feed flow greater than or equal to steam flow. • S/G levels returning to program.
	SRO	7. **IF** reactor power dropped by greater than or equal to 15% in one hour, **THEN NOTIFY** Chemistry to initiate power change sampling requirements. ***Step is N/A since conditions are not met.***
	BOP	8. **IF** C-7 LOSS OF LOAD STM DUMP INTERLOCK annunciator LIT [66E], **THEN** a. **ENSURE** steam dump valves have zero demand. b. **RESET** loss-of-load interlock with steam dump mode switch. ***Step is N/A since conditions are not met.***

Op Test No.: NRC Scenario # 2 Event # 5 Page 16 of 25

Event Description: 1D 6.9 KV Unit Board Trips, resulting in the loss of the Standby MFP, 1C Hotwell Pump and 1C #3 HDT pump.

Time	Position	Applicant's Actions or Behavior
	BOP	9. **CHECK** VALVE POS LIMIT LIGHT LIT.
	BOP	10. **REDUCE** turbine load setpoint using REFERENCE CONTROL ∇ lower) AND GO button until VALVE POS LIMIT LIGHT not LIT, **THEN SET** valve position limiter to 95%.
	SRO	11. **RETURN TO** Instruction in effect.
EXAMINER: The following actions are from ARI 11-B, UNIT BD 1D UV/CONTROL PWR FAILURE.		
	SRO	**[1] IF** 6.9kV Unit Bd 1D is energized, **AND** motor breakers have not tripped, **THEN** **[a] DISPATCH** Operator to the board to check DC power available (red indicating light lit if available). **[b] IF** DC power is not available, **THEN REFER TO** SOI-201.04, *6.9KV UNIT BOARD 1D,* to transfer DC to the alternate source.
	SRO	**[2] INITIATE** corrective action as conditions dictate.
EXAMINER: The following actions are from ARI 165-B, CCW/HPFP/RCW MOTOR TRIPOUT.		
	BOP	**[1] DETERMINE** which motor tripped.
	SRO	**[2] REFER TO** GOI-7, Generic Equipment Operating Guidelines. ***(No actions are required at this point.)***
	SRO	**[3] ENSURE** adequate pumps in service to replace tripped pump and start additional pumps, if necessary. ***Since the other 3 CCW pumps are already in service, this step requires no action.***
	SRO	**[4] IF** a Fire Pump has tripped, **THEN REFER TO** Tech Specs. ***Step is N/A since no Fire Pump tripped.***
	SRO	**[5] IF** a Raw Cooling Water Pump has tripped, **THEN REFER TO** AOI-46, Loss of Raw Cooling Water. ***Step is N/A since no Raw Cooling Water pump tripped.***
	SRO	**[6] NOTIFY** Work Control to initiate corrective action, if necessary.
	CREW	**Crew Brief -** conduct for this event as time allows prior to the next event.
	CREW	**Notifications** should be addressed as applicable if not specifically addressed by the procedure or in the crew brief.

Op Test No.: NRC Scenario # 2 Event # 5 Page 17 of 25

Event Description: 1D 6.9 KV Unit Board Trips, resulting in the loss of the Standby MFP, 1C Hotwell Pump and 1C #3 HDT pump.

Time	Position	Applicant's Actions or Behavior
		Operations Management - Shift Manager. Maintenance Personnel – Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Simulator operator enters Event 6		

Op Test No.: NRC	Scenario # 2	Event # 6 and 7	Page 18 of 25
Event Description:	Feedwater break outside containment. 1B MD AFW Pump shaft seizes. TD AFW Pump is steam bound.		

Time	Position	Applicant's Actions or Behavior
Indications: Makeup flow to the condenser increasing. Hotwell level decreasing. Narrow range level decreasing on ALL SGs. 168-B TURB FDN SUMP LEVEL HI		
	BOP	Diagnose and announces leak outside containment.
	SRO	Enters and directs actions of AOI-38,"Main Steam or Feedwater Line Break." Once determination is made that the steam leak is in the Turbine Building and a threat to personnel, orders a reactor trip, MSIV closure and isolation of condensate/feedwater system.
EXAMINER: The following actions are from AOI-38,"Main Steam or Feedwater Line Break."		
	SRO	1. **IF** leak threatens personnel safety, **THEN:** a. **TRIP** Rx. b. **CLOSE** the following: • MSIVs. • MSIV bypass valves. c. ** **GO TO** E-0, Reactor Trip or Safety Injection.
EXAMINER: The following steps are from E-0,"Reactor Trip or Safety Injection."		
NOTE 1 Steps 1 thru 4 are **IMMEDIATE ACTION STEPS.**		
NOTE 2 Status Trees / SPDS should be monitored when transitioned to another instruction.		
	RO	1. **ENSURE** reactor trip: • Reactor trip and bypass breakers OPEN. • RPIs at bottom of scale. • Neutron flux DROPPING.
	RO	2. **ENSURE** Turbine Trip: • All turbine stop valves CLOSED.
	RO	3. **CHECK** 6.9 kV shutdown boards: a. At least one board energized from: • CSST (offsite), OR • D/G (blackout).

Op Test No.: NRC Scenario # 2 Event # 6 and 7 Page 19 of 25

Event Description: Feedwater break outside containment. 1B MD AFW Pump shaft seizes. TD AFW Pump is steam bound.

Time	Position	Applicant's Actions or Behavior
	RO	4. **CHECK** SI actuated: a. Any SI annunciator LIT. b. Both trains SI **ACTUATED**. • 1-XX-55-6C • 1-XX-55-6D
	RO	**4. <u>RESPONSE NOT OBTAINED:</u> DETERMINE** if SI required: a. **IF** ANY of the following exists: • S/G press less than 675 psig, OR • RCS press less than 1870 psig, OR • Cntmt press greater than 1.5 psig **THEN ACTUATE** SI manually. **IF** SI **NOT** required, **THEN GO TO** ES-0.1, Reactor Trip Response.
	SRO	Transitions to ES-0.1, "REACTOR TRIP RESPONSE".
	SRO	Assigns Status Tree Performance to Surrogate STA.
<u>EXAMINER</u>: The following steps are from ES-0.1, "REACTOR TRIP RESPONSE."		
CAUTION Plant conditions, AFW pump start signals and flow requirements should be evaluated as time allows.		
	SRO	1. **MONITOR** SI actuation criteria: • **IF** SI actuation occurs during the performance of this Instruction, **THEN** ** **GO TO** E-0, Reactor Trip or Safety Injection.
	BOP	2. **CHECK** Generator PCBs OPEN.
	RO	3. **MONITOR** RCS temperature stable at or trending to 557°F: • **IF** any RCP running, **THEN MONITOR** RCS Loop T-avg trending to 557°F. OR • **IF** NO RCP running, **THEN MONITOR** RCS Loop T-cold trending to 557°F.

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Event Description: Feedwater break outside containment. 1B MD AFW Pump shaft seizes. TD AFW Pump is steam bound.

Time	Position	Applicant's Actions or Behavior
	BOP	4. **ENSURE** AFW operation: a. AFW established: • Both MD AFW pumps RUNNING. • TD AFW pump RUNNING. • LCVs in AUTO or controlled in MANUAL. b. Heat sink available: • Total feed flow greater than 410 gpm, OR • At least one S/G NR level greater than 29%.
	SRO	4. **RESPONSE NOT OBTAINED** a. **ESTABLISH** feed flow from AFW or MFW as necessary. b. **IF** heat sink can **NOT** be established, **THEN** ** **GO TO** FR-H.1, Loss Of Secondary Heat Sink.
	SRO	Transitions to FR-H.1, "LOSS OF SECONDARY HEAT SINK".
Note: Crew may trip the TDAFW pump as a precautionary measure. Not required by procedure.		
EXAMINER: The following steps are from FR-H.1, "LOSS OF SECONDARY HEAT SINK."		
CAUTION • **If total feed flow CAPABILITY of 410 gpm is available, this Instruction should NOT be performed.** • **If an Intact S/G is available, feed flow should NOT be reestablished to any faulted S/G.**		
	SRO	1. **CHECK** if secondary heat sink is required: a. RCS pressure greater than any Intact S/G pressure. b. RCS temperature greater than 375°F [360°F ADV].
	SRO	2. **ENSURE** at least one charging pump RUNNING.
CAUTION RCS bleed and feed criteria must be monitored for immediate response if the criteria is exceeded.		
	SRO	3. **DETERMINE** if RCS bleed and feed required: a. **CHECK** RCS bleed and feed required: • Any THREE S/G WR levels less than or equal to 26% [36% ADV]. OR • RCS pressure greater than or equal to 2335 psig.

Op Test No.: NRC Scenario # 2 Event # 6 and 7 Page 21 of 25

Event Description: Feedwater break outside containment. 1B MD AFW Pump shaft seizes. TD AFW Pump is steam bound.

Time	Position	Applicant's Actions or Behavior
	SRO	3.a. **RESPONSE NOT OBTAINED** a. **MONITOR** RCS bleed and feed criteria: **WHEN** criteria are met, **THEN PERFORM** Substep 3b. ** **GO TO** step 4.
		4. **ENSURE** S/G blowdown ISOLATED.
	BOP	5. **MONITOR** CST volume greater than 200,000 gal.
NOTE If the use of condensate flow is anticipated, then a higher pzr level will better accommodate the level shrink from S/G cooldown and depressurization.		
	RO	6. **CONTROL** pzr level between 29% and 63% [47% and 58% ADV].
	BOP	7. **ESTABLISH** MD AFW pump flow: ***Based on reports from the field, the MD AFW pumps will not be available for use in the near term. The SRO may direct the BOP to address this step, while FR-H.1 performance continues.***
CRITICAL TASK (prior to bleed and feed)	BOP	8. **ESTABLISH** TD AFW pump flow:
EXAMINER: ***Based on reports from the field, the TDAFW pump is steam bound. Approximately 5 minutes after the TDAFW pump is shutdown to support venting, the AUO will report back to the control room that venting was successful, and the SRO will direct the BOP to feed SGs using the TDAFW pump. After AFW flow is established, TERMINATE the scenario. Actions will continue per FR-H.1 until TD AFW pump is vented. See back of this Scenario Guide for detailed steps on venting the TD AFW pump.***		
	RO	9. **STOP** all four RCPs.
	BOP	10. **IF** Secondary pumps will be used to feed S/Gs, **THEN REFER TO** Appendix A (FR-H.1), Establishing MFW following Reactor Trip, while continuing this Instruction.
CAUTION • **If offsite power is lost after SI reset, manual action will be required to restart the SI pumps and RHR pumps due to loss of SI start signal.** • **If plant conditions degrade after automatic SI is blocked, manual actuation may be required.**		
NOTE After the low steamline pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.		
	RO	11. **BLOCK** SI signals:

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Event Description: Feedwater break outside containment. 1B MD AFW Pump shaft seizes. TD AFW Pump is steam bound.

Time	Position	Applicant's Actions or Behavior
		a. **INITIATE** RCS depressurization to less than 1912 psig: **IF** letdown in service, **THEN ALIGN** aux spray USING Appendix B (FR-H.1), ALIGN AUX SPRAY.
EXAMINER: The following steps are from FR-H.1, "LOSS OF SECONDARY HEAT SINK," Appendix B, "Align Aux Spray."		
	RO	1. **ENSURE** at least one charging pump running.
	RO	2. **IF** charging is not aligned, **THEN ALIGN** charging: a) **CLOSE** RCP seal flow control 1-FCV-62-89. b) **OPEN** charging isolation 1-FCV-62-90 and 1-FCV-62-91. c) **ENSURE** charging 1-FCV-62-85 or 1-FCV-62-86 OPEN.
CAUTION If RCS is on cold leg recirc, seal return isolation valves should not be opened (prevents sump inventory from diverting to VCT).		
		d) **OPEN** seal return 1-FCV-62-61 and 1-FCV-62-63.
	RO	3. **ENSURE** BIT outlet valves 1-FCV-63-25 AND 1-FCV-63-26 CLOSED.
NOTE Aux spray flow can be maximized by closing the normal pzr spray valve(s).		
	RO	4. **CONTROL** aux spray flow: a) **OPEN** aux spray 1-FCV-62-84. b) **CLOSE** charging 1-FCV-62-85 and 1-FCV-62-86. c) **MODULATE** Pzr Spray valves as needed to control Pzr pressure. d) **ADJUST** aux spray flow rate with 1-FCV-62-93 and 1-FCV-62-89 as needed.
END OF SCENARIO		

Date_____ **INITIALS**

6.7 Minor Boration

NOTES

1) Section 6.7, Minor Boration, may be reproduced, laminated, displayed, reused, etc. as desired.
2) Minor Boration is defined as the addition of Boric Acid done several times each shift early in core life, to compensate for burnable poison burn-up, and maintain Tavg on program.

[1] **ENSURE** 1-HS-68-341H, BACKUP HEATER C [1-M-4], is ON, to equalize RCS-Pzr C_B. ☐

[2] **ADJUST** 1-FC-62-139, BA TO BLENDER [1-M-6], for desired flow rate. ☐

[3] **ADJUST** 1-FQ-62-139, BA BATCH COUNTER [1-M-6], for required quantity. ☐

[4] **PLACE** 1-HS-62-140B, VCT MAKEUP MODE [1-M-6], in BOR. ☐

[5] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL [1-M-6], to START. ☐

[5.1] **CHECK** Red light is LIT. ☐

[6] **MONITOR** the following parameters:

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

[7] **IF** DESIRED to flush affected piping, **THEN PERFORM** Section 6.3. ☐

[8] **WHEN** Boration is COMPLETE, **THEN**

PLACE 1-HS-62-140B, VCT MAKEUP MODE, in AUTO. ☐

[9] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL, to START. ☐

[9.1] **CHECK** Red light is LIT. ☐

Venting of TD AFW Pump
Examiner: Only the applicable sections of SOI-3.02 for the Turbine Driven Aux. Feed Pump are included here.

Date_____ Initials

8.7 Venting of AFW Pumps

Source Notes 1,2,4,6,7 applies to this section.

WARNINGS

1) The AFW pumps may start at any time, without warning.
2) Keep clear of the pumps' shafts and other moving parts while venting the pumps.
3) Water will spray from the vent line if the pump starts while venting.
4) Be prepared to close the vent valve at all times during the venting process.

CAUTION

Radioactive steam may be present when venting AFW pumps.

NOTE

IF venting due to vapor binding, it may also be necessary to vent AFW Pump Discharge Header to ensure system is returned to Standby condition. Unused portions of this section may be N/A'd.

[1] NOTIFY RADCON of possible radiological hazards. _____

Date_____ Initials

8.7 **Venting of AFW Pumps (continued)**

[3.3] **WHEN** solid stream of water exists, **THEN**

CLOSE 1-VTV-3-932, AUX FEEDWATER PMP 1B-B CASING VENT. _____ _____ IV

[3.4] **NOTIFY** UO that AFW PUMP 1B-B vented. _____

Date_____ Initials

8.7 **Venting of AFW Pumps (continued)**

[4] PERFORM the following to vent TD AFW PUMP [A3T/692]:

[4.1] **NOTIFY** UO of intention to vent TD AFW PUMP. _____

[4.2] OPEN 1-VTV-3-930, T.D. AUX FEEDWATER PUMP CASING VENT. _____

[4.3] **WHEN** solid stream of water exists, THEN CLOSE 1-VTV-3-930, T.D. AUX FEEDWATER PUMP CASING VENT. _____ _____ IV

[4.4] **NOTIFY** UO that TD AFW PUMP vented. _____

SHIFT TURNOVER CHECKLIST
Page 1 of 2

SHIFT TURNOVER CHECKLIST

Page _____ of _____

☐ SM
☒ US/MCR Unit _____ _____
☐ UO Unit _____ Off-going - Name
☐ AUO Station _____ _____
☐ STA (STA Function) On-coming - Name

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

- Abnormal equipment lineup/conditions:
  1A MD AFW Pump tagged for pump bearing replacement. Tech Spec 3.7.5.b was entered 6 hours ago. .
  Expected return-to-service in 16 hours.

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

- Major Activities/Procedures in progress/planned:
  The pre-conditioned power level is 96%. The unit is returning to power following 1-B MFP trip 8 hours ago.
  Power escalation to 95% is in progress. Continue power escalation Train A Week Channel I. Perform
  load escalation using Reactivity Plan provided by Reactor Engineering. Currently at Step 40 of GO-4
  Section 5.2, "Unit Startup from 30% to 100% Reactor Power. Control Bank D at 193 Steps.
  RCS boron is 951 ppm. Train A Week Channel I.

- Radiological changes in plant during shift:

Part 2 - Performed by on-coming shift

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

Review the following programs for changes since last shift turnover:

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

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

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

Relief Time: _____ Relief Date: _____

SHIFT TURNOVER CHECKLIST
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SHIFT TURNOVER CHECKLIST

Page _____ of _____

☐ SM
☐ US/MCR Unit _____
☒ UO Unit _____ Off-going - Name
☐ AUO Station _____
☐ STA (STA Function) On-coming - Name

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

- Abnormal equipment lineup/conditions:
  1A MD AFW Pump tagged for pump bearing replacement. Tech Spec 3.7.5.b was entered 6 hours ago. .
  Expected return-to-service in 16 hours.

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

- Major Activities/Procedures in progress/planned:
  The pre-conditioned power level is 96%. The unit is returning to power following 1-B MFP trip 8 hours ago.
  Power escalation to 95% is in progress. Continue power escalation Train A Week Channel I. Perform
  load escalation using Reactivity Plan provided by Reactor Engineering. Currently at Step 40 of GO-4
  Section 5.2, "Unit Startup from 30% to 100% Reactor Power. Control Bank D at 193 Steps.
  RCS boron is 951 ppm. Train A Week Channel I.

- Radiological changes in plant during shift:

Part 2 - Performed by on-coming shift

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

Review the following programs for changes since last shift turnover:

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

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

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

Relief Time: _____ Relief Date: _____

Op Test No.: NRC	Scenario # 3	Event # 5	Page 10 of 24
Event Description:	Steam Generator Pressure transmitter 1-PT-1-9A fails LOW. BOP takes manual control of #3 SG main feed water regulating valve to control level. Enters AOI-16. Tech Spec Evaluation.		

Time	Position	Applicant's Actions or Behavior
62-C SG 3 STM-FW FLOW MISMATCH 118-A SG 3 PRESS LO 122-A SG 3 PRESS NEG RATE 58-B SG FEEDWATER FLOW HI		
	BOP	Diagnose and announce failure of SG #3 steam pressure transmitter low.
	BOP	May place SG #3 main feed water regulating valve in MANUAL to return SG level to normal as a PRUDENT OPERATOR ACTION.
	BOP	May place main feed water pump MASTER CONTROLLER in MANUAL to prevent MFPs from slowing down due to failed input to the speed control program as a PRUDENT OPERATOR ACTION.
	SRO	Enter and direct actions of AOI-16, "Loss of Normal Feedwater," Sub Section 3.6, "MFW reg or bypass reg valve control failure."
EXAMINER: The following actions are from AOI-16, Sub Section 3.6.		
	BOP	1. **CONTROL** failed MFW reg or bypass reg valve in MANUAL.
	SRO	2. **EVALUATE** placing control rods in MANUAL.
NOTE		**If the main reg. valve is malfunctioning, the bypass reg. valve for the affected loop may be manually positioned as necessary up to 0.85 x 106 lb/hr flow to dampen oscillations in feedwater flow. A power tilt in the affected core quadrant may occur due to a rise in bypass flow. Flows above 84,500 lbm/hr in the bypass line will invalidate the value of computer point U1118.**
	BOP	3. **CHECK** SG levels on bypass reg valve control.
	SRO	3. **RESPONSE NOT OBTAINED** ** **GO TO** Step 5.
	BOP	5. **CHECK** S/G levels returning to PROGRAM.
	BOP	6. **MONITOR** TDMFW Pump speed normal for current power level.
NOTE		**A LO FW FLOW WTR HAMMER annunciation [59-C] will be received when any main feedwater flow drops to less than 0.75 x 106 lb/hr.**
	SRO	7. **WHEN** any S/G MFW flow drops to less than 0.55 x 106 lb/hr, **THEN INITIATE** manual anti-water hammer actions: **Anti-water hammer actions are not required for the failure in progress - N/A.**
CAUTION		**Power range N41 controls S/G 1 and S/G 4 MFW reg valves. N42 controls S/G 2 and S/G 3 MFW reg valves.**
NOTE		**All power range monitors input to auctioneered high anticipatory circuit for bypass FW reg valves.**

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Event Description: Steam Generator Pressure transmitter 1-PT-1-9A fails LOW. BOP takes manual control of #3 SG main feed water regulating valve to control level. Enters AOI-16. Tech Spec Evaluation.

Time	Position	Applicant's Actions or Behavior
	RO	8. **CHECK** power range N41 through N44 NORMAL.
NOTE Steps 7 & 8 should end up having the same channel (A or B) selected for steam flow and feed flow on each S/G to ensure a loss of voltage to any one channel will have minimal effect on the affected S/G level.		
	BOP	9. **CHECK** controlling steam flow Channels NORMAL.
	BOP	9. **RESPONSE NOT OBTAINED** a. **SELECT** operable channel. b. **EVALUATE** effect of the failed channel on the MFPs Speed Control and **ADJUST** in MANUAL as necessary while continuing this section.
	BOP	10. **CHECK** controlling FW flow channels NORMAL.
	BOP	11. **CHECK** press compensation channel(s) NORMAL.
	SRO	11. **RESPONSE NOT OBTAINED** **REFER TO** Tech Specs: 3.3.2 ***Function 1.e, 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 mode 4 within 84 hours.*** ***Function 4.d (1) 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 mode 4 within 84 hours.*** 3.3.3, ***Function 25 Steam Generator Pressure. Condition A With one or more Functions with one required channel inoperable, Restore the required channel to operable status within 30 days.*** 3.3.4, Remote Shutdown System. **NOT APPLICABLE**
	BOP	12. **IF** affected S/G controlling channel and level NORMAL, **THEN** a. **RETURN** MFW reg valve to AUTO. b. **RETURN** TDMFWP Speed Control to AUTO (if in MANUAL).

Op Test No.: NRC Scenario # 3 Event # 5 Page 12 of 24

Event Description: Steam Generator Pressure transmitter 1-PT-1-9A fails LOW. BOP takes manual control of #3 SG main feed water regulating valve to control level. Enters AOI-16. Tech Spec Evaluation.

Time	Position	Applicant's Actions or Behavior
	RO	13. **WHEN** conditions allow auto rod control, **THEN,** a. **ENSURE** T-avg and T-ref within 1°F. b. **ENSURE** zero demand on control rod position indication [1-M-4]. c. **PLACE** rods in AUTO.
EXAMINER: With the auctioneering circuit malfunction, the crew will NOT be able to place control rods in AUTO.		
	SRO	13. **INITIATE** repairs to failed equipment.
	SRO	14. **RETURN TO** Instruction in effect.
	SRO	**Crew Brief -** conduct 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.
	SRO	Operations Management - Shift Manager. Maintenance Personnel – Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Simulator operator enters Event 6		

Op Test No.: NRC Scenario # 3 Event # 6 Page 13 of 24

Event Description: Steam leak inside containment. Enter AOI-38 to determine location and severity of leak.

Time	Position	Applicant's Actions or Behavior
144-A ICE COND INLET DOOR OPEN 103-B CNTMT MOISTURE HI 160-C RX BDLG POCKET SUMP LEVEL HI		
	RO	Announces ice condenser doors open alarm.
	BOP	Monitors radiation monitors and determines from the absence of alarms that a steam leak is in progress.
	SRO	Enters and direct actions of AOI-38. "Main Steam or Feedwater Line Leak."
EXAMINER: The following actions are from AOI-38,"Main Steam or Feedwater Line Leak."		
	SRO	1. **IF** leak threatens personnel safety, **THEN:** a. **TRIP** Rx. b. **CLOSE** the following: • MSIVs. • MSIV bypass valves. c. ** **GO TO** E-0, Reactor Trip or Safety Injection.
	BOP	2. **CHECK** S/G PORVs CLOSED.
	BOP	3. **CHECK** steam dump valves CLOSED.
	RO	4. **CHECK** reactor power less than or equal to 100%: • Loop ΔT. • NIS power range monitors.
	RO/BOP	4. **RESPONSE NOT OBTAINED** **REDUCE** turbine load to 90% with valve position limiter. **IF** Rx power returns to 100%, **THEN** a. **TRIP** Rx. b. **CLOSE** all MSIVs and bypass valves. c. ** **GO TO** E-0, Reactor Trip or Safety Injection.
	RO	5. **ENSURE** T–avg and T–ref. within 3°F.

Op Test No.: NRC Scenario # 3 Event # 6 Page 14 of 24

Event Description: Steam leak inside containment. Enter AOI-38 to determine location and severity of leak.

Time	Position	Applicant's Actions or Behavior
NOTE		**It is a normal condition for Turbine load and Rx power to exhibit a nominal mismatch for loads less than 50%.** **Hotwell makeup will rise following a rapid runback. The makeup flow should be allowed to stabilize before making any determination of leak size.**
	BOP	6. **MONITOR** leak less than 3% of required steam or FW flow: • **IF** power greater than 50%, **THEN COMPARE** turbine load to reactor power and ΔT. • **OBSERVE** steam and FW flow recorders. • **OBSERVE** hotwell level makeup less than 950 gpm.
	BOP	7. **MONITOR** CST volume greater than 200,000 gallons.
	BOP	8. **ENSURE** SG levels on program.
CAUTION		**FW or condensate leaks upstream of the FW isol valves should be promptly dealt with to limit hazards to Turbine Bldg personnel.**
	SRO	9. **DISPATCH** personnel to perform secondary plant inspection for main steam and feedwater leaks.
	RO	10. **CHECK** Cntmt conditions NORMAL: • Pressure (1-PDR-30-133 between -0.1 and +0.3 psig). • Temperature (Window 104-B DARK). • Humidity (Window 103-B DARK). • Sump level (Window 127-E DARK).
	BOP	10. **RESPONSE NOT OBTAINED** **ENSURE** all Cntmt coolers RUNNING: • Upper containment coolers • Lower containment coolers • CRDM coolers
	RO	11. **MONITOR** Cntmt press stable or dropping.
		11. **RESPONSE NOT OBTAINED** **IF** Cntmt press rising uncontrolled, **THEN** a **TRIP** Rx. b. ** **GO TO** E-0, Reactor Trip or Safety Injection.

Op Test No.: NRC Scenario # 3 Event # 6, 7, and 8 Page 15 of 24

Event Description: Reactor fails to trip automatically and manually. Crew enters FR-S.1, "Nuclear Power Generation / ATWS." Steam line break gets worse, requiring a safety injection actuation. MSIVs fail to auto close.

Time	Position	Applicant's Actions or Behavior
	RO	Announces the ATWS condition, after attempting to trip the reactor manually 1-M-4 and then from the second reactor trip switch on 1-M-6.
	RO	Performs IMMEDIATE ACTION of FR-S.1.
	BOP	Performs IMMEDIATE ACTION of FR-S.1
	SRO	Enters and directs performance of FR-S.1, "Nuclear Power Generation/ATWS."
EXAMINER: The following steps are from FR-S.1 "Nuclear Power Generation/ATWS."		
	RO	1. **ENSURE** Reactor Trip: • Reactor trip and bypass breakers OPEN. • RPIs at bottom of scale. • Neutron flux DROPPING.
CRITICAL TASK	RO	**1. RESPONSE NOT OBTAINED** Manually **TRIP** reactor. **IF** reactor will **NOT** trip, **THEN INSERT** control rods.
CRITICAL TASK	BOP	2. **ENSURE** Turbine Trip: • • All turbine stop valves CLOSED.
	BOP	3. **CHECK** AFW pumps operation: a. Both MD AFW pumps RUNNING. b. TD AFW pump RUNNING. c. LCVs in AUTO or controlled in MANUAL.
	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.
	RO	**5. CHECK** pzr pressure less than 2335 psig.

Op Test No.: NRC Scenario # 3 Event # 6, 7, and 8 Page 16 of 24

Event Description: Reactor fails to trip automatically and manually. Crew enters FR-S.1, "Nuclear Power Generation / ATWS." Steam line break gets worse, requiring a safety injection actuation. MSIVs fail to auto close.

Time	Position	Applicant's Actions or Behavior
	RO	**6. VERIFY** Cntmt Vent Isolation:*(on 1-XX-55-6E and 1-XX-55-6F)* * Train A GREEN * Train B GREEN
	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. *Assigns E-0, Steps 1 through 6 to the BOP. These steps are:* 1. **ENSURE** reactor trip: • Reactor trip and bypass breakers OPEN. • RPIs at bottom of scale. • Neutron flux DROPPING. 2. **ENSURE** Turbine Trip: • All turbine stop valves CLOSED. 3. **CHECK** 6.9 kV shutdown boards: a. At least one board energized from: ▪ CSST (offsite), OR ▪ D/G (blackout). 4. **CHECK** SI actuated: a. Any SI annunciator LIT. b. Both trains SI **ACTUATED**. • 1-XX-55-6C • 1-XX-55-6D 5. **EVALUATE** support systems: • **REFER TO** Appendixes A and B (E-0), Equipment Verification pages 15-28. 6. **ANNOUNCE** reactor trip and safety injection over PA system.
	RO	**9. ENSURE** the following trips: a. Reactor Trip.
EXAMINER: The RO may dispatch an AUO to open Rod Drive MG set input breakers at 480 V Unit Boards, and an AUO to open Reactor Trip breakers locally while initially inserting the control rods.		
	RO	**9. RESPONSE NOT OBTAINED:** a. **DISPATCH** operator to locally trip reactor: • **OPEN** reactor trip breakers and MG set output breakers [MG set room]. • **OPEN** breakers to MG sets [480V unit boards A and B].
	BOP	b. Turbine Trip.

Op Test No.: NRC Scenario # 3 Event # 6, 7, and 8 Page 17 of 24

Event Description: Reactor fails to trip automatically and manually. Crew enters FR-S.1, "Nuclear Power Generation / ATWS." Steam line break gets worse, requiring a safety injection actuation. MSIVs fail to auto close.

Time	Position	Applicant's Actions or Behavior
	RO	**10. MAINTAIN** rod insertion UNTIL rods fully inserted. Rods are fully inserted based on local operator actions already performed.
	SRO	**11. REFER TO** EPIP-1, Emergency Plan Classification Flowchart for ATWS event.
	SRO	**12. MONITOR** reactor subcriticality: a. **CHECK** Power range channels less than 5%. b. **CHECK** Intermediate range startup rate NEGATIVE. c. ** **GO TO** Step 21.
	RO	**21. TERMINATE** emergency boration: a. **PLACE** BA transfer pumps in SLOW speed. b. **CLOSE** emergency borate valve 1-FCV-62-138. c. **IF** alternate boration opened, THEN Locally CLOSE 1-ISV-62-929.
CAUTION Evaluation of boration requirements should consider subsequent cooldown actions in addition to current conditions.		
	SRO	**22. DETERMINE** shutdown margin requirements: a. **NOTIFY** Chemistry to sample RCS. b. **REFER TO** 1-SI-0-10, Shutdown Margin, OR REACTINW Computer Program. c. **INITIATE** RCS boration as necessary: • **REFER TO** SOI-62.02, CVCS BORON Concentration Control. d. **INITIATE** flushing boric acid piping as necessary: • **REFER TO** AOI-34, Immediate Boration.
	SRO	**IF SI** actuated, **THEN RETURN TO** Instruction in effect.
EXAMINER: The SRO will enter E-0, Reactor Trip or Safety Injection," at this point.		
	SRO	Enters and directs actions of E-0,"Reactor trip or Safety Injection." Steps 1-6 have already been addressed by the BOP during the performance of FR-S.1.
NOTE 1 Steps 1 thru 4 are **IMMEDIATE ACTION STEPS.**		
NOTE 2 Status Trees / SPDS should be monitored when transitioned to another instruction.		

Op Test No.: NRC Scenario # 3 Event # 6, 7, and 8 Page 18 of 24

Event Description: Reactor fails to trip automatically and manually. Crew enters FR-S.1, "Nuclear Power Generation / ATWS." Steam line break gets worse, requiring a safety injection actuation. MSIVs fail to auto close.

Time	Position	Applicant's Actions or Behavior
	RO	1. **ENSURE** reactor trip: • Reactor trip and bypass breakers OPEN. • RPIs at bottom of scale. • Neutron flux DROPPING.
	BOP	2. **ENSURE** Turbine Trip: • All turbine stop valves CLOSED.
	BOP	3. **CHECK** 6.9 kV shutdown boards: a. At least one board energized from: • CSST (offsite), OR • D/G (blackout).
	RO	4. **CHECK** SI actuated: a. Any SI annunciator LIT. b. Both trains SI **ACTUATED**. • 1-XX-55-6C • 1-XX-55-6D
	BOP	5. **EVALUATE** support systems: • **REFER TO** Appendixes A and B (E-0), Equipment Verification pages 15-28.
	RO	6. **ANNOUNCE** reactor trip and safety injection over PA system.
	RO	7. **ENSURE** secondary heat sink available with either: • Total AFW flow greater than 410 gpm, OR • At least one S/G NR level greater than 29% [39% ADV].
	RO	8. **MONITOR** RCS temp stable at or trending to 557°F: • **IF** any RCP running, **THEN MONITOR** RCS Loop T-avg trending to 557°F. OR • **IF** NO RCP running, **THEN MONITOR** RCS Loop T-cold trending to 557°F. **EXAMINER**: The RNO steps for this step are included at the back of this Scenario Guide.

Op Test No.: NRC Scenario # 3 Event # 6, 7, and 8 Page 19 of 24

Event Description: Reactor fails to trip automatically and manually. Crew enters FR-S.1, "Nuclear Power Generation / ATWS." Steam line break gets worse, requiring a safety injection actuation. MSIVs fail to auto close.

Time	Position	Applicant's Actions or Behavior
	RO	9. **ENSURE** excess letdown valves CLOSED: • 1-FCV-62-54 • 1-FCV-62-55
	RO	10. **CHECK** pzr PORVs and block valves: a. Pzr PORVs CLOSED. b. At least one block valve OPEN.
	RO	11. **CHECK** pzr safety valves CLOSED: **EVALUATE** tailpipe temperatures and acoustic monitors.
	RO	12. **CHECK** pzr sprays CLOSED.
NOTE Seal injection flow should be maintained to all RCPs.		
CRITICAL TASK to trip all RCPs due to loss of cooling on the Phase B actuation.		13. **CHECK** if RCPs should remain in service: a. Phase B signals DARK [MISSP]. b. RCS pressure greater than 1500 psig.
	SRO/RO	14. **CHECK** S/G pressures: • All S/G pressures controlled or rising. • All S/G pressures greater than 120 psig.
	SRO	14. **RESPONSE NOT OBTAINED** **IF** S/G pressure low OR dropping uncontrolled, **THEN** ** **GO TO** E-2, Faulted Steam Generator Isolation.
EXAMINER: The following actions are 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.**	
CRITICAL TASK to manually close all MSIVs and bypasses.		1. **ENSURE** all MSIVs and MSIV bypasses CLOSED.
NOTE If it is known that a steam leak exists in the Turbine building, the following step should not be performed until the affected steam header is depressurized.		

Op Test No.: NRC Scenario # 3 Event # 6, 7, and 8 Page 20 of 24

Event Description: Reactor fails to trip automatically and manually. Crew enters FR-S.1, "Nuclear Power Generation / ATWS." Steam line break gets worse, requiring a safety injection actuation. MSIVs fail to auto close.

Time	Position	Applicant's Actions or Behavior
	BOP	2. **PLACE** steam dump controls OFF: • 1-HS-1-103A, STEAM DUMP FSV "A". • 1-HS-1-103B, STEAM DUMP FSV "B".
	SRO/BOP	3. **CHECK** for at least one Intact S/G: • Any S/G pressure controlled or rising, OR • Any S/G pressure greater than P-sat for RCS incore temperature.
	BOP	4. **IDENTIFY** Faulted S/G based on ANY of the following: • Any S/G pressure dropping in an uncontrolled manner, OR • Any S/G pressure less than 120 psig, OR • S/G enclosure temps high: 1) T1002A for 2 and 3, 2) T1003A for 1 and 4. OR • Local indication of break in any of the following: 1) Main steam lines, 2) Main feedwater lines, 3) Other secondary piping.
CAUTION • **If the turbine-driven AFW pump is the only available source of feed flow, steam supply to the turbine-driven AFW pump must be maintained from one SG.** • **RCS cooldown requires the availability of at least one S/G.**		
	BOP	5. **ISOLATE** Faulted S/G: a. **ISOLATE** AFW flow to Faulted S/G. b. **ENSURE** MFW ISOLATED to Faulted S/G: • MFW isolation and bypass isolation valves CLOSED. • MFW reg and bypass reg valves CLOSED. • MFPs TRIPPED.

Op Test No.: NRC Scenario # 3 Event # 6, 7, and 8 Page 21 of 24

Event Description: Reactor fails to trip automatically and manually. Crew enters FR-S.1, "Nuclear Power Generation / ATWS." Steam line break gets worse, requiring a safety injection actuation. MSIVs fail to auto close.

Time	Position	Applicant's Actions or Behavior
		c. **ENSURE** Faulted S/G PORV CLOSED. d. **ENSURE** Faulted S/G blowdown ISOLATED.
NOTE TD AFW pump steam supply should NOT be aligned from a S/G with a known primary to secondary leak if other AFW sources are available.		
		6. **ENSURE** TD AFW pump being supplied from Intact S/G.
		7. **MONITOR** CST volume greater than 200,000 gal.
	BOP	8. **WHEN** RCS temperature is stable or rising following Faulted S/G blowdown, **THEN ADJUST** Intact S/G PORV controllers in AUTO to: • P-sat for the highest RCS temp (one or more RCPs running) OR • P-sat for the highest T-cold temp (no RCPs running)
	BOP	9. **CHECK** secondary side radiation: • S/G discharge monitors NORMAL. • Condenser vacuum exhaust rad monitors NORMAL. • S/G blowdown rad monitor recorders NORMAL trend prior to isolation. • S/G sample results by Chemistry.
	SRO/RO	10. **CHECK** SI termination criteria: a. **CHECK** RCS subcooling greater than 65°F [85°F ADV]. b. **CHECK** secondary heat sink available with either: • Total feed flow to Intact S/Gs greater than 410 gpm, OR • At least one Intact S/G NR level greater than 29% [39% ADV]. c. **CHECK** RCS pressure stable or rising. d. **CHECK** pzr level greater than 15% [33% ADV]. e. ** **GO TO** ES-1.1,SI Termination.
EXAMINER: The following actions are from ES-1.1 SI Termination."		
	RO	1. **RESET** SI, and **CHECK** the following: • SI ACTUATED permissive DARK. • AUTO SI BLOCKED permissive LIT.

Op Test No.: NRC Scenario # 3 Event # 6, 7, and 8 Page 22 of 24

Event Description: Reactor fails to trip automatically and manually. Crew enters FR-S.1, "Nuclear Power Generation / ATWS." Steam line break gets worse, requiring a safety injection actuation. MSIVs fail to auto close.

Time	Position	Applicant's Actions or Behavior
	RO	2. **RESET** Phase A and Phase B.
	BOP	3. **ENSURE** cntmt air in service: a. Aux air press greater than 75 psig [M-15]. b. Cntmt air supply valves OPEN [M-15]: • 1-FCV-32-80. • 1-FCV-32-102. • 1-FCV-32-110.
NOTE On SI reset failure, the non-affected train should be stopped and placed in A-AUTO.		
	RO	4. **ENSURE** ONLY one Charging Pump running: • **STOP** all but one CCP and **PLACE** in A-AUTO.
	RO	5. **CHECK** RCS press stable or rising.
	RO	6. **ALIGN** charging: a. **CLOSE** RCP seal flow control 1-FCV-62-89. b. **OPEN** charging isolation valves 1-FCV-62-90 and 1-FCV-62-91. c. **ENSURE** charging valve 1-FCV-62-85 OR 1-FCV-62-86 OPEN. d. **CHECK** RHR Suction aligned from RWST. e. **OPEN** seal return valves 1-FCV-62-61 and 1-FCV-62-63.
	RO	7. **CLOSE** BIT outlet valves 1-FCV-63-25 and 1-FCV-63-26.
	RO	8. **ADJUST** 1-FCV-62-89 and 1-FCV-62-93 to maintain: • Seal injection flow between 8 and 13 gpm for each RCP. • Pzr level stable or rising.
	RO	9. **CONTROL** charging flow to maintain pzr level: a. **IF** any S/G Faulted, **THEN DO NOT CONTINUE** this Instruction UNTIL Faulted S/G depressurization stops. b. **CHECK** pzr level stable or rising.
EXAMINER: When Step 9 is addressed, inform crew that another crew will continue from this point, and terminate the scenario.		
END OF SCENARIO		

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 %

Step	Action/Expected Response	Response Not Obtained
8.	**MONITOR** RCS temp stable at or trending to 557°F: • **IF** any RCP running, **THEN** **MONITOR** RCS Loop T-avg trending to 557°F. OR • **IF** NO RCP running, **THEN** **MONITOR** RCS Loop T-cold trending to 557°F.	**IF** temp less than 557°F, **THEN** **ENSURE** steam dumps and S/G PORVs CLOSED. **IF** cooldown continues, **THEN:** • **PLACE** steam dump controls OFF. • **CONTROL** total AFW flow to maintain greater than 410 gpm UNTIL NR level in at least one S/G greater than 29% [39% ADV]. **IF** cooldown continues after AFW flow is controlled, **THEN** • **CLOSE** MSIVs. • **ENSURE** MSIV bypasses CLOSED. **IF** RCS temp greater than 564°F, **THEN** **ENSURE** either steam dumps or S/G PORVs OPEN.
9.	**ENSURE** excess letdown valves CLOSED: • 1-FCV-62-54 • 1-FCV-62-55	Manually **CLOSE** valves.

SHIFT TURNOVER CHECKLIST
Page 1 of 2

SHIFT TURNOVER CHECKLIST

Page _____ of _____

☐	SM			
☒	US/MCR	Unit	_____	_____
☐	UO	Unit	_____	Off-going - Name
☐	AUO	Station	_____	_____
☐	STA (STA Function)			On-coming - Name

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

- Abnormal equipment lineup/conditions:
  1A Containment Spray pump is out of service for bearing replacement. LCO 3.6.6, Containment Spray System Condition A was entered 6 hours ago. The 1A Containment Spray pump is expected to be returned to service in 16 hours.
  .

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

- Major Activities/Procedures in progress/planned:
  Predictive Maintenance has requested the 1C #3 heater drain pump be removed from service for a shaft alignment due to concerns over the inboard motor bearing vibration trend. Operations Management has requested a power reduction to 85% at a rate of 1%/minute to prepare for pump shutdown. Plant is currently at 100% power, MOL. RCS boron concentration is 877 ppm. Decision to perform shutdown was made 30 minutes ago. Use AOI-39, "Rapid Load Reduction," for the power reduction. information for shutdown. Control Bank D is at 220 steps. Train A Week - Channel I.

- Radiological changes in plant during shift:

Part 2 - Performed by on-coming shift

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

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

Review the following programs for changes since last shift turnover:

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

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

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

Relief Time: _____ Relief Date: _____

SHIFT TURNOVER CHECKLIST

Page _____ **of** _____

☐ SM			
☐ US/MCR	Unit	_____	
☒ UO	Unit	_____	Off-going - Name
☐ AUO	Station	_____	
☐ STA (STA Function)			On-coming - Name

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

- Abnormal equipment lineup/conditions:
  1A Containment Spray pump is out of service for bearing replacement. LCO 3.6.6, Containment Spray System Condition A was entered 6 hours ago. The 1A Containment Spray pump is expected to be returned to service in 16 hours.

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

- Major Activities/Procedures in progress/planned:
  Predictive Maintenance has requested the 1C #3 heater drain pump be removed from service for a shaft alignment due to concerns over the inboard motor bearing vibration trend. Operations Management has requested a power reduction to 85% at a rate of 1%/minute to prepare for pump shutdown. Plant is currently at 100% power, MOL. RCS boron concentration is 877 ppm. Decision to perform shutdown was made 30 minutes ago. Use AOI-39, "Rapid Load Reduction," for the power reduction. information for shutdown. Control Bank D is at 220 steps. Train A Week - Channel I.

- Radiological changes in plant during shift:

Part 2 - Performed by on-coming shift

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

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

Review the following programs for changes since last shift turnover:

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

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

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

Relief Time: _____ Relief Date: _____

Facility:	**Watts Bar Fall NRC Exam 2009**	Scenario No.: **3**	Op Test No.: **1**
Examiners:		Operators:	**SRO**
			RO
			BOP

Initial Conditions: 100% power, MOL. RCS boron concentration is 877 ppm. Train A/Channel III Work Week.

Turnover: 1A Containment Spray pump is out of service for bearing replacement. LCO 3.6.6, Containment Spray System Condition A was entered 6 hours ago. The 1A Containment Spray pump is expected to be returned to service in 16 hours. Predictive Maintenance has requested the 1C #3 heater drain pump be removed from service for a shaft alignment due to concerns over the inboard motor bearing vibration trend. Train A/Channel I Work Week.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R-RO N-BOP	Power reduction to 85% in preparation for removing 1C #3 Heater Drain Pump from service for repairs.
2	RX07A RC08B	I-RO TS-SRO	Controlling Pressurizer Pressure Channel Fails HIGH. RO takes manual control of pressurizer pressure. Tech Spec Evaluation
3	FW56C	C-BOP	Conditions given in the turnover worsen. 1C #3 heater drain pump experiences motor overload, requiring the pump to be tripped. Requires entry into AOI-37, "Turbine Runback Response."
4	RX18	I-RO	Tavg Auctioneering circuit fails LOW. RO takes manual control of rods.
5	RX26E	I-BOP TS-SRO	Steam Generator Pressure transmitter 1-PT-1-9A fails LOW. BOP takes manual control of #3 SG main feed water regulating valve to control level. Enters AOI-16, "Loss of Normal Feedwater." Tech Spec Evaluation.
6	MS05B	C-BOP	Steam leak inside containment. Enter AOI-38, "Main Steam or Feedwater Line Leak". Leak increases requiring the crew to manually trip the reactor. After the reactor trip is successful, a steam leak inside containment occurs.
7	RP01A RP01B RP01C	M-ALL	Reactor fails to trip automatically and manually. Crew enters FR-S.1 for the ATWS.
8	MS28A MS28B MS28C MS28D	C-BOP	Failure of automatic isolation of all MSIVs. Requires BOP to manually close all 4 MSIVs.

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

Scenario 3 - Summary

Initial Condition	100% power, MOL. RCS boron concentration is 877 ppm. Train A/Channel I Work Week.

Turnover	1A Containment Spray pump is out of service for bearing replacement. LCO 3.6.6, Containment Spray System Condition A was entered 6 hours ago. The 1A Containment Spray pump is expected to be returned to service in 16 hours. Predictive Maintenance has requested the 1C #3 heater drain pump be removed from service for a shaft alignment due to concerns over the inboard motor bearing vibration trend. Train A/Channel I Work Week.

Event 1	Power reduction to 85% power in preparation for removing 1C #3 Heater Drain Pump from service. Power reduction to be accomplished at 1%/min. rate.
Event 2	The controlling pressurizer pressure channel (PT-68-340) will fail high resulting in pressurizer spray valves fully opening and requiring manual action to close to stop the RCS depressurization. The SRO will direct performance of AOI-18 to select another controlling channel and return spray control to automatic. SRO will evaluate and enter applicable Reactor Protection and ESFAS instrumentation Technical specifications.
Event 3	Conditions given in the turnover worsen. 1C #3 heater drain pump amps increase causing a motor overload, requiring the pump to be tripped. Requires entry into AOI-37.
Event 4	Tavg Auctioneering circuit fails HIGH. RO takes manual control of rods.
Event 5	Steam Generator Pressure transmitter 1-PT-1-9A fails LOW. BOP takes manual control of #3 SG main feed water regulating valve to control level. Enters AOI-16. Tech Spec Evaluation.
Event 6	Steam leak inside containment. Enter AOI-38 to determine location and severity of leak. Leak size increases requiring the crew to manually trip the reactor, per AOI-38. After the decision is made to trip the reactor, steam leak inside containment propagates.
Event 7	Reactor fails to trip automatically and manually. Crew enters FR-S.1 for actions to take for the ATWS.
Event 8	Failure of automatic isolation of all MSIVs. Requires BOP to manually close all 4 MSIVs.

Critical Task 1	*FR-S.1 -- A: Isolate the main turbine from the SGs before plant and scenario-specific criteria are exceeded.*
Critical Task 2	*FR-S.1 -- C:Insert negative reactivity into the core by at least one of the following methods before completing the immediate-action steps of FR-S.1: De-energize the control rod drive MG sets, or Insert RCCAs, or establish emergency boration flow to the RCS.*
Critical Task 3	*Trip RCPs Due to loss of cooling on a Phase B (critical only after the reactor has tripped).*
Critical Task 4	*Close MSIVs.*

SIMULATOR SETUP INFORMATION

1. **ENSURE NRC Examination Security has been established.**

2. **Right click on 349, and then select RESET.**

3. **Enter the password.**

4. **Select "Yes" on the INITIAL CONDITION RESET pop-up window.**

5. **ENSURE the following information appears on the Director Summary Screen:**

	Key		Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
	hs-72-44a-1	05040 cntmt sump hdr a fcv	R		00:00:00	00:00:00	00:00:00		Off	On
	rp01c	manual and automatic reactor trip signal failure (atws)	M		00:00:00	00:00:00	00:00:00		InActive	Active
	hs-72-39a-1	05080 cs hdr a isol vlv sw.	R		00:00:00	00:00:00	00:00:00		Off	On
	hs-72-34a-1	05060 cs pump a recirc fcv	R		00:00:00	00:00:00	00:00:00		Off	Off
	ms28b	fail auto close 1-11	M		00:00:00	00:00:00	00:00:00		InActive	Active
	ms28d	fail auto close 1-29	M		00:00:00	00:00:00	00:00:00		InActive	Active
	rp01a	manual reactor trip signal failure (atws)	M		00:00:00	00:00:00	00:00:00		InActive	Active
	ms28a	fail auto close 1-4	M		00:00:00	00:00:00	00:00:00		InActive	Active
	hs-72-27a-1	06020 cntmt spray pump a mtr sw	R		00:00:00	00:00:00	00:00:00		Off	Off
	hs-72-22a-1	05020 rwst spray hdr a fcv	R		00:00:00	00:00:00	00:00:00		Off	Off
	rp01b	automatic reactor trip signal failure (atws)	M		00:00:00	00:00:00	00:00:00		InActive	Active
	ms28c	fail auto close 1-22	M		00:00:00	00:00:00	00:00:00		InActive	Active

(Continued on next page)

SIMULATOR SETUP INFORMATION

	Key		Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
	rx07a	pzr pressure transmitter fails to position chnl 1 68-340	M	1	00:00:00		00:00:00		100	66.875
	ms05b	main steam line leak in containment sg #2	M	19	00:00:00		00:00:00		10	0
	fw56c	hdp 3c bearing wear	M	2	00:00:00		00:01:30		9.5	0
	rdr01	rod control mg set #1 bkr	R	20	00:00:00		00:00:00		trip	close
	rdr02	rod control mg set #2 bk	R	20	00:00:00		00:00:00		trip	close
	rp51b	reactor trip breaker rtb trip	M	21	00:00:00		00:00:00		Active	InActive
	rp51a	reactor trip breaker rta trip	M	21	00:00:00		00:00:00		Active	InActive
	rx18	t-avg control signal failure	M	3	00:00:00		00:00:00		20	56.342
	rx26e	stm gen pres transmitter failure, chnl i pt-1-20a	M	4	00:00:00		00:00:00		0	77.708
	ms05b	main steam line leak in containment sg #2	M	5	00:00:00		00:00:30		1	0

6. **Place simulator in RUN and acknowledge any alarms.**

7. **Place 1B-B Containment Spray pump handswitch in the STOP-PULL-TO-LOCK position. Close, then hang HOLD NOTICE card on handswitch, 1-FCV-72-39A and 1-FCV-72-44A. Place PROTECTED EQUIPMENT (Pink Tag) on 1B-B CSS handswitch.**

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

9. **Place simulator in FREEZE.**

EVENT INITIATION AND ROLE PLAY

Exam Event	Simulator Event	DESCRIPTION/ROLE PLAY
1	**NONE**	Power reduction to 85% in preparation for removing 1C #3 Heater Drain Pump from service for repairs. ***ROLE PLAY: NONE***
2	**1**	Controlling Pressurizer Pressure Channel Fails HIGH. ***ROLE PLAY: When contacted as Work Control, report that the channel failure will be addressed as soon as an individual is available.***
3	**2**	Conditions given in the turnover worsen. 1C #3 heater drain pump amps increase causing a motor overload, requiring the pump to be tripped. Requires entry into AOI-37. ***ROLE PLAY: When contacted as Turbine Bldg. AUO, report that the 1C #3 HD pump tripped due to overcurrent. As Support AUO, report #3 HD Tank levels to the BOP. Use INSIGHT auo screen to view levels.***
4	**3**	Tavg Auctioneering circuit fails LOW. RO takes manual control of rods. ***ROLE PLAY: When contacted as Work Control, report that the channel failure will be addressed as soon as an individual is available.***
5	**4**	Steam Generator Pressure transmitter 1-PT-1-9A fails LOW. ***ROLE PLAY: When contacted as Work Control, report that the channel failure will be addressed as soon as an individual is available.***
6	**5**	Steam leak inside containment. Enter AOI-38 to determine location and severity of leak. Leak size increases requiring the crew to manually trip the reactor, per AOI-38. After the reactor trip is successful, steam leak inside containment propagates.

EVENT INITIATION AND ROLE PLAY

Exam Event	Simulator Event	DESCRIPTION/ROLE PLAY
7	**NONE**	Reactor fails to trip automatically and manually. Crew enters FR-S.1 for actions to take for the ATWS. ***ROLE PLAY: 2 minutes after being dispatched to the reactor trip breakers and the Rod Drive MG set input breakers, delete the auto and manual trip failure malfunctions, and enter Event 20 to trip the rod drive mg sets, then enter Event 21 to trip the reactor trip breakers.***
8	**NONE**	Failure of automatic isolation of all MSIVs. Requires BOP to manually close all 4 MSIVs.

Op Test No.: NRC	Scenario # 3	Event # 1	Page 1 of 24
Event Description:	Power reduction to 85% in preparation for removing 1C #3 Heater Drain Pump from service for repairs.		

Time	Position	Applicant's Actions or Behavior
EXAMINER: The following actions are from AOI-39, "Rapid Load Reduction," Section 3.2, "Power Reduction From Greater than 50% Power."		
CAUTION Condenser Backpressure limits are on previous page.		
CAUTION TURBINE MANUAL Operation requires continuous operator monitoring and control.		
CAUTION LOSS OF CONDENSER VACUUM may be made worse if steam dumps are actuated. AOI-11 requires T-ave and T-ref be maintained within 3°F.		
NOTE If the initiating condition is corrected, the power reduction may be terminated.		
	SRO RO	1. **ESTABLISH** a turbine load reduction rate less than or equal to 5% / min: a. SET a desired load in the SETTER with the REFERENCE CONTROL. b. SET the LOAD RATE at less than or equal to 5% / min. c. DEPRESS GO pushbutton.
CAUTION	Over boration may result in excessive rod withdrawal or Tavg lower than desired for at power conditions.	
NOTE 1	Rod Control should remain in automatic for Tavg Control.	
NOTE 2	The following Table assumes ~ 1/3 reactivity by rod insertion during the load reduction. The RCS boron concentration may be adjusted should delta I or RILs criteria be approached.	

Op Test No.: NRC Scenario # 3 Event # 1 Page 2 of 24

Event Description: Power reduction to 85% in preparation for removing 1C #3 Heater Drain Pump from service for repairs.

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Actions or Behavior</th></tr>
<tr><td></td><td>RO</td><td>2. INITIATE a manual boration:
a. DETERMINE recommended boration flowrate and volume from table below.
<table><tr><th>TURBINE LOAD REDUCTION RATE (%/min)</th><th>BORATION FLOWRATE (gal/min)</th><th>BORIC ACID VOLUME TO REDUCE POWER FROM 100% TO 20%</th></tr><tr><td>2%</td><td>20 GPM</td><td rowspan="3">~ 800 GALs TOTAL</td></tr><tr><td>3%</td><td>30 GPM</td></tr><tr><td>≥4%</td><td>40 GPM</td></tr></table>b. INITIATE boration to maintain control rods above low-low insertion limit:
1) ADJUST BA flow controller, 1-FC-62-139, to desired flow rate.
2) ADJUST BA batch counter 1-FQ-62-139 to required quantity.
3) PLACE mode selector 1-HS-62-140B to BOR.
4) PLACE VCT makeup control 1-HS-62-140A, to START.
5) VERIFY desired boric acid flow indicated on 1-FI-62-139.</td></tr>
<tr><td></td><td>SRO</td><td>REFER to EPIP-1, Emergency Plan Classification Flowchart.
<u>EXAMINER</u>: Step is N/A for given conditions.</td></tr>
<tr><td></td><td>SRO</td><td>NOTIFY the Load Coordinator of the required load reduction and expected ramp rate.</td></tr>
<tr><td colspan="3">NOTE If reactor power is stabilized at a lower level a drop in Tavg will occur due to Xenon build up. Dilution may be required to maintain power level.</td></tr>
<tr><td></td><td>SRO
RO</td><td>MONITOR Tavg and Tref:
▪ Tavg trending to Tref.
▪ Mismatch less than 5°F.</td></tr>
<tr><td></td><td>SRO</td><td>CHECK rate of power reduction is rapid enough for existing plant conditions.</td></tr>
<tr><td></td><td>SRO</td><td>NOTIFY Cnds Demin AUO of impending pmp shutdowns.</td></tr>
<tr><td></td><td>SRO</td><td>WHEN rated thermal power change exceeds 15% in one hour, NOTIFY Chemistry to initiate 1-SI-68-128.</td></tr>
<tr><td colspan="3"><u>EXAMINER</u>: Further steps of AOI-39, "Rapid Power Reduction" are not included, since the crew will only reduce power to 85%, and the remainder of AOI-39 steps are power level dependent. Simulator Operator enters Event 2.</td></tr>
</table>

Op Test No.: NRC	Scenario # 3	Event # 2	Page 3 of 24
Event Description:	1-PT-68-340, Channel I Pressurizer Pressure Transmitter, fails HIGH. Requires entry into AOI-18, :Malfunction of Pressurizer Pressure Control System."		

Time	Position	Applicant's Actions or Behavior
Indications: 90-A PZR PRESS HI 124-B PZR PRESS HI Actual RCS pressure dropping rapidly. Both pressurizer spray valves fully open		
	RO	Diagnose and announce failure of 1-PT-68-340 high.
	SRO	Enter and direct actions of AOI-18, "Malfunction of Pressurizer Pressure Control System."
EXAMINER: The following actions are from AOI-18, "Malfunction of Pressurizer Pressure Control System."		
NOTE 120 AC VITAL PWR BD 1-IV [breaker 2] supplies the plugmold power strip associated with both PZR spray valves and several other instruments required to respond to this event.		
	RO	1. **CHECK** pressurizer pressure stable or trending to desired pressure: • • 1-PI-68-340A, • • 1-PI-68-334, • • 1-PI-68-323, • • 1-PI-68-322.
	RO	1. **RESPONSE NOT OBTAINED: PLACE** pzr master controller 1-PIC-68-340A in MANUAL and **RESTORE** press to normal. **EXAMINER**: Causes backup heaters to come ON.
	RO	2. **CHECK** 1-XS-68-340D selected to a failed controlling or backup channel.
	RO	3. **RESTORE** press control to normal: a. **SELECT** operable channels for control and backup with 1-XS-68-340D. b. **ENSURE** operable channel selected for recording with 1-XS-68-340B. c. **ENSURE** TR-68-2A placed to operable channel using 1-XS-68-2B, ΔT RCDR TR-68-2A LOOP SELECT [1-M-5]. d. **WHEN** Pressurizer pressure on program, **THEN RETURN** Pzr master controller 1-PIC-68-340A to AUTO.
	SRO	4. **NOTIFY** Work Control to remove failed channel from service.
	SRO	5. ****GO TO** Step 17.

Op Test No.: NRC Scenario # 3 Event # 2 Page 4 of 24

Event Description: 1-PT-68-340, Channel I Pressurizer Pressure Transmitter, fails HIGH. Requires entry into AOI-18, :Malfunction of Pressurizer Pressure Control System."

Time	Position	Applicant's Actions or Behavior
	SRO	17. **REFER TO** the following Tech Specs:
		3.3.1 ***Function 6. Overtemperature ΔT, Condition W, With one channel inoperable, place the channel in trip within 72 hours OR Be in Mode 3 within 78 hours.*** ***Function 8a. Pressurizer Pressure - Low, Condition X, With one channel inoperable, place the channel in trip within 72 hours, OR reduce THERMAL POWER to <P-7 within 78 hours.*** ***Function 8b. Pressurizer Pressure - High, Condition W, With one channel inoperable, place the channel in trip within 72 hours OR Be in Mode 3 within 78 hours.*** 3.3.2 ***Function 1.d, Pressurizer Pressure - Low, Condition D, With one channel inoperable, place the channel in trip within 72 hours OR be in Mode 3 within 78 hours AND be in Mode 4 within 84 hours.*** ***Function 8.b Pressurizer Pressure, P-11, Condition L, With one P-11 interlock channel inoperable, verify interlock is in required state for existing unit conditions within 1 hour OR be in Mode 3 within 7 hours AND be in Mode 4 within 13 hours.*** 3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits ***Action A. One or more RCS DNB parameters not within limits, Restore RCS DNB parameter(s) to within limits within 2 hours.***
	SRO	18. **INITIATE** repairs to failed equipment.
	SRO	19. **RETURN TO** Instruction in effect.
	SRO	**Crew Brief -** conduct 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.
	SRO	Operations Management - Shift Manager. Maintenance Personnel – Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Simulator operator enters Event 3		

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

Event Description: 1C #3 Heater drain pp. is tripped due to bearing failure, requiring a load reduction.

Time	Position	Applicant's Actions or Behavior
White light on 1C #3 heater drain pump handswitch LIT. 14-D, M-1 THRU M-6 MOTOR OVERLOAD Increasing amps on 1C #3 heater drain pump.		
	BOP	Announce motor overload on 1C #3 heater drain pump.
	SRO	Directs trip of 1C #3 heater drain tank pump.
	SRO	May enter and direct actions of AOI-39, "Rapid Load Reduction."
	SRO	May enter and direct actions of AOI-37, "Turbine Runback."
EXAMINER: The following actions are from AOI-39, "Rapid Load Reduction."		
CAUTION Condenser Backpressure limits are on previous page.		
CAUTION TURBINE MANUAL Operation requires continuous operator monitoring and control.		
CAUTION LOSS OF CONDENSER VACUUM may be made worse if steam dumps are actuated. AOI-11, "Loss of Condenser Vacuum," 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	1. **ESTABLISH** a turbine load reduction rate less than or equal to 5%/min: a. **SET** a desired load in the SETTER with the REFERENCE CONTROL. b. **SET** the LOAD RATE at less than of equal to 5%/min. c. **DEPRESS** GO pushbutton.
CAUTION Over boration may result in excessive rod withdrawal or Tavg lower than desired for at power conditions.		
NOTE 1 Rod Control should remain in automatic for Tavg Control.		
NOTE 2 The following Table assumes ~ 1/3 reactivity by rod insertion during the load reduction. The RCS boron concentration may be adjusted should ΔI or RILs criteria be approached.		

Op Test No.: NRC Scenario # 3 Event # 3 Page 6 of 24

Event Description: 1C #3 Heater drain pp. is tripped due to bearing failure, requiring a load reduction.

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Actions or Behavior</th></tr>
<tr><td></td><td>RO</td><td>2. INITIATE a manual boration:
a. DETERMINE recommended boration flowrate and volume from table below.
<table><tr><th>TURBINE LOAD REDUCTION RATE (%/min)</th><th>BORATION FLOWRATE (gal/min)</th><th>BORIC ACID VOLUME TO REDUCE POWER FROM 100% TO 20%</th></tr><tr><td>2%</td><td>20 GPM</td><td rowspan="3">~ 800 GALs TOTAL</td></tr><tr><td>3%</td><td>30 GPM</td></tr><tr><td>≥4%</td><td>40 GPM</td></tr></table>b. INITIATE boration to maintain control rods above low-low insertion limit:
1) ADJUST BA flow controller, 1-FC-62-139, to desired flow rate.
2) ADJUST BA batch counter 1-FQ-62-139 to required quantity.
3) PLACE mode selector 1-HS-62-140B to BOR.
4) PLACE VCT makeup control 1-HS-62-140A, to START.
5) VERIFY desired boric acid flow indicated on 1-FI-62-139.</td></tr>
<tr><td></td><td>SRO</td><td>3. REFER TO EPIP-1, Emergency Plan Classification Flowchart.</td></tr>
<tr><td></td><td>SRO</td><td>4. NOTIFY the Load Coordinator of the required load reduction and expected ramp rate.</td></tr>
<tr><td colspan="3">NOTE IF reactor power is stabilized at a lower level a drop in Tavg will occur due to Xenon build up. Dilution may be required to maintain power level.</td></tr>
<tr><td></td><td>RO</td><td>5. MONITOR Tavg and Tref:
• Tavg trending to Tref.
• Mismatch less than 5°F.</td></tr>
<tr><td></td><td>SRO</td><td>6. CHECK rate of power reduction is rapid enough for existing plant conditions.</td></tr>
<tr><td></td><td>BOP</td><td>7. NOTIFY Cnds Demin AUO of impending pmp shutdowns.</td></tr>
<tr><td></td><td>SRO</td><td>8. WHEN rated thermal power change exceeds 15% in one hour, NOTIFY Chemistry to initiate 1-SI-68-28.</td></tr>
<tr><td></td><td>SRO</td><td>Ensures power level stabilized at approximately 80%. Directs the RO to determine if additional boration is required to return AFD (ΔI) to within limits.</td></tr>
<tr><td></td><td>SRO</td><td>Crew Brief - conduct for this event as time allows prior to the next event.</td></tr>
<tr><td></td><td>SRO</td><td>Notifications should be addressed as applicable if not specifically addressed by the procedure or in the crew brief.</td></tr>
</table>

Op Test No.: NRC Scenario # 3 Event # 4 Page 8 of 24

Event Description: Tavg Auctioneering circuit fails LOW. RO takes manual control of rods.

Time	Position	Applicant's Actions or Behavior
94-A TAVG-TREF DEVIATION 94-B TAVG TAUCT DEVIATION		
	RO	Determines rod insertion is due to a failure. May place rod control in MANUAL.
	RO	Diagnoses and announces that RCS Auctioneered Tavg has failed.
	RO	Enters and directs actions of AOI-2, "Malfunction of Reactor Control System."
EXAMINER: The following actions are from AOI-2, "Malfunction of Reactor Control System," Sub Section 3.2, "Continuous Rod Withdrawal/Insertion."		
	RO	1. **PLACE** control rods in MAN.
	SRO/RO	2. **CHECK** control rod movement STOPPED.
	RO/BOP	3. **MAINTAIN** T-avg on PROGRAM. (Reference Attachment 1) • **USE** control rods. OR • **ADJUST** turbine load.
EXAMINER: Attachment 1 in step above is "Reactor Power VS Tavg/Tref Temperature and PZR Level," and is included at the back of this Scenario Guide.		
	RO	4. **CHECK** loop T-avg channels NORMAL.
	RO	5. **CHECK** Auct Tavg NORMAL on 1-TR-68-2B.
	RO	5. **RESPONSE NOT OBTAINED: CONTROL** pzr level in MAN with 1-FCV-62-93. (Reference Attachment 1)
	SRO/RO	6. **CHECK** NIS power range channels NORMAL.
	RO/BOP	7. **CHECK** the following: • Turbine impulse pressure channel 1-PI-1-73, NORMAL. • Tref and Auct Tavg NORMAL on 1-TR-68-2B (Reference Attachment 1)
	BOP	7. **RESPONSE NOT OBTAINED:** PLACE steam dumps in pressure mode as follows: a. **PLACE** steam dumps to OFF. b. **PLACE** mode selector HS to STEAM PRESS. c. **ADJUST** steam dump demand to zero. d. **PLACE** steam dumps to ON. e. **ENSURE** controller set at 84% (1092 psig). f. **WHEN** conditions allow, THEN REFER TO SOI-1.02 and PLACE steam dumps in TAVG Mode.

Op Test No.: NRC Scenario # 3 Event # 4 Page 9 of 24

Event Description: Tavg Auctioneering circuit fails LOW. RO takes manual control of rods.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	8. **MONITOR** core power distribution parameters: • Power range channels. • Δ Flux Indicators. • T-avg. • Loop ΔT. • Incore TCs. • Feed flow/Steam flow.
	SRO	9. **INITIATE** repairs to failed equipment.
	SRO	10. **REFER TO** Tech Specs: ***SRO determines that there are no Tech Specs associated with the failure of the Tavg Auctioneering Unit.***
CAUTION	**Allowing at least 5 minutes between any rod control input (i.e., T-avg, T-ref, or NIS) change and placing rods in AUTO, will help prevent undesired control rod movement.**	
	SRO	11. **NOTIFY** Chemistry of any reactor power changes greater than 15% in one hour.
	SRO	**Crew Brief -** conduct 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.
	SRO	Operations Management - Shift Manager. Maintenance Personnel – Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Simulator Operator enters Event 5.		