

Facility:	<b>Watts Bar</b>	Scenario No.:	<b>1</b>	Op Test No.:	<b>1</b>
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		
Initial Conditions:	15% RTP, MOL. RCP Boards have not been transferred. After this transfer, power is to be raised to full power				
Turnover:	15% RTP was achieved 45 minutes ago, leaving 11 hours and 15 minutes for the initial performance of 1-SI-92-1, "NIS Daily Comparison". IA MFP has been placed in service. 1B-B Thermal Barrier Booster Pump is out-of service due to a seized pump shaft. Expected return to service is to be determined. OR 14.10 has been entered for the 1B-B Thermal Barrier Booster Pump. RCP #1, #2 and #3 have been transferred. RCP #4 is on its alternate power supply, and after relay testing, is now ready to transfer to its normal power supply.				
Event No.	Malf. No.	Event Type*	Event Description		
1	N/A	N-SRO/RO	Transfer RCP #4 Board to normal supply.		
2	N/A	R-SRO/RO N-BOP	Raise reactor power using GO-3.		
3	RX07A	I-SRO/RO TS-SRO	1-PT-68-340 fails high, requiring manual control of PZR pressure.		
4	RW18A	C-SRO/BOP TS-SRO	ERCW Pump A-A Shaft Shears. Operator manually starts a redundant ERCW pump.		
5	CV09	I-SRO/RO	VCT Level Transmitter 1-LT-62-130A fails to 100%.		
6	RM90106	C-BOP TS-SRO	Lower Compartment Radiation Monitor 1-RM-90-106 fails.		
7	166-E 166-D	M-ALL	Seismic Event.		
8	MS02B MS04A/B/C/D	M-ALL	MSLB on SG #2 outside Containment. Reactor auto trips and crew enters E-0.		
9	RP55A/B/C	C-BOP C-SRO	ALL AFW Pumps fail to auto start. BOP manually starts AFW pumps.		
10	MS04A/B/C/D	C-ALL	All MSIVs fail to auto close, and cannot be closed manually. (FR-P.1)		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

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Event Description:       Transfer RCP Boards to normal supply.		
Time	Position	Applicant's Actions or Behavior

### **Scenario 1 - Summary**

**Initial Condition**

The Unit is at 15% RTP, MOL. IA MFP has been placed in service.

**Turnover:**

15% RTP, was achieved 45 minutes ago, leaving 11 hours and 15 minutes for the initial performance of 1-SI-92-1, "NIS Daily Comparison". IA MFP has been placed in service. 1B-B Thermal Barrier Booster Pump is out-of service due to a seized pump shaft. Expected return to service is to be determined. OR 14.10 has been entered for the 1B-B Thermal Barrier Booster Pump. RCP #1, #2 and #3 have been transferred. RCP #4 is on its alternate power supply, and after relay testing, is now ready to transfer to its normal power supply.

**Event 1**

Crew transfers power supply to RCP #4 from startup to USST.

**Event 2**

Crew begins raising reactor power per GO-3, Unit Startup.

**Event 3**

1-PT-68-340 (PZR pressure control) fails high, causing PZR sprays to fully open and heaters to deenergize. RO takes manual control of the master pressure controller to control PZR pressure. SRO implements AOI-18, Malfunction of PZR Pressure Control, and evaluates Technical Specifications.

**Event 4**

ERCW Pump A-A shaft shears. CCW Hx outlet temperatures will begin rising. There is no standby start feature for these pumps. The SRO will implement AOI-13, Loss of Essential Raw Cooling Water, which will direct manual starting of a redundant ERCW pump. SRO evaluates Technical Specifications.

**Event 5**

A VCT level transmitter fails to 100%, resulting in letdown diverting to the radwaste system (HUT). VCT level lowers, and auto makeup is disabled by this failure. The operator manually controls an LCV to prevent a low level in the VCT and to prevent charging pump suction swapping to the RWST.

**Event 6**

Lower Compartment Radiation Monitor 1-RM-90-106 fails. Requires various actions per the Alarm Response Instruction, including performing a source check. SRO evaluates Technical Specifications.

**Event 7**

A seismic event occurs, which generates 166-E SEISMIC RECORDING INITIATED AND 166-D OBE SPECTRA EXCEEDED annunciators. Requires implementation of AOI-9, Earthquake. This earthquake does not result in any significant and immediately noticeable damage to the plant, but IS designed to be a precursor for Event 8.

**Event 8**

A Main Steam Line Break occurs outside of containment. The crew ensures the reactor trips and enters E-0, with eventual transition to ECA-2.1 for uncontrolled depressurization of all SGs (see Event 10).

**Event 9**

AFW pumps will not auto start, requiring operator action to manually start ALL AFW pumps.

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Event Description:      Transfer RCP Boards to normal supply.		
Time	Position	Applicant's Actions or Behavior

Event 10

All MSIVs fail to auto close. Crew attempts to close MSIVs at Aux. Control Room, but NO MSIVs will close. This requires implementation of FR-P.1, Pressurized Thermal Shock. Recommended to terminate scenario when the Cold Overpressure Protection System (COPS) is armed.

<b>Critical Task 1</b>	<b>Critical Task 2</b>
FR-P.1 -- A:      Terminate ECCS flow so that if the challenge to the integrity CSF is <ul style="list-style-type: none"> <li>• Severe, an extreme challenge is prevented</li> <li>• Extreme, RCS pressure and temperature are controlled before the end of the scenario</li> </ul>	FR-P.1 -- B:      Control the AFW flow rate in order to minimize the RCS cooldown rate before an extreme (red-path) challenge develops to the integrity CSF

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Event Description:       Transfer RCP Boards to normal supply.									
Time	Position	Applicant's Actions or Behavior							

<b>The following actions are taken from SOI-202.04, "6.9KV Reactor Coolant Pump Board 1D", Section 8.0, "Infrequent Operations".</b>		
	RO	[1] <b>OBTAIN</b> SRO approval.
	RO	[2] <b>ENSURE</b> MSB has verified Time Delay Relay (TDR) 1-62-068-0074 contact points 1and 5 closed (located on left side panel in compartment 1D3 of RCP BD 1D).
<b>NOTE</b> IF Unit is out of service, Bd may be energized by backfeeding from USSTs.		
	RO	[3] <b>CHECK</b> voltage 6560 to 7260V to Normal ACB 2124 on 1-EI-57-58, USST 1B \VOLTS [1-M-1].
	RO	[4] <b>ENSURE</b> 1-HS-68-31AA, RCP 2 NORMAL BKR & LIFT PMP [1-M-5], PUSHED IN to place handswitch in control of ACB 2114. .
	RO	[5] <b>ENSURE</b> 1-HS-68-73BA, RCP 4 ALTERNATE BKR & XFER SELECTOR [1-M-5], PUSHED IN to place ACB 2624 auto transfer in MANUAL.
	RO	[6] <b>MONITOR</b> 1-EI-68-73A, RCP 4 AMPS [1-M-5] during transfer to ensure RCP Amp load transfers to Normal supply.
<b>CAUTION</b> Release handswitches SLOWLY after transfer is complete to prevent inadvertent breaker actuation.		
		<b>Start of Critical Step(s)</b>
	RO	[7] <b>PLACE AND HOLD</b> 1-HS-68-73AA, RCP 4 NORMAL BKR & LIFT PMP, in START, <b>AND PLACE</b> 1-HS-68-73BA, RCP 4 ALTERNATE BKR & XFER SELECTOR, in STOP.
		<b>End of Critical Step(s)</b>
	RO	[8] <b>ENSURE</b> Normal ACB 2124 CLOSED, and Alt ACB 2624 OPEN.
	RO	[9] <b>IF</b> desired to place Board Transfer in AUTO, <b>THEN</b> PULL 1-HS-68-73BA, RCP 4 ALTERNATE BKR & XFER SELECTOR, out to PULL AUTO.
	SRO	This action completes GO-3 Section 5.4. The SRO continues with GO-3, Section 5.5, "Raise Power to Between 20 and 24%".

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Event Description:	Raise reactor power using GO-3 using GO-3"Unit Startup from less than 4% to Reactor Power to 30% Reactor Power, Section 5.5 Raise Reactor Power to Between 20 and 24 %.								
Time	Position	Applicant's Actions or Behavior							

<p><b>The following actions are taken from GO-3"Unit Startup from less than 4% to Reactor Power to 30% Reactor Power", Section 5.5, "Raise Reactor Power to Between 20 and 24%".</b></p>		
<p><b>NOTES</b></p>		
<p>1) To enter this section Turbine load should be between 15 and 20%.</p>		
<p>2) The main emphasis of this section is to raise Reactor Power to between 20 and 24%</p>		
<p>3) " Pre-conditioned" power levels and maximum allowable rates of power changes are specified by TI-45, "Determination of Preconditioned Reactor Power".</p>		
<p>4) Declared fuel defects, as determined by the Fuel Reliability Assessment Team (FRAT) or the Shift Manager, have limitations on rate of power changes as specified in TI-45.</p>		
<p>5) Power escalations should be per SOI-47.02 Turbine loading recommendations.</p>		
<p>6) If possible, dilution should be in 50 to 75 gallon batches every 12 to 15 minutes for a steady rise in TAVG. Dilution and rod movement rates may be adjusted depending on SG level stability.</p>		
<p>7) If a feedwater flow/pressure transient occurs during turbine rollup or subsequent loading, the operator may place the TDMFWP recirc controller in MANUAL to prevent feedback into the system due to valve modulations.</p>		
<p><b>The following actions are taken from SOI-62.02, "Boron Concentration Control", Section 6.6, Minor Dilution.</b></p>		
<p><b>NOTES</b></p>		
<p>1) Section 6.6, Minor Dilution, may be reproduced, laminated, displayed, reused, etc. as desired.</p>		
<p>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.</p>		
	RO	[1] <b>ENSURE</b> 1-HS-68-341H, BACKUP HEATER C, is ON, to equalize Pzr-RCS CB.
	RO	[2] <b>ADJUST</b> 1-FQ-62-142, PW BATCH COUNTER, for required quantity.
	RO	[3] <b>PLACE</b> 1-HS-62-140B, VCT MAKEUP MODE in DIL.
	RO	[4] <b>TURN</b> 1-HS-62-140A, VCT MAKEUP CONTROL, to START. [4.1] <b>CHECK</b> Red light is LIT.
	RO	[5] <b>MONITOR</b> 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

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Event Description: Raise reactor power using GO-3 using GO-3"Unit Startup from less than 4% to Reactor Power to 30% Reactor Power, Section 5.5 Raise Reactor Power to Between 20 and 24 %.		
Time	Position	Applicant's Actions or Behavior
		1-FQ-62-139      1-M-6      PW BATCH COUNTER
	RO	[6] <b>WHEN</b> dilution is COMPLETE, AND 1-FCV-62-128 is closed, <b>THEN PLACE</b> 1-HS-62-140B, VCT MAKEUP MODE, in AUTO.
	RO	[7] <b>TURN</b> 1-HS-62-140A, VCT MAKEUP CONTROL, to START. [7.1] <b>CHECK</b> Red light is LIT.
<b>The following actions are taken from GO-3"Unit Startup from less than 4% to Reactor Power to 30% Reactor Power, Section 5.5 Raise Reactor Power to Between 20 and 24 %.</b>		
	BOP	[1] <b>INITIATE</b> a rise in Reactor power to between 20 and 24% by performing the following: [1.1] <b>DETERMINE</b> appropriate LOAD RATE per SOI-47.02. [1.2] <b>SET</b> the LOAD RATE at predetermined value. [1.3] <b>PUSH</b> REFERENCE CONTROL Δ (raise) button to set desired load in SETTER display. [1.4] <b>PUSH</b> the GO button.
<b>NOTES</b>		
1) TAVG is programmed from 557°F at no load to 586.2°F at 100%, at a rate of 0.29 °F/% power.		
2) Pzr level is programmed from 25 to 60% as a function of TAVG.		
	RO	[2] <b>MONITOR</b> the following as load rises: A. TAVG following TREF program. B. RCP seal flow between 8 and 13 gpm per pump. C. Pzr level on program.
	RO	D. Correct power distribution, quadrant power tilts, rod insertion, rod misalignment, inoperable RPIs, and inoperable rods by monitoring: • All RPI's • Step Counters • Loop ΔT • NIS
	RO	[3] <b>COMPARE</b> TAVG, ΔT, and NIS to check indications are consistent with expected values.
	RO	[4] <b>WHEN</b> Turbine load is greater than 15%, <b>THEN</b> [4.1] <b>CHECK</b> Permissive 66-A, C-5 LO TURB IMPULSE PRESS ROD BLOCK, is <b>NOT LIT</b> . [4.2] <b>IF</b> auto rod control is desired, <b>THEN PLACE</b> rod control in

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Event Description: Raise reactor power using GO-3 using GO-3"Unit Startup from less than 4% to Reactor Power to 30% Reactor Power, Section 5.5 Raise Reactor Power to Between 20 and 24 %.		
Time	Position	Applicant's Actions or Behavior
		AUTO per SOI-85.01.
<b>CAUTION</b>		
If the Steam Dumps cycle, the MFP and Bypass Regs may swing, and control rods may respond if in Auto.		
	BOP	<p>[5] <b>WHEN</b> steam dump demand (1-XI-1-33) reduces to zero, <b>THEN TRANSFER</b> Steam Dumps to TAVG mode by performing the following:</p> <p>[5.1] <b>PLACE</b> 1-HS-1-103A, STEAM DUMP FSV "A", to OFF</p> <p>[5.2] <b>PLACE</b> 1-HS-1-103B, STEAM DUMP FSV "B", to OFF.</p> <p>[5.3] <b>PLACE</b> 1-HS-1-103D, STEAM DUMP MODE, to T AVG.</p> <p>[5.4] <b>IF</b> Permissive 66-E, C-7 LOSS OF LOAD STM DUMP INTERLOCK, is LIT, <b>THEN</b></p> <p>[5.4.1] <b>MOMENTARILY PLACE</b> 1-HS-1-103D to RESET.</p> <p>[5.4.2] <b>CHECK</b> Permissive 66-E is <b>NOT</b> LIT.</p> <p>[5.5] <b>ADJUST</b> 1-PIC-1-33, STEAM DUMP PRESS CONTROL, to 84% and place in AUTO.</p>
<b>NOTE</b>		
If TAVG is greater than TREF, a demand will be indicated in TAVG mode, however, the dumps will NOT operate until armed by a load rejection or a Reactor trip signal.		
	BOP	<p>[5.6] <b>PLACE</b> 1-HS-1-103A, STEAM DUMP FSV "A", to ON.</p> <p>[5.7] <b>PLACE</b> 1-HS-1-103B, STEAM DUMP FSV "B", to ON.</p>
<b>NOTE</b>		
Step 5.5[6] is performed to prevent water hammer in the #2 Feedwater Heater hi-level bypass lines at higher power levels. Isolating air fail the valves closed (EDC 52270).		
	BOP	<p>[6] <b>PRIOR</b> to exceeding 20% turbine load:</p> <p>[6.1] <b>VERIFY</b> the #2 Feedwater Heater normal level control valves (1-LCV-6-21, -43, -66) are maintaining the #2 heaters at normal levels</p> <p>[6.2] <b>ISOLATE</b> air to the # 2 Feedwater Heater Hi-level bypass to condenser LCVs by closing the following valves:</p>
<b>Lead Examiner may cue the next event.</b>		

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Event Description: 1-PT-68-340, Pressurizer Pressure Control, fails high.									
Time	Position	Applicant's Actions or Behavior							

Expected Alarms:		
90-A PZR PRESS HI		
123-C OVERTEMP ΔT TRIP ALERT		
123-D OVERTEMP ΔT TURB RUNBACK & C-3 ROD BLOCK		
	RO	Diagnoses and announces failure.
	RO	May place master pressure controller in MANUAL to regain control of RCS pressure after the failure.
	SRO	Enter and direct actions of AOI-18, "Malfunction Of Pressurizer Pressure Control System", and directs crew actions.
<b>NOTE</b> 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. <b>CHECK</b> pressurizer pressure stable or trending to desired pressure: <ul style="list-style-type: none"> <li>• 1-PI-68-340A,</li> <li>• 1-PI-68-334,</li> <li>• 1-PI-68-323,</li> <li>• 1-PI-68-322.</li> </ul>
	RO	1. <b>RESPONSE NOT OBTAINED PLACE</b> pzs master controller 1-PIC-68-340A in MANUAL and <b>RESTORE</b> press to normal.
	RO	2. <b>CHECK</b> 1-XS-68-340D selected to a failed controlling or backup channel.
	RO	3. <b>RESTORE</b> press control to normal: <ol style="list-style-type: none"> <li>a. <b>SELECT</b> operable channels for control and backup with 1-XS-68-340D.</li> <li>b. <b>ENSURE</b> operable channel selected for recording with 1-XS-68-340B.</li> <li>c. <b>WHEN</b> Pressurizer pressure on program, <b>THEN RETURN</b> Pzs master controller 1-PIC-68-340A to AUTO.</li> </ol>
	SRO	4. <b>NOTIFY</b> Work Control to remove failed channel from service.
	SRO	5. <b>** GO TO</b> Step 17.
	SRO	17. <b>REFER TO</b> the following Tech Specs: <ol style="list-style-type: none"> <li>3.3.1-1, 6. Overtemperature ΔT Condition W. <ol style="list-style-type: none"> <li>8.a. Pressurizer Pressure Low Condition X</li> <li>8.b. Pressurizer Pressure High Condition W</li> </ol> </li> <li>3.3.2-1, 1.d Pressurizer Pressure Low Condition D <ol style="list-style-type: none"> <li>8.b Pressurizer Pressure P-11 Condition L</li> </ol> </li> </ol>
	SRO	18. <b>INITIATE</b> repairs to failed equipment.

Op Test No.:	<u>NRC</u>	Scenario #	<u>1</u>	Event #	<u>3</u>	Page	<u>9</u>	of	<u>66</u>
Event Description: 1-PT-68-340, Pressurizer Pressure Control, fails high.									
Time	Position	Applicant's Actions or Behavior							

	SRO	19. <b>RETURN TO</b> Instruction in effect.
	CREW	<b>Crew Brief</b> would be conducted for this event as time allows prior to the next event.
	CREW	<p><b>Notifications</b> should be addressed as applicable if not specifically addressed by the procedure or in the crew brief.</p> <p><u>Operations Management</u> - Shift Manager.</p> <p><u>Maintenance Personnel</u> –Maintenance Shift Supervisor (MSS).  <b>(Note:</b> Maintenance notification may be delegated to the Shift Manager).</p>
<b>Lead Examiner may cue the next event .</b>		

Op Test No.:	<u>NRC</u>	Scenario #	<u>1</u>	Event #	<u>4</u>	Page	<u>10</u>	of	<u>66</u>
Event Description: ERCW Pump A-A Shaft Shears.									
Time	Position	Applicant's Actions or Behavior							

Expected Alarms:		
223-A ERCW HDR A SUP PRESS LO		
223-B ERCW PMP A-A DISCH PRESS LO		
	BOP	Diagnoses and announces failure
	BOP	May enter Alarm Response Instructions 223-A and 223-B.
	SRO	Enter and direct actions of AOI-13, "Loss of Essential Raw Cooling Water", and directs crew actions, using Section 3.2, Loss of ERCW Pump".
	BOP	1. <b>START</b> redundant trained ERCW Pump.
	SRO	2. <b>ENSURE</b> header pressures and flows return to expected values for existing plant conditions.
	BOP	3. <b>ENSURE</b> pump amps NORMAL.
	BOP	4. <b>PLACE</b> failed pump HS in PULL TO LOCK.
	BOP	5. <b>DISPATCH</b> personnel to determine reason for pump failure.
	BOP	6. Locally <b>CLOSE</b> discharge valve on failed pump.
	BOP	7. <b>ENSURE</b> applicable emergency power selector switch selected away from failed pump.
	SRO	8. <b>INITIATE</b> repair.
	SRO	9. <b>REFER TO</b> Tech Spec 3.7.8, Essential Raw Cooling Water System (ERCW). 3.7.8 Condition A. and 3.8.1.c until the auto start switch has been repositioned
		10. <b>RETURN TO</b> Instruction in effect.
	CREW	<b>Crew Brief</b> would typically be conducted for this event as time allows prior to the next event.
	CREW	<b>Notifications</b> should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. <u>Operations Management</u> - Shift Manager. <u>Maintenance Personnel</u> –Maintenance Shift Supervisor (MSS). ( <b>Note:</b> Maintenance notification may be delegated to the Shift Manager).
<b>Lead Examiner may cue the next event .</b>		

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Event Description: VCT Level Transmitter 1-LT-62-130A fails to 100%.									
Time	Position	Applicant's Actions or Behavior							

Expected Alarms: 109-A, VCT LEVEL HI/LO		
	RO	Diagnoses and announces failure
	RO	Enters Alarm Response Instructions 109-A.
	SRO	Enter and direct actions of ARI 109-A, "VCT LEVEL HI/LO".
	RO	[1] <b>IF</b> high level, <b>THEN</b> <b>[a] ENSURE</b> 1-LCV-62-118 diverted to HUT and <b>OPEN</b> . <b>[b] ENSURE</b> NO VCT makeup in progress. <b>Step is N/A due to failure mode.</b>
	RO	[2] <b>IF</b> low level, <b>THEN</b> <ul style="list-style-type: none"> <li>• <b>ENSURE</b> 1-LCV-62-118 aligned to VCT.</li> <li>• <b>INITIATE</b> makeup in accordance with SOI-62.02, <i>BORON CONCENTRATION CONTROL</i>.</li> <li>• <b>ENSURE</b> suction to the Centrifugal Charging Pump swaps over to the RWST at 7% VCT level.</li> </ul> <b>Step is N/A due to failure mode.</b>
	RO	[3] <b>VERIFY</b> letdown and charging in service and that Reactor Coolant Filter is not clogged.
	RO	[4] <b>IF</b> 1-LCV-62-118 diverted to HUT due to instrument failure, <b>THEN</b> <b>[a] PLACE</b> 1-HS-62-118 in VCT position until repairs completed. <b>[b] PLACE</b> 1-HS-62-118 in P-AUTO position when repairs completed.
	SRO	[5] <b>IF</b> RCS leakage is suspected, <b>THEN GO TO</b> AOI-6, <i>SMALL REACTOR COOLANT SYSTEM LEAK</i> . <b>Step is N/A due to failure mode.</b>
	CREW	<b>Crew Brief</b> would be conducted for this event as time allows prior to the next event.
	CREW	<b>Notifications</b> should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. <u>Operations Management</u> - Shift Manager. <u>Maintenance Personnel</u> –Maintenance Shift Supervisor (MSS). <b>(Note:</b> Maintenance notification may be delegated to the Shift Manager).
<b>Lead Examiner may cue the next event when Tech Spec Evaluation Complete and SRO has addressed the need for a Crew Brief.</b>		

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Event Description: Lower Compartment Radiation Monitor 1-RM-90-106 fails.									
Time	Position	Applicant's Actions or Behavior							

Expected Alarms:		
173-E, LWR CNTMT AIR 1-RM-90-106 INSTR MALF		
	BOP	Diagnoses and announces failure
	BOP	Enters Alarm Response Instructions 173-E.
	SRO	Enter and direct actions of ARI 173-E, "LWR CNTMT AIR 1-RM-90-106 INSTR MALF".
<b>NOTES</b>		
1) 1-RE-90-106 has NO AUTO flow control.		
2) Computer points R1012A and R1013A correspond to the listed source channels.		
	BOP	1] <b>CHECK</b> 1-RM-90-106A or B Operate light lit, <b>IF NOT, THEN PERFORM</b> source check on affected channel and reset the monitor.
	BOP	[2] <b>ENSURE</b> correct valve and switch alignment on panel 0-M-12 per SOI-90.02, Gaseous Process Radiation Monitors.
	SRO	[3] <b>DISPATCH</b> Operator with Radiological Protection coverage to investigate alarm and initiate corrective action.
	SRO	[4] <b>NOTIFY</b> Chemistry Countroom to initiate sampling IAW 1-SI-90-25 if required.
	SRO	[5] <b>NOTIFY</b> MIG to investigate alarm.
	BOP	[6] <b>ALIGN</b> 1-RM-90-112 to lower containment IAW SOI-90.02 if 1-RM-90-106 is inoperable.
	SRO	[7] <b>REFER TO</b> Tech Specs (LCO 3.4.15). 3.4.15.B RCS Leakage Detection Instrumentation
	CREW	<b>Crew Brief</b> would typically be conducted for this event as time allows prior to the next event.
	CREW	<b>Notifications</b> should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. <u>Operations Management</u> - Shift Manager. <u>Maintenance Personnel</u> –Maintenance Shift Supervisor (MSS). (Note: Maintenance notification may be delegated to the Shift Manager).
<b>Lead Examiner may cue the next event.</b>		

Op Test No.:	<u>NRC</u>	Scenario #	<u>1</u>	Event #	<u>7, 8, 9 and 10</u>	Page	<u>13</u>	of	<u>66</u>
Event Description: Seismic Event, MSLB on SG #2 outside Containment., failure of AFW pumps to AUTO start, and all MSIVs fail to auto close (cannot be closed manually).									
Time	Position	Applicant's Actions or Behavior							

Expected Alarms:		
166-D OBE SPECTRA EXCEEDED		
166-E SEISMIC RECORDING INITIATED		
<b>NOTE TO EVALUATOR: It is not expected that the crew would enter the AOI-9 "Earthquake", since the steam line break will occur shortly after receipt of 166-D and 166-E.</b>		
	BOP	Diagnoses and announces failure
	BOP	Enters Alarm Response Instructions 166-E, "SEISMIC RECORDING INITIATED", and 166-D, "OBE SPECTRA EXCEEDED".
	SRO	Due to the rapid nature of the steam line failure, the SRO will NOT enter and direct actions of AOI-9, "EARTHQUAKE", but will address the EOP entry.
<b>NOTE TO EVALUATOR: After Seismic Event, the #2 Main steam line ruptures outside containment, and ALL MSIVs fail to close.</b>		
	BOP	Diagnoses and announces reactor trip and safety injection actuations
	RO	Performs E-0 Immediate Operator Actions.
	BOP	Performs E-0 Immediate Operator Actions.
	SRO	Enter and direct actions of E-0, "REACTOR TRIP OR SAFETY INJECTION".
	RO	1. <b>ENSURE</b> reactor trip: <ul style="list-style-type: none"> <li>• Reactor trip and bypass breakers OPEN.</li> <li>• RPIs at bottom of scale.</li> <li>• Neutron flux DROPPING.</li> </ul>
	BOP	2. <b>ENSURE</b> Turbine Trip: <ul style="list-style-type: none"> <li>• All turbine stop valves CLOSED.</li> </ul>
	BOP	3. <b>CHECK</b> 6.9 kV shutdown boards: <ol style="list-style-type: none"> <li>a. At least one board energized from: <ul style="list-style-type: none"> <li>• CSST (offsite),</li> <li>OR</li> <li>• D/G (blackout).</li> </ul> </li> </ol>
	RO	4. <b>CHECK</b> SI actuated: <ol style="list-style-type: none"> <li>a. Any SI annunciator LIT.</li> <li>b. Both trains SI <b>ACTUATED</b>. <ul style="list-style-type: none"> <li>• 1-XX-55-6C</li> <li>• 1-XX-55-6D</li> </ul> </li> </ol>

Op Test No.:	<u>NRC</u>	Scenario #	<u>1</u>	Event #	<u>7, 8, 9 and 10</u>	Page	<u>14</u>	of	<u>66</u>
Event Description: Seismic Event, MSLB on SG #2 outside Containment., failure of AFW pumps to AUTO start, and all MSIVs fail to auto close (cannot be closed manually).									
Time	Position	Applicant's Actions or Behavior							

	BOP	5. <b>EVALUATE</b> support systems: <b>REFER TO</b> Appendixes A and B (E-0), Equipment Verification pages 15-28.
	SRO	6. <b>ANNOUNCE</b> reactor trip and safety injection over PA system.
Event 9	BOP	Recognizes the failure of the AFW pumps to start and <b>MANUALLY</b> starts pumps.
	BOP	7. <b>ENSURE</b> secondary heat sink available with either: <ul style="list-style-type: none"> <li>• Total AFW flow greater than 410 gpm,</li> </ul> OR <ul style="list-style-type: none"> <li>• At least one S/G NR level greater than 29% [39% ADV].</li> </ul>
	RO	8. <b>MONITOR</b> RCS temp stable at or trending to 557°F: <ul style="list-style-type: none"> <li>• <b>IF</b> any RCP running, <b>THEN MONITOR</b> RCS Loop T-avg trending to 557°F.</li> </ul> OR <ul style="list-style-type: none"> <li>• <b>IF NO</b> RCP running, <b>THEN MONITOR</b> RCS Loop T-cold trending to 557°F.</li> </ul>
Event 10	RO	Recognizes failure of AUTO closure and attempts to <b>MANUALLY</b> close MSIVs from the MCR handswitches. MSIVs will remain OPEN after action is taken.
	RO	8. <b>RESPONSE NOT OBTAINED IF</b> temp less than 557°F, <b>THEN ENSURE</b> steam dumps and S/G PORVs CLOSED. <b>IF</b> cooldown continues, <b>THEN</b> : <ul style="list-style-type: none"> <li>• <b>PLACE</b> steam dump controls OFF.</li> <li>• <b>CONTROL</b> total AFW flow to maintain greater than 410 gpm UNTIL NR level in at least one S/G greater than 29% [39% ADV].</li> </ul> <b>IF</b> cooldown continues after AFW flow is controlled, <b>THEN</b> <ul style="list-style-type: none"> <li>• <b>CLOSE</b> MSIVs.</li> <li>• <b>ENSURE</b> MSIV bypasses CLOSED.</li> </ul> <b>IF</b> RCS temp greater than 564°F, <b>THEN ENSURE</b> either steam dumps or S/G PORVs OPEN.
	RO	9. <b>ENSURE</b> excess letdown valves CLOSED: <ul style="list-style-type: none"> <li>• 1-FCV-62-54</li> <li>• 1-FCV-62-55</li> </ul>

Op Test No.: <u>  NRC  </u> Scenario # <u>  1  </u> Event # <u>  7, 8, 9 and 10  </u> Page <u>  15  </u> of <u>  66  </u>		
Event Description: Seismic Event, MSLB on SG #2 outside Containment., failure of AFW pumps to AUTO start, and all MSIVs fail to auto close (cannot be closed manually).		
Time	Position	Applicant's Actions or Behavior
	RO	10. <b>CHECK</b> pZR PORVs and block valves: a. PZR PORVs CLOSED. b. At least one block valve OPEN.
	RO	11. <b>CHECK</b> pZR safety valves CLOSED: • <b>EVALUATE</b> tailpipe temperatures and acoustic monitors.
	RO	12. <b>CHECK</b> pZR sprays CLOSED.
	RO	13. <b>CHECK</b> if RCPs should remain in service: a. Phase B signals DARK [MISSP]. b. RCS pressure greater than 1500 psig.
	RO	13. <b>RESPONSE NOT OBTAINED</b> a. <b>STOP</b> all RCPs. <b>** GO TO</b> Step 14. b. <b>ENSURE</b> at least one Charging pump OR SI pump injecting. <b>WHEN</b> injection flow established, <b>THEN STOP</b> all RCPs.
	RO	14. <b>CHECK</b> S/G pressures: • All S/G pressures controlled or rising. • All S/G pressures greater than 120 psig.
	SRO	14. <b>RESPONSE NOT OBTAINED</b> <b>IF</b> S/G pressure low OR dropping uncontrolled, <b>THEN ** GO TO</b> E-2, Faulted Steam Generator Isolation.
<b>NOTE TO EVALUATOR: The following steps are taken from E-2.</b>		
<b>CAUTION If a faulted S/G is NOT needed for RCS cooldown, it should remain isolated during subsequent recovery actions.</b>		
	BOP	1. <b>ENSURE</b> all MSIVs and MSIV bypasses CLOSED.
	BOP	1. <b>RESPONSE NOT OBTAINED</b> Manually <b>CLOSE</b> valves. <b>IF</b> valves can <b>NOT</b> be closed, <b>THEN</b> Locally <b>REMOVE</b> power to valves: • <b>DISPATCH</b> NAUO to perform Attachment 1 (E-2).
<b>NOTE</b> If it is known that a steam leak exists in the Turbine building, the following step should not be performed until the affected steam header is depressurized.		
	BOP	2. <b>PLACE</b> steam dump controls OFF: • 1-HS-1-103A, STEAM DUMP FSV "A".

Op Test No.: NRC Scenario # 1 Event # 7, 8, 9 and 10 Page 16 of 66

Event Description: Seismic Event, MSLB on SG #2 outside Containment., failure of AFW pumps to AUTO start, and all MSIVs fail to auto close (cannot be closed manually).

Time	Position	Applicant's Actions or Behavior
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		<ul style="list-style-type: none"> <li>• 1-HS-1-103B, STEAM DUMP FSV "B".</li> </ul>
	RO	3. <b>CHECK</b> for at least one Intact S/G: <ul style="list-style-type: none"> <li>• Any S/G pressure controlled or rising,</li> <li>OR</li> <li>• Any S/G pressure greater than P-sat for RCS incore temperature.</li> </ul>
	SRO	3. <b>RESPONSE NOT OBTAINED</b> <b>IF</b> pressure in all four S/Gs dropping uncontrolled, <b>THEN</b> <b>** GO TO</b> ECA-2.1, Uncontrolled Depressurization of All Steam Generators.

**NOTE TO EVALUATOR: The following steps are taken from ECA-2.1, "Uncontrolled Depressurization of All Steam Generators."**

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

	SRO	1. <b>REFER TO</b> EPIP-1, Emergency Plan Classification Flowchart.
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**CAUTION If the TD AFW pump is the only available source of feed flow to ANY S/G, the steam supply must be maintained available.**

	RO	2. <b>ENSURE</b> secondary pressure boundary isolated: <ul style="list-style-type: none"> <li>• <b>ENSURE</b> all MSIVs and MSIV bypasses CLOSED.</li> <li>• <b>PLACE</b> steam dump controls OFF.</li> <li>• <b>ENSURE</b> MFW reg and bypass reg valves CLOSED.</li> <li>• <b>ENSURE</b> MFW isolation and bypass isolation valves CLOSED.</li> <li>• <b>IF</b> both MD AFW pumps available, <b>THEN ENSURE</b> steam supply valves to TD AFW pump CLOSED.</li> <li>• <b>ENSURE</b> S/G PORVs CLOSED.</li> <li>• <b>ENSURE</b> S/G blowdown ISOLATED.</li> </ul>
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	SRO	2. <b>RESPONSE NOT OBTAINED</b> Manually <b>CLOSE</b> valves to restore pressure boundary on at least one S/G. <b>IF</b> valves CANNOT be closed, <b>THEN DISPATCH</b> personnel to close valves locally, one loop at a time: <ul style="list-style-type: none"> <li>• <b>CLOSE</b> MSIV and bypass valve as necessary USING Attachment 1 (ECA-2.1).</li> <li>• <b>ISOLATE</b> S/G atmospheric relief valve as necessary.</li> <li>• <b>CLOSE</b> additional feedwater or condensate MOVs as necessary.</li> <li>• <b>ISOLATE</b> blowdown locally as necessary.</li> </ul>
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**CAUTION If total feed flow CAPABILITY of 410 gpm is available, FR-H.1, Loss of Secondary Heat Sink, should NOT be implemented.**

**NOTE** Minimum detectable flow is assured by observing flow indicator response to valve movement.

Op Test No.:	<u>NRC</u>	Scenario #	<u>1</u>	Event #	<u>7, 8, 9 and 10</u>	Page	<u>17</u>	of	<u>66</u>
Event Description: Seismic Event, MSLB on SG #2 outside Containment., failure of AFW pumps to AUTO start, and all MSIVs fail to auto close (cannot be closed manually).									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>3. <b>CONTROL</b> feed flow to minimize RCS cooldown and prevent S/G dryout:</p> <p>a. <b>CHECK</b> T-cold cooldown rate less than 100°F in the last one hour.</p> <p>b. <b>CONTROL</b> feed flow to maintain S/G NR levels less than 50%.</p> <p>c. <b>IF</b> any S/G NR level drops to 29% [39% ADV], <b>THEN MAINTAIN</b> at least minimum detectable flow to each S/G with low level.</p>
	SRO	<p>4. <b>MONITOR</b> shutdown margin during RCS cooldown:</p> <ul style="list-style-type: none"> <li>• <b>REFER TO</b> 1-SI-0-10, Shutdown Margin OR REACTINW Computer Program.</li> </ul>
	SRO	5. <b>MONITOR</b> T-hot stable or dropping.
<p><b>CAUTION</b> The 1500 psig RCP trip criteria is <b>NOT</b> applicable if the pressure drop is caused by S/G depressurization as indicated by RCS temperature at T-sat for S/G pressure.</p>		
<p><b>NOTE</b> Seal injection flow should be maintained to all RCPs.</p>		
	SRO	<p>6. <b>MONITOR</b> if RCPs should remain in service:</p> <p>a. Phase B DARK [MISSP].</p> <p>b. RCS pressure greater than 1500 psig.</p>
	SRO	<p>7. <b>MONITOR</b> pZR PORVs and block valves:</p> <p>a. PZR PORVs CLOSED.</p> <p>b. At least one block valve OPEN.</p>
	SRO	<p>8. <b>CHECK</b> secondary side activity levels:</p> <ul style="list-style-type: none"> <li>• S/G discharge rad monitors NORMAL.</li> <li>• Condenser vacuum exhaust rad monitors NORMAL.</li> <li>• S/G blowdown rad monitor recorders NORMAL trend prior to isolation,</li> <li>• S/G sample results by Chemistry NORMAL.</li> </ul>
<p><b>CAUTION</b> If offsite power is lost after SI reset, manual action will be required to restart the SI pumps and RHR pumps due to loss of SI start signal.</p>		
<p><b>NOTE TO EVALUATOR:</b> The transient in progress will cause an <b>ORANGE PATH</b> condition, which will require entry into FR-P.1 "PRESSURIZED THERMAL SHOCK". The following steps are taken from FR-P.1.</p>		
	SRO	1. <b>CHECK</b> RCS pressure greater than 150 psig.
	RO	2. <b>CHECK</b> T-cold stable or rising.
	SRO	<p>2. <b>RESPONSE NOT OBTAINED</b></p> <p><b>IF</b> T-cold dropping uncontrolled, <b>THEN:</b></p> <ul style="list-style-type: none"> <li>• <b>ENSURE</b> steam dump valves CLOSED.</li> <li>• <b>ENSURE</b> S/G PORVs CLOSED.</li> </ul> <p><b>IF</b> RHR System in Shutdown Cooling mode, <b>THEN STOP</b> any cooldown from RHR.</p>

Op Test No.:	<u>NRC</u>	Scenario #	<u>1</u>	Event #	<u>7, 8, 9 and 10</u>	Page	<u>18</u>	of	<u>66</u>
Event Description: Seismic Event, MSLB on SG #2 outside Containment., failure of AFW pumps to AUTO start, and all MSIVs fail to auto close (cannot be closed manually).									
Time	Position	Applicant's Actions or Behavior							

		<p><b>IF</b> uncontrolled cooldown continues, <b>THEN</b>:</p> <ul style="list-style-type: none"> <li>• <b>CLOSE</b> MSIVs,</li> <li>• <b>ENSURE</b> MSIV bypasses CLOSED.</li> <li>• <b>PLACE</b> steam dump controls OFF.</li> </ul>
<p><b>CAUTION</b></p> <ul style="list-style-type: none"> <li>• 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 at least one S/G.</li> <li>• If a faulted S/G is necessary for RCS temperature control feed flow to that generator should be maintained.</li> </ul>		
<p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• A Faulted S/G is any S/G that is depressurizing in an uncontrolled manner or is completely depressurized.</li> <li>• Minimum detectable flow is assured by observing flow indicator response to valve movement.</li> </ul>		
	SRO	<p>3. <b>CHECK</b> S/G pressures:</p> <ul style="list-style-type: none"> <li>• All S/G pressures controlled or rising.</li> <li>• All S/G pressures greater than 120 psig.</li> </ul>
	SRO	<p>3. <b>RESPONSE NOT OBTAINED</b></p> <p><b>IF</b> S/G with low or dropping press has <b>NOT</b> been isolated, <b>THEN REFER TO E-2, Faulted Steam Generator Isolation</b>, while continuing with this instruction.</p> <p><b>ENSURE</b> TD AFW pump being supplied from intact S/G.</p> <p><b>IF</b> all S/Gs Faulted, <b>THEN CONTROL</b> feed flow at minimum detectable flow to each S/G.</p> <p><b>IF</b> Faulted S/G necessary for RCS temp control, <b>THEN CONTROL</b> feed flow to minimum detectable flow to that S/G.</p> <p><b>IF</b> Faulted S/G NOT necessary for RCS temp control, <b>THEN ISOLATE</b> all feedwater to Faulted S/G.</p>
	RO	<p>4. <b>MONITOR</b> CST volume greater than 200,000 gal.</p>
<b>CRITICAL TASK</b>	SRO	<p>5. <b>MINIMIZE</b> RCS cooldown:</p> <ol style="list-style-type: none"> <li>a. <b>CHECK</b> at least one intact S/G NR level greater than 29% [39% ADV].</li> <li>b. <b>CONTROL</b> feed flow to intact S/G(s) as necessary.</li> <li>c. <b>CONTROL</b> S/G pressures as necessary.</li> </ol>
	RO	<p>6. <b>MONITOR</b> pwr PORVs and block valves:</p> <ol style="list-style-type: none"> <li>a. <b>CHECK</b> at least one block valve OPEN.</li> <li>b. <b>CHECK</b> RCS temperature less than 350°F.</li> <li>c. <b>ARM</b> COPS with 1-HS-68-334D and 1-HS-68-340AD.</li> <li>d. <b>CHECK</b> RCS pressure less than cold overpressure limit: <ul style="list-style-type: none"> <li>• <b>REFER TO</b> Figure 1, Cold Overpressure Limit Curve.</li> </ul> </li> </ol>

Op Test No.:	<u>NRC</u>	Scenario #	<u>1</u>	Event #	<u>7, 8, 9 and 10</u>	Page	<u>19</u>	of	<u>66</u>
Event Description: Seismic Event, MSLB on SG #2 outside Containment., failure of AFW pumps to AUTO start, and all MSIVs fail to auto close (cannot be closed manually).									
Time	Position	Applicant's Actions or Behavior							

	RO	6.d. <b>RESPONSE NOT OBTAINED</b> ENSURE at least one pzz PORV OPEN. <b>WHEN</b> press less than cold overpress limit, <b>THEN PERFORM</b> Substep 6g. <b>GO TO</b> Step 7.
	SRO	7. <b>CHECK</b> ECCS in service: <ul style="list-style-type: none"> <li>• Any SI pump RUNNING,</li> <li>OR</li> <li>• Flow thru BIT.</li> </ul>
NOTE Either Loop 1 or 2 pzz spray valve is effective for Loop 2 RCP in service or for Loops 1, 3, & 4 RCPs in service.		
	RO	8. <b>CHECK</b> SI termination criteria: <ul style="list-style-type: none"> <li>• RVLIS greater than 60% with NO RCP running,</li> <li><b>OR</b></li> <li>RVLIS greater than 63% with ANY RCP running.</li> <li>• RCS subcooling greater than 115°F [135°F ADV].</li> </ul>
<b>CAUTION</b> If offsite power is lost after SI reset, then manual action will be required to restart the SI pumps and RHR pumps.		
		9. <b>RESET</b> SI, and <b>CHECK</b> the following: <ul style="list-style-type: none"> <li>• SI ACTUATED permissive DARK.</li> <li>• AUTO SI BLOCKED permissive LIT.</li> </ul>
		10. <b>RESET</b> Phase A and Phase B, and <b>INITIATE</b> Appendix A, (FR-P.1), CLA Breaker Operation.
		11. <b>ENSURE</b> cntmt air in service: <ol style="list-style-type: none"> <li>a. Aux air press greater than 75 psig [M-15].</li> <li>b. Cntmt air supply valves OPEN [M-15]: <ul style="list-style-type: none"> <li>• 1-FCV-32-80.</li> <li>• 1-FCV-32-102.</li> <li>• 1-FCV-32-110.</li> </ul> </li> </ol>
<b>CRITICAL TASK</b>		12. <b>STOP</b> ECCS pumps, and <b>PLACE</b> in A-AUTO: <ul style="list-style-type: none"> <li>• RHR pumps.</li> <li>• SI pumps.</li> <li>• All BUT one charging pump.</li> </ul>
<b>END OF SCENARIO</b>		

**SIMULATOR SETUP INFORMATION**

**Simulator Console Operators Instructions  
NRC Scenario 1**

**SIMULATOR SETUP INFORMATION**

1. **ENSURE** NRC EXAMINATION SECURITY has been established.
2. **RESET** the Simulator to **IC-331**. (**Must have correct password in order to RESET**).
3. **ENSURE** the following information appears on the Director Summary Display:

<b>Key</b>	<b>Description</b>	<b>Event</b>	<b>Final</b>
ms04a	msiv fails to close 1-4	active	
ms04b	msiv fails to close 1-11	active	
ms04c	msiv fails to close 1-22	active	
ms04d	msiv fails to close 1-29	active	
rp55a	failure of auto start on motor driven aux feedpump a	active	
rp55b	failure of auto start on motor driven aux feedpump b	active	
rp55c	failure of auto start on motor driven aux feedpump c	active	
rc07a	pZR pressure transmitter fails to position chnl 1 68-340	1	100
rw18a	ercw pump a-a sheared shaft	2	active
cv09	vct level transmitter fails to position; 130-a	3	100
rm90106a	failure of rm-90-106a cntmt bldg lwr compt mon - particulate	4	0
mux_05c080	166-e seismic recording initiated	5	On
mux_05c072	166-d obe spectra exceeded	5	On
ms02b	main steam line break outside containment sg #2	5	50

4. Place the simulator in RUN momentarily. Acknowledge alarms, and then place the simulator in FREEZE.

1	N/A	Transfer RCP Board power supplies.
2	N/A	Raise reactor power using GO-3
3	1	1-PT-68-340 fails high <b>ROLE PLAY:</b> 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. <b>ROLE PLAY:</b> 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.
4	2	ERCW pump A-A Shaft Shears <b>ROLE PLAY:</b> As Outside AUO, when contacted, confirm that the shaft for the A-A ERCW pump is sheared.
5	3	VCT Level transmitter 1-LT-62-130A fails to 100% <b>ROLE PLAY:</b>
6	4	Lower Containment Radiation Monitor 1-RM-90-106 fails. <b>ROLE PLAY:</b>
7		Seismic Event, 166-D, 166-E annunciators received. <b>ROLE PLAY:</b> As Outside AUO, report that a violent shaking has been felt on site. <b>ROLE PLAY:</b> As Nuclear Security and report that a violent shaking of the ground has been reported by multiple Security Officers at a variety of locations on site..
8		Main steam line break on #2 SG OUTSIDE containment. <b>ROLE PLAY:</b> As Outside AUO, state that there is a large cloud of steam outside the plant. <b>ROLE PLAY:</b> As Control Building AUO report that the ACR switches for the MSIVs are in the "Aux" position. Insert remote function msr26a, msr26b, msr26c and msr26d to AUX. MSIVs WILL REMAIN OPEN. <b>ROLE PLAY:</b> As Control Building AUO report that the fuses for the MSIVs have been removed per E-2, Attachment 1 or ECA-2.1, Attachment 1.

<b>9</b>		ALL AFW pumps fail to start, requiring manual starts of all pumps.
<b>10</b>		NO MSIVs close, and CANNOT be closed manually. Malfunctions to prevent closure are active and DO NOT require entry.

Facility: <b>Watts Bar</b>		Scenario No.: <b>2</b>		Op Test No.: <b>1</b>	
Examiners: _____		Operators: _____		_____	
_____		_____		_____	
Initial Conditions: 53% RTP, BOL.					
Turnover: The plant is at 53%, BOL. 1A Motor Driven AFW pump is out-of-service, and disassembled to replace a motor bearing. 1B-B Thermal Barrier Booster Pump is out of service due to a seized pump shaft. 1-SI-0-21, Excore QPTR has been performed SAT. Commence a power escalation to 90%, at the maximum allowed rate					
Event No.	Malf. No.	Event Type*	Event Description		
1	N/A	N-SRO/BOP R-RO	Commence power escalation to 90%.		
2	RX02F	I-SRO/RO TS-SRO	Loop 2 RCS T-cold instrument fails HIGH. Requires manual control of rods to terminate rod insertion.		
3	RX26G	I-SRO/BOP TS-SRO	SG #4 pressure transmitter fails LOW. Requires manual control of feed flow.		
4	TU02I, J, K	C-SRO/BOP	High vibration on turbine bearings 9, 10 and 11. Requires manual reactor trip when one bearing reaches 14 mils.		
5	RP01C	I-SRO/RO	Reactor trip failure (ATWS). Requires entry into FR-S.1.		
6	TH03C	M-ALL	An RCS leak develops, progressing to a Small Break LOCA.		
7	CS02A/B	C-BOP/SRO	Containment Spray fails to actuate on Hi-Hi Containment pressure actuation.		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Op Test No.:	<u>NRC</u>	Scenario #	<u>2</u>	Event #	<u>1</u>	Page	<u>25</u>	of	<u>66</u>
Event Description: Commence power escalation to 90%.									
Time	Position	Applicant's Actions or Behavior							

**Scenario 2 - Summary**

Initial Condition - IC-332, 53%, BOL.

Turnover

The plant is at 53%, MOL. 1A Motor Driven AFW pump is out-of-service, and disassembled to replace a motor bearing. LCO 3.7.5.b was entered 10 hours ago. Expected to return to service in approximately 36 hours. 1B-B Thermal Barrier Booster Pump is out-of service due to seized pump shaft. OR-14.10 was entered due to the thermal barrier booster pumps. Expected return to service is to be determined. 1-SI-0-21, "Excore QPTR", has been performed SAT. Commence a power escalation to 90%. Boron concentration is currently at 1080 ppm.

Event 1

Crew commences a power escalation to 90% per GO-4, "Normal Power Operation".

Event 2

A Loop 2 RCS Tcold instrument fails HIGH, causing control rods to continuously insert. Operator takes manual control of rods to stop the insertion. AOI-2, "Malfunction of Reactor Control System", is entered. SRO evaluates Technical Specifications.

Event 3

SG #4 pressure transmitter 1-PT-1-27A fails LOW, causing the steam flow signal for SG #4 to lower, resulting in lowering feed flow. Operator takes manual control of feed flow to stabilize level in SG #4. SRO implements AOI-16, Loss of Normal Feedwater. SRO evaluates Technical Specifications for the failed instrument.

Event 4

Main Turbine bearings 9, 10, and 11 begin experiencing high vibration. Ramps in over a 5 minute period. Requires a manual reactor trip prior to any bearing exceeding 14 mils.

Event 5

ATWS. The RO is unable to trip the reactor from the control room and must manually drive rods; the BOP manually trips the turbine. Crew implements FR-S.1, ATWS.

Event 6

An RCS leak develops and progresses to a Small Break LOCA (ramp to 54% severity over 3 minutes).

Event 7

Containment Spray fails to auto actuate on Hi-Hi containment pressure. Requires manually starting both Containment Spray Pumps.

<b>Critical Task 1</b>	<b>Critical Task 2</b>
FR-S.1 - A: Isolate the main turbine from the SGs within 30 seconds of the discovery of the ATWS condition	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: <ul style="list-style-type: none"> <li>• De-energize the control rod drive MG sets</li> <li>• Insert RCCAs</li> <li>• Establish emergency boration flow to the RCS</li> </ul>
<b>Critical Task 3</b>	
FR-S.1 - B: Start AFW pumps within 60 seconds of	

Op Test No.: <u>  NRC  </u> Scenario # <u>  2  </u> Event # <u>  1  </u> Page <u>  26  </u> of <u>  66  </u>		
Event Description: Commence power escalation to 90%.		
Time	Position	Applicant's Actions or Behavior

the ATWS condition.

Op Test No.:	<u>NRC</u>	Scenario #	<u>2</u>	Event #	<u>1</u>	Page	<u>27</u>	of	<u>66</u>
Event Description: Commence power escalation to 90%.									
Time	Position	Applicant's Actions or Behavior							

<b>Console Operator: No action required for Event 1</b>				
<b>None: Crew will continue power increase from 53% using GO-4, "Normal Power Operation", Section 5.5 at Step [23]</b>				
	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.		
<b>The following actions are taken from SOI-62.02, "Boron Concentration Control", Section 6.6, Minor Dilution.</b>				
<b>NOTES</b>				
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] <b>ENSURE</b> 1-HS-68-341H, BACKUP HEATER C, is ON, to equalize Pzr-RCS CB.		
	RO	[2] <b>ADJUST</b> 1-FQ-62-142, PW BATCH COUNTER, for required quantity.		
	RO	[3] <b>PLACE</b> 1-HS-62-140B, VCT MAKEUP MODE in DIL.		
	RO	[4] <b>TURN</b> 1-HS-62-140A, VCT MAKEUP CONTROL, to START. [4.1] <b>CHECK</b> Red light is LIT.		
	RO	[5] <b>MONITOR</b> 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] <b>WHEN</b> dilution is COMPLETE, AND 1-FCV-62-128 is closed, <b>THEN PLACE</b> 1-HS-62-140B, VCT MAKEUP MODE, in AUTO.		
	RO	[7] <b>TURN</b> 1-HS-62-140A, VCT MAKEUP CONTROL, to START. [7.1] <b>CHECK</b> Red light is LIT		
<b>The following actions are taken from GO-4" GO-4, "Normal Power Operation", Section 5.5 at Step [23]</b>				

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Event Description: Commence power escalation to 90%.									

Time	Position	Applicant's Actions or Behavior
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		[23] <b>CONTINUE</b> ascension to 90% power (70 to 74% if following refueling) by performing the following:
	BOP	[23.1] <b>IF</b> during any of the following steps the REFERENCE changes in an undesired manner, <b>THEN</b> <b>ADJUST</b> VPL to stop turbine load rise. <b>OR</b> <b>PUSH</b> TURBINE MANUAL to place the turbine control mode in manual mode and <b>PROCEED</b> to section 5.6
		[23.2] <b>ADJUST</b> VALVE POSITION LIMIT to 90% or $\leq$ to 5% above the Gov Control Indication.
		[23.3] <b>SET</b> LOAD RATE at predetermined value.
		[23.4] <b>PUSH</b> REFERENCE CONTROL $\Delta$ (raise) button to set desired load in SETTER display.
<b>NOTE</b> RCS should be diluted to raise TAVG, then Turbine load raised along with TAVG. Control rods will be used along with dilution to maintain $\Delta I$ and, if needed, for temperature.		
	BOP	[23.5] <b>PUSH</b> GO button.
		[23.6] <b>MONITOR</b> Generator Megawatts RISING.
<b>NOTE: Step 23 will be repeated on a repetitive basis until power changes have been made.</b>		

Op Test No.:	<u>NRC</u>	Scenario #	<u>2</u>	Event #	<u>2</u>	Page	<u>29</u>	of	<u>66</u>
Event Description: Loop 2 T cold Instrument fails High									
Time	Position	Applicant's Actions or Behavior							

### Console Operator: When directed, initiate Event 2

#### Indications available:

- 1-M-5A 91-F EAGLE PROC PROT CH II RTD FAILURE
- 1-M-5A 93-A RCS LOOP ΔT DEVIATION
- 1-M-5A 94-A TAVG-T REF DEVIATION
- 1-M-5A 94-B TAVG-T AUCTION DEVIATION
- Loop 2 RCS Tavg 1-TI-68-2A indicates approximately 590°F.
- Control Rods insert at 72 steps/minute.

	RO	Diagnose and announce failure.
	RO	May place Control Rods in Manual, after confirming that no 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.
	RO	1. <b>PLACE</b> control rods in MAN.
	RO	2. <b>CHECK</b> control rod movement STOPPED.
	RO	3. <b>MAINTAIN</b> T-avg on PROGRAM. (Reference Attachment 1) <b>USE</b> control rods. OR <b>ADJUST</b> turbine load.
	RO	4. <b>CHECK</b> loop T-avg channels NORMAL.
	RO	Determines that Loop 2 T-avg channel is <b>NOT NORMAL</b> , by observing 1-TI-68-25E on Panel 1-M-5.
	SRO	<b>4. Enters Step 4, Response Not Obtained Column for actions.</b>
	RO	<b>DEFEAT</b> failed loop ΔT and loop T-avg channels by placing 1-XS-68-2D, ΔT CHANNEL DEFEAT, and 1-XS-68-2M, TAVG CHANNEL DEFEAT, in failed channel position (Loop 2) then PULL.
	RO	<b>ENSURE</b> TR-68-2A placed to operable channel using 1-XS-68-2B, ΔT RCDR TR-68-2A LOOP SELECT [1-M-5]. <i>TR-68-2A is in Loop 1 position.</i>
	SRO	<b>NOTIFY</b> Maintenance to implement IMI-160 for failed channel.
	RO	<b>WHEN</b> at least 3 minutes have elapsed since failed T-avg channel is defeated, <b>THEN</b> a) <b>ENSURE</b> T-avg and T-ref within 1°F. b) <b>ENSURE</b> zero demand on control rod position indication [1-M-4]. c) <b>PLACE</b> rods in AUTO.

Op Test No.:	<u>NRC</u>	Scenario #	<u>2</u>	Event #	<u>2</u>	Page	<u>30</u>	of	<u>66</u>
Event Description: Loop 2 T cold Instrument fails High									
Time	Position	Applicant's Actions or Behavior							

	RO	5. <b>CHECK</b> Auct Tavg NORMAL on 1-TR-68-2B.
	RO	6. <b>CHECK</b> NIS power range channels NORMAL.
	RO	7. <b>CHECK</b> the following: <ul style="list-style-type: none"> <li>• Turbine impulse pressure channel 1-PI-1-73, NORMAL.</li> <li>• Tref and Auct Tavg NORMAL on 1-TR-68-2B (Reference Attachment 1)</li> </ul>
	RO	8. <b>MONITOR</b> core power distribution parameters: <ul style="list-style-type: none"> <li>• Power range channels.</li> <li>• <math>\Delta</math> Flux Indicators.</li> <li>• T-avg.</li> <li>• Loop <math>\Delta</math>T.</li> <li>• Incore TCs.</li> <li>• Feed flow/Steam flow.</li> </ul>
	SRO	9. <b>INITIATE</b> repairs to failed equipment.
	SRO	Contacts Work Control to initiate troubleshooting and repairs to Loop 2 T-avg instrument.
	SRO	10. <b>REFER TO</b> Tech Specs:
	SRO	3.3.1-1, Function 6. Overtemperature $\Delta$ T, Condition W. Function 7. Overpower $\Delta$ T, Condition W. Function 13. SG Water Level Low-Low Coincident with Vessel $\Delta$ T, Condition V 3.3.2-1, Function 6.b Auxiliary Feedwater Start, SG Water Level Low-Low Coincident with Vessel $\Delta$ T, Condition N
		<b>CAUTION</b> 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. <b>NOTIFY</b> Chemistry of any reactor power changes greater than 15% in one hour.
	SRO	12 <b>IF</b> loop $\Delta$ T and loop Tavg channels were defeated due to Tavg channel failure, and Tavg channel has been repaired, THEN PUSH IN 1-XS-68-2D, $\Delta$ T CHANNEL DEFEAT, and 1-XS-68-2M, TAVG CHANNEL DEFEAT, and select away from all $\Delta$ T and Tavg channels. <b>(Step is conditional and will be N/A'ed)</b>

Op Test No.:	<u>NRC</u>	Scenario #	<u>2</u>	Event #	<u>2</u>	Page	<u>31</u>	of	<u>66</u>
Event Description: Loop 2 T cold Instrument fails High									
Time	Position	Applicant's Actions or Behavior							

	SRO	13 . <b>WHEN</b> conditions allow auto rod control, <b>THEN</b> : a. <b>ENSURE</b> T-avg and T-ref within 1°F. b. <b>ENSURE</b> zero demand on control rod position indication [1-M-4]. c. <b>PLACE</b> rods in AUTO.
	SRO	14. <b>WHEN</b> conditions allow auto pZR level control, <b>THEN ENSURE</b> pZR level returned to normal program, <b>AND PLACE</b> 1-FCV-62-93 in AUTO
	SRO	15. <b>RETURN TO</b> Instruction in effect.
	CREW	<b>Crew Brief</b> would conducted for this event as time allows prior to the next event.
	CREW	<b>Notifications</b> should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. <u>Operations Management</u> - Shift Manager. <u>Maintenance Personnel</u> – Maintenance Shift Supervisor (MSS). ( <b>Note:</b> Maintenance notification may be delegated to the Shift Manager).
<b>Lead Examiner may cue the next event .</b>		

Op Test No.:	<u>NRC</u>	Scenario #	<u>2</u>	Event #	<u>3</u>	Page	<u>32</u>	of	<u>66</u>
Event Description: SG #4 pressure transmitter fails LOW									
Time	Position	Applicant's Actions or Behavior							

<b>Indications available:</b>		
<ul style="list-style-type: none"> <li>• 1-M-4C 63-F SG LEVEL DEVIATION</li> <li>• 1-M-6B 119-A SG 4 PRESS LO</li> <li>• 1-M-6B 123-A SG 4 PRESS NEG RATE</li> </ul>		
	BOP	Diagnose and announce failure
	BOP	May place SG #4 main feedwater regulating valve in Manual in order to minimize the effect of the instrument failure.
	SRO	Enters AOI-16, Loss Of Normal Feedwater, Section 3.6, MFW reg or bypass reg valve control failure and directs crew actions
	BOP	1. <b>CONTROL</b> failed MFW reg or bypass reg valve in MANUAL.
	SRO	2. <b>EVALUATE</b> placing control rods in MANUAL.
<p><b>NOTE</b> If the main reg. valve is malfunctioning, the bypass reg. valve for the affected loop may be manually positioned as necessary up to <math>0.85 \times 10^6</math> 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.</p>		
	BOP	3. <b>CHECK</b> SG levels on bypass reg valve control.
	SRO	<b>Enters Response Not Obtained Column and then proceeds to Step 5.</b>
	BOP	5. <b>CHECK</b> S/G levels returning to PROGRAM.
	BOP	6. <b>MONITOR</b> TDMFW Pump speed normal for current power level.
<p><b>NOTE A LO FW FLOW WTR HAMMER</b> annunciation [59-C] will be received when any main feedwater flow drops to less than <math>0.75 \times 10^6</math> lb/hr.</p>		
	BOP	7. <b>WHEN</b> any S/G MFW flow drops to less than $0.55 \times 10^6$ lb/hr, <b>THEN INITIATE</b> manual anti-water hammer actions: <i>No actions are required.</i>
<p><b>CAUTION</b> 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.</p>		
<p><b>NOTE</b> All power range monitors input to auctioneered high anticipatory circuit for bypass FW reg valves.</p>		
	RO	8. <b>CHECK</b> power range N41 through N44 NORMAL.
<p><b>NOTE</b> Steps 7 &amp; 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.</p>		
	BOP	9. <b>CHECK</b> controlling steam flow Channels NORMAL. Reports that SG #4 is NOT normal

Op Test No.:	<u>NRC</u>	Scenario #	<u>2</u>	Event #	<u>3</u>	Page	<u>33</u>	of	<u>66</u>
Event Description: SG #4 pressure transmitter fails LOW									
Time	Position	Applicant's Actions or Behavior							

	SRO	9. <b>RESPONSE NOT OBTAINED</b>
	BOP	a. <b>SELECT</b> operable channel. b. <b>EVALUATE</b> effect of the failed channel on the MFPs Speed Control and ADJUST in MANUAL as necessary while continuing this section.
	BOP	10. <b>CHECK</b> controlling FW flow channels NORMAL.
	SRO	11. <b>CHECK</b> press compensation channel(s) NORMAL.
	SRO	11. <b>RESPONSE NOT OBTAINED REFER</b> to Tech Specs
	SRO	3.3.2-1, Function 1.e Safety Injection - Steam Line Pressure-Low, Condition D Function 4.d Steam Line Isolation - Steam Line Pressure-Low, Condition D
	SRO	12. <b>IF</b> affected S/G controlling channel and level NORMAL, THEN a. <b>RETURN</b> MFW reg valve to AUTO. b. <b>RETURN</b> TDMFWP Speed Control to AUTO (if in MANUAL).
	SRO	13. <b>WHEN</b> conditions allow auto rod control, THEN, a. ENSURE T-avg and T-ref within 1°F. b. ENSURE zero demand on control rod position indication [1-M-4]. c. PLACE rods in AUTO.
	SRO	13. <b>INITIATE</b> repairs to failed equipment. ( <b>Step miss-numbered in actual plant procedure</b> )
	SRO	14. <b>RETURN TO</b> Instruction in effect.
	CREW	<b>Crew Brief</b> would be conducted for this event as time allows prior to the next event.
	CREW	<b>Notifications</b> should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. <u>Operations Management</u> - Shift Manager. <u>Maintenance Personnel</u> –Maintenance Shift Supervisor (MSS). ( <b>Note:</b> Maintenance notification may be delegated to the Shift Manager).
<b>Lead Examiner may cue the next event.</b>		

Op Test No.:	<u>NRC</u>	Scenario #	<u>2</u>	Event #	<u>4</u>	Page	<u>34</u>	of	<u>66</u>
Event Description: High vibration on turbine bearings 9, 10 and 11									
Time	Position	Applicant's Actions or Behavior							

**Console Operator: When directed, initiate Event 4**

**Indications available:**

- 1-M-2A 23-A TURB/GEN VIBRATION HI/HI-HI
- ICS display for Main Turbine indicates rising vibration on multiple bearings.

	BOP	Diagnose and announce failure
	BOP	Respond to Annunciator 23-A TURB/GEN VIBRATION HI/HI-HI
	SRO	Direct performance of ARI 23-A.
	SRO	Announces the High Vibration Limit of 14 mils to the crew
	BOP	[1] <b>IF</b> the cause of this alarm is COUPLING vibration, <b>THEN</b> notify the Sys Eng. No Operator action is required.
	BOP	[2] <b>MONITOR</b> 1-CRT-47-121 [1-M-2] to determine which bearing has possible vibration problems.
	BOP	[3] <b>DISPATCH</b> Operator to perform the following: <ul style="list-style-type: none"> <li>• <b>CHECK</b> local indications on 1-L-792.</li> <li>• <b>SOUND</b> Turbine bearings.</li> <li>• <b>CHECK</b> Turbine lube oil temperature.</li> <li>• <b>CHECK</b> Seal Oil temperature.</li> </ul>
	BOP	[4] <b>ATTEMPT</b> to stabilize or reduce bearing vibration by varying one or more of the following parameters within normal operation limits: <ul style="list-style-type: none"> <li>• Turbine bearing lube oil supply temperature.</li> <li>• Generator Megawatts and/or VARS.</li> <li>• Seal Oil temperature.</li> </ul>
<b>Note: (1) For 1-XX-47-131 the Hi alarm set point for the #11 exciter bearing, is 10 mils (ref. TACF 1-08-0003-047)</b>		
	SRO	[5] <b>IF</b> bearing vibration is above 7 mils (10 mils for # 11 bearing), <b>THEN NOTIFY</b> Engineering <b>AND EVALUATE</b> if load reduction or unit shutdown warranted.
	SRO	[6] <b>IF</b> bearing vibration continues to rise above evaluated limits, <b>THEN EVALUATE</b> rapid load reduction per AOI-39, or tripping the turbine prior to exceeding 14 mils vibration.
	SRO	[7] <b>ENSURE</b> Turbine is operated within startup and loading limitations of SOI-47.02, Turbo-generator Startup Operation.
	SRO	[8] <b>ENSURE</b> lube oil temperature, condenser vacuum, sealing steam pressure, and exhaust hood temperature are normal.
	SRO	Directs Reactor Trip and Turbine trip prior to the 14 mil setpoint being reached.

**Simulator Console Operators Instructions  
NRC Scenario 2**

**SIMULATOR SETUP INFORMATION**

<p><b>Console Operator: Open Rod Drive MG set input breakers for 480 V Unit Boards and Reactor Trip breakers by inserting Event 6. Time delays will cause breaker repositioning on a staggered basis with the first breaker opening at 90 seconds and the last breaker opening at 135 seconds.</b></p>		
<p><b>Indications available:</b></p> <ul style="list-style-type: none"> <li>MANUAL Reactor Trip initiated in response to the turbine high vibration condition is UNSUCCESSFUL from both 1-M-4 and 1-M-6 Reactor Trip switches.</li> </ul>		
	RO	Performs <b>IMMEDIATE OPERATOR ACTIONS of FR-S.1</b> - Attempts to trip the reactor from both the 1-M-4 and the 1-M-6 Reactor Trip switches.
<b>CRITICAL TASK</b>	RO	Performs <b>IMMEDIATE OPERATOR ACTION of FR-S.1</b> - Ensures control rod insertion by either AUTOMATIC or MANUAL means. While insertion of rods is being accomplished the RO may dispatch an AUO to open the Rod Drive MG set input breakers at the 480 V Unit Boards, and another AUO to open the Reactor Trip breakers locally.
<b>CRITICAL TASK</b>	BOP	Performs <b>IMMEDIATE OPERATOR ACTION of FR-S.1</b> - Manually trips the turbine upon recognition of the ATWS conditions.
<b>CRITICAL TASK</b>	BOP	Manually starts the Auxiliary Feedwater Pumps upon recognition of the ATWS conditions.
<p><b>Note to Evaluators: The small break LOCA event will be entered automatically 1 minute after the reactor trip breakers are manually opened.</b></p>		
	SRO	Implements FR-S.1, "Nuclear Power Generation/ATWS"
	RO	[1] <b>ENSURE</b> Reactor Trip: <ul style="list-style-type: none"> <li>Reactor trip and bypass</li> <li>breakers OPEN.</li> <li>RPIs at bottom of scale.</li> <li>Neutron flux DROPPING.</li> </ul>
	RO	[1] <b>RESPONSE NOT OBTAINED</b> Manually <b>TRIP</b> reactor. <b>IF</b> reactor will <b>NOT</b> trip, <b>THEN INSERT</b> control rods. (NOTE: since this is an IMMEDIATE OPERATOR ACTION, the RO is already performing these actions.)
	BOP	[2] <b>ENSURE</b> Turbine Trip: (NOTE: since this is an IMMEDIATE OPERATOR ACTION, the BOP has already performed these actions.)
	BOP	[3] <b>CHECK</b> AFW pumps operation: <ul style="list-style-type: none"> <li>a. Both MD AFW pumps RUNNING.</li> <li>b. TD AFW pump RUNNING.</li> </ul>

**Simulator Console Operators Instructions  
NRC Scenario 2**

**SIMULATOR SETUP INFORMATION**

		c. LCVs in AUTO or controlled in MANUAL.
	BOP	[3] <b>RESPONSE NOT OBTAINED</b> Manually <b>START</b> pumps and open valves as necessary. (NOTE: since this is an IMMEDIATE OPERATOR ACTION, the BOP has already performed these actions.)
	BOP	[4] <b>INITIATE</b> RCS Boration: a. <b>ENSURE</b> at least one centrifugal charging pump RUNNING. b. <b>OPEN</b> RWST outlet valves 1-LCV-62-135 and 1-LCV-62-136. c. <b>CLOSE</b> VCT outlet valves 1-LCV-62-132 and 1-LCV-62-133. d. <b>OPEN</b> BIT outlet valves 1-FCV-63-25 and 1-FCV-63-26 e. <b>CHECK</b> BIT flow. f. <b>PLACE</b> BA pumps in FAST speed. g. Throttle <b>OPEN</b> emergency borate valve 1-FCV-62-138 to maintain boric acid flow
	RO	[5] <b>CHECK</b> p2r pressure less than 2335 psig.
	RO	[6] <b>VERIFY</b> Cntmt Vent Isolation: <ul style="list-style-type: none"> <li>• Train A GREEN.</li> <li>• Train B GREEN.</li> </ul>
	BOP	[7] <b>IF</b> AFW flow established, <b>THEN</b> a. <b>PLACE</b> 1-HS-3-45 to LONG CYCLE RECIRC. b. <b>PLACE</b> MFW Bypass Reg Valves in AUTO.
	SRO	[8] <b>IF</b> SI actuated OR required, <b>THEN PERFORM</b> Steps 1 through 6 of E-0, Reactor Trip or Safety Injection, as time allows. <i>Assigns E-0, Steps 1 through 6 to the BOP.</i>
<p><b>The RO may have dispatched an AUO to open the Rod Drive MG set input breakers at the 480 V Unit Boards, and another AUO to open the Reactor Trip breakers locally while initially inserting the control rods.</b></p>		
	RO	[9] <b>ENSURE</b> the following trips: a. Reactor Trip.
	RO	a. <b>RESPONSE NOT OBTAINED DISPATCH</b> operator to locally trip reactor: <ul style="list-style-type: none"> <li>• <b>OPEN</b> reactor trip breakers and MG set output breakers [MG set room].</li> <li>• <b>OPEN</b> reactor trip breakers and MG set output breakers [MG set room].</li> </ul>

**Simulator Console Operators Instructions  
NRC Scenario 2**

**SIMULATOR SETUP INFORMATION**

		<ul style="list-style-type: none"> <li>• <b>OPEN</b> breakers to MG sets [480V unit boards A and B].</li> </ul>
	BOP	<p>b. Turbine Trip.</p> <p>The BOP tripped the turbine upon recognition of the ATWS conditions.</p>
	RO	<p>[10] <b>MAINTAIN</b> rod insertion UNTIL rods fully inserted.</p> <p><i>Rods are fully inserted based on local operator actions already performed.</i></p>
	SRO	<p>[11] <b>REFER TO</b> EPIP-1, Emergency Plan Classification Flowchart for ATWS event.</p>
	SRO	<p>[12] <b>MONITOR</b> reactor subcriticality:</p> <ul style="list-style-type: none"> <li>a. <b>CHECK</b> Power range channels less than 5%.</li> <li>b. <b>CHECK</b> Intermediate range startup rate NEGATIVE.</li> <li>c. <b>GO TO</b> Step 21.</li> </ul>
	RO	<p>[21] <b>TERMINATE</b> emergency boration:</p> <ul style="list-style-type: none"> <li>a. <b>PLACE</b> BA transfer pumps in SLOW speed.</li> <li>b. <b>CLOSE</b> emergency borate valve 1-FCV-62-138.</li> <li>c. <b>IF</b> alternate boration opened, THEN Locally <b>CLOSE</b> 1-ISV-62-929.</li> </ul>
<p><b>CAUTION</b> Evaluation of boration requirements should consider subsequent cooldown actions in addition to current conditions.</p>		
	SRO	<p>[22] <b>DETERMINE</b> shutdown margin requirements:</p> <ul style="list-style-type: none"> <li>a. <b>NOTIFY</b> Chemistry to sample RCS.</li> <li>b. <b>REFER TO</b> 1-SI-0-10, Shutdown Margin, OR REACTINW Computer Program.</li> <li>c. <b>INITIATE</b> RCS boration as necessary: <ul style="list-style-type: none"> <li>• <b>REFER TO</b> SOI-62.02, CVCS BORON Concentration Control.</li> </ul> </li> <li>d. <b>INITIATE</b> flushing boric acid piping as necessary: <ul style="list-style-type: none"> <li>• <b>REFER TO</b> AOI-34, Immediate Boration.</li> </ul> </li> </ul>
	SRO	<p>[23] <b>IF SI</b> actuated, <b>THEN RETURN TO</b> Instruction in effect.</p>
<p><b>The following actions are taken from E-0, "Reactor Trip or Safety Injection"</b></p>		
	SRO	<p>Transition is made to E-0.</p>
	SRO	<p>Directs performance of the high level steps 1-6, since these steps have already been addresses by the BOP during parallel performance with FR-S.1.</p>
	RO	<p>[1] <b>ENSURE</b> reactor trip:</p>
	BOP	<p>[2] <b>ENSURE</b> Turbine Trip:</p>
	BOP	<p>[3] <b>CHECK</b> 6.9 kV shutdown boards energized:</p>
	RO	<p>[4] <b>CHECK</b> SI actuated:</p>

**Simulator Console Operators Instructions  
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**SIMULATOR SETUP INFORMATION**

	BOP	[5] <b>EVALUATE</b> support systems:  <i>During performance of this step, the BOP will determine that the Containment Spray system did not automatically start upon the receipt of a hi-hi cntmt pressure signal. The BOP will manually actuate containment spray.</i>
	SRO	[6] <b>ANNOUNCE</b> reactor trip and safety injection over PA system.
	BOP	[7] <b>ENSURE</b> secondary heat sink available with either: <ul style="list-style-type: none"> <li>• Total AFW flow greater than 410 gpm,</li> <li>OR</li> <li>• At least one S/G NR level greater than 29% [39% ADV].</li> </ul>
	RO	[8] <b>MONITOR</b> RCS temp stable at or trending to 557°F:
	RO	[9] <b>ENSURE</b> excess letdown valves CLOSED: <ul style="list-style-type: none"> <li>• 1-FCV-62-54</li> <li>• 1-FCV-62-55</li> </ul>
	RO	[10] <b>CHECK</b> pZR PORVs and block valves: <ul style="list-style-type: none"> <li>a. PZR PORVs CLOSED.</li> <li>b. At least one block valve OPEN.</li> </ul>
	RO	[11] <b>CHECK</b> pZR safety valves CLOSED:  <b>EVALUATE</b> tailpipe temperatures and acoustic monitors.
	RO	[12] <b>CHECK</b> pZR sprays CLOSED.
	RO	[13] <b>CHECK</b> if RCPs should remain in service: <ul style="list-style-type: none"> <li>a. Phase B signals DARK [MISSP].</li> <li>b. RCS pressure greater than 1500 psig.</li> </ul>
	BOP	[14] <b>CHECK</b> S/G pressures: <ul style="list-style-type: none"> <li>• All S/G pressures controlled or rising.</li> <li>• All S/G pressures greater than 120 psig.</li> </ul>
	BOP	[15] <b>CHECK</b> for RUPTURED S/G <ul style="list-style-type: none"> <li>• All S/Gs narrow range levels CONTROLLED or DROPPING.</li> <li>• Secondary side radiation NORMAL from Appendix A.</li> </ul>
	SRO	[16] <b>CHECK</b> cntmt conditions: <ul style="list-style-type: none"> <li>• Cntmt pressure NORMAL.</li> <li>• Radiation NORMAL from Appendix A.</li> <li>• Cntmt sump level NORMAL.</li> <li>• Cntmt temp ann window DARK [104-B].</li> </ul>
	SRO	(Since cntmt parameters are abnormal, the SRO will enter the RNO and make the transition to E-1.)

**Simulator Console Operators Instructions  
NRC Scenario 2**

**SIMULATOR SETUP INFORMATION**

		<b>** GO TO E-1, Loss of Reactor or Secondary Coolant.</b>
	RO	[1] <b>CHECK</b> if RCPs should remain in service: a. Phase B signals DARK [MISSP]. b. RCS pressure greater than 1500 psig.
	SRO	[2] <b>REFER TO</b> EPIP-1, Emergency Plan Classification Flowchart.
	SRO	[3] <b>RECORD</b> current time to mark initiation of LOCA and determination of time for hot leg recirc.
	BOP	[4] <b>CHECK</b> S/G pressures: • All S/G pressures controlled or rising. • All S/Gs pressures greater than 120 psig.
	BOP	[5] <b>MAINTAIN</b> 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] <b>CHECK</b> 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] <b>ENSURE</b> 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] <b>MONITOR</b> pZR PORVs and block valves: a. PZR PORVs CLOSED. b. At least one block valve OPEN.
	SRO	[9] <b>DETERMINE</b> if cntmt spray should be stopped: a. <b>MONITOR</b> cntmt pressure less than 2.0 psig. b. <b>CHECK</b> at least one cntmt spray pump RUNNING. c. <b>RESET</b> cntmt spray signal. d. <b>STOP</b> cntmt spray pumps, and <b>PLACE</b> in A-AUTO. e. <b>CLOSE</b> cntmt spray discharge valves 1-FCV-72-2 and 1-FCV-72-39.

**Simulator Console Operators Instructions  
NRC Scenario 2**

**SIMULATOR SETUP INFORMATION**

	BOP	[10] <b>ENSURE</b> both pocket sump pumps STOPPED [M-15]:
	SRO	[11] <b>CHECK</b> SI termination criteria: a. <b>CHECK</b> RCS subcooling greater than 65°F [85°F ADV].
	SRO	[11] a. <b>RESPONSE NOT OBTAINED</b> a. <b>** GO TO</b> Caution prior to Step 12.
	RO	[12] <b>RESET</b> SI and <b>CHECK</b> the following: • SI ACTUATED permissive DARK. • AUTO SI BLOCKED permissive LIT.
	SRO	[13] <b>DETERMINE</b> if RHR pumps should be stopped: a. <b>CHECK</b> RCS pressure greater than 150 psig. b. <b>CHECK</b> RHR suction aligned from RWST. c. <b>CHECK</b> RCS pressure stable or rising. d. <b>STOP</b> RHR pumps and <b>PLACE</b> in A-AUTO. e. <b>MONITOR</b> RCS pressure greater than 150 psig.
	SRO	[14] <b>CHECK</b> pressure in all S/Gs controlled or rising.
	SRO	[15] <b>CHECK</b> RCS pressure stable or dropping.
	SRO	[16] <b>MONITOR</b> electrical board status: a. <b>CHECK</b> offsite power available b. <b>CHECK</b> all shutdown boards ENERGIZED by offsite power. c. <b>PLACE</b> any unloaded D/G in standby USING SOI-82 Diesel Generators.
	BOP	[17] <b>INITIATE</b> BOP realignment: • <b>REFER TO</b> AOI-17, Turbine Trip.
	BOP	[18] <b>INITIATE</b> 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.
	SRO	[19] <b>DETERMINE</b> if hydrogen igniters should be energized: a. <b>CHECK</b> hydrogen analyzers in service. b. <b>CHECK</b> cntmt hydrogen less than 5% [M-10].

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**SIMULATOR SETUP INFORMATION**

		<p>c. <b>ENERGIZE</b> hydrogen igniters [M-10]:</p> <ul style="list-style-type: none"> <li>• 1-HS-268-73 ON.</li> <li>• 1-HS-268-74 ON.</li> </ul>
	SRO	<p>[20] <b>ENSURE</b> RHR available for cntmt sump recirculation:</p> <ul style="list-style-type: none"> <li>• Power to at least one operable RHR pump AVAILABLE.</li> <li>• Cntmt sump valve 1-FCV-63-72 or 1-FCV-63-73 to operable RHR pump AVAILABLE.</li> </ul>
	SRO	<p>[21] <b>EVALUATE</b> plant equipment status:</p> <ul style="list-style-type: none"> <li>• <b>REFER TO</b> Appendix E (E-1), Equipment Evaluation.</li> </ul>
	BOP	<p>[22] <b>CHECK</b> Aux Bldg radiation for loss of RCS inventory outside cntmt:</p> <ul style="list-style-type: none"> <li>a. Area monitor recorders 1-RR-90-1 and 0-RR-90-12A Aux Bldg points NORMAL.</li> <li>b. Vent monitor recorder 0-RR-90-101 NORMAL trend prior to isolation.</li> </ul>
	SRO	<p>[23] <b>NOTIFY</b> Chemistry of event status and plant conditions.</p>
	SRO	<p>[24] <b>DETERMINE</b> if RCS cooldown and depressurization is required:</p> <ul style="list-style-type: none"> <li>a. <b>CHECK</b> RCS pressure greater than 150 psig.</li> <li>b. <b>GO TO</b> ES-1.2, Post LOCA Cooldown and Depressurization.</li> </ul>
<p><b>The following steps are taken from ES-1.2, “Post LOCA Cooldown and Depressurization”.</b></p>		
	RO	<p>[1] <b>PREPARE</b> for switchover to RHR cntmt sump:</p> <ul style="list-style-type: none"> <li>a. <b>RESTORE</b> power to 1-FCV-63-1, RWST to RHR suction, USING Appendix A, (ES-1.2) 1-FCV-63-1 Breaker Operation.</li> <li>b. <b>WHEN</b> RWST level less than 34%, <b>THEN GO TO</b> ES-1.3, Transfer to Containment Sump.</li> </ul>
<p><b>CAUTION</b> If offsite power is lost after SI reset, manual action will be required to restart the SI pumps and RHR pumps due to loss of SI start signal.</p>		
	RO	<p>[2] <b>RESET</b> SI, and <b>CHECK</b> the following:</p> <ul style="list-style-type: none"> <li>• SI ACTUATED permissive DARK.</li> <li>• AUTO SI BLOCKED permissive LIT.</li> </ul>
	RO	<p>[3] <b>RESET</b> Phase A and Phase B.</p>
	BOP	<p>[4] <b>ENSURE</b> cntmt air in service:</p> <ul style="list-style-type: none"> <li>a. Aux air press greater than 75 psig [M-15].</li> </ul>

**Simulator Console Operators Instructions  
NRC Scenario 2**

**SIMULATOR SETUP INFORMATION**

		<p>b. Cntmt air supply valves OPEN [M-15]:</p> <ul style="list-style-type: none"> <li>• 1-FCV-32-80.</li> <li>• 1-FCV-32-102.</li> <li>• 1-FCV-32-110.</li> </ul>
	BOP	<p>[5] <b>MONITOR</b> electrical board status:</p> <p>a. CHECK offsite power available.</p> <p>b. <b>CHECK</b> all shutdown boards ENERGIZED by offsite power.</p> <p>c. <b>CHECK</b> all unit boards ENERGIZED.</p> <p>d. <b>PLACE</b> any unloaded D/G in standby USING SOI-82 Diesel Generators.</p>
<p><b>NOTE</b> Backup heater C bank may need to be placed in AUX at the breaker compt to ensure it is turned OFF.</p>		
	RO	<p>[6] <b>ENSURE</b> pwr heaters off:</p> <ul style="list-style-type: none"> <li>• <b>PLACE</b> Backup heaters A-A OFF.</li> <li>• <b>PLACE</b> Backup heaters B-B OFF.</li> <li>• <b>PLACE</b> Backup heaters C OFF.</li> <li>• <b>PLACE</b> Control heaters D OFF.</li> </ul>
		<p>[7]. <b>DETERMINE</b> if RHR pumps should be stopped:</p> <p>a. <b>CHECK</b> RHR suction aligned from RWST.</p> <p>b. <b>CHECK</b> RCS press:</p> <ul style="list-style-type: none"> <li>• RCS press greater than 150 psig.</li> <li>• RCS press stable or rising.</li> </ul> <p>c. <b>STOP</b> RHR pumps, and <b>PLACE</b> in A-AUTO.</p> <p>d. <b>MONITOR</b> RCS press greater than 150 psig.</p>
		<p>[8] <b>MONITOR</b> Intact S/G NR levels:</p> <p>a. At least one intact S/G NR level greater than 29% [39% ADV].</p> <p>b. <b>CONTROL</b> intact S/G levels between 29% and 50% [39% and 50% ADV].</p>
		<p>[9] <b>EVALUATE</b> Motor-Driven AFW Pumps recirc flow per FOP.</p>
<p><b>NOTE</b> The following boration will result in a CB in the ACTIVE portion of the RCS which will be higher than the calculated cold shutdown CB.</p>		
<p><b>NOTE TO EVALUATOR:</b> The Surrogate STA will provide a value for RCS boron concentration which will satisfy cold shutdown conditions. This value is 1561 ppm.</p>		
		<p>[10] <b>INITIATE</b> RCS boration to cold shutdown boron concentration:</p> <p>a. <b>DETERMINE</b> cold shutdown CB:</p> <ul style="list-style-type: none"> <li>• <b>REFER TO</b> 1-SI-0-10, Shutdown Margin, OR REACTINW Computer Program.</li> </ul> <p>b. <b>INITIATE</b> RCS boration: • <b>REFER TO</b> SOI-62.02, CVCS Boron Concentration Control.</p>

**Simulator Console Operators Instructions  
NRC Scenario 2**

**SIMULATOR SETUP INFORMATION**

		<p>[11] <b>MONITOR</b> shutdown margin during RCS cooldown:</p> <p>a. <b>NOTIFY</b> Chemistry to monitor RCS boron concentration at the following sample points:</p> <ul style="list-style-type: none"> <li>• RCS hot leg.</li> <li>• CVCS letdown line.</li> </ul>
<p><b>NOTE</b> After the low steamline pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.</p>		
		<p><b>INITIATE</b> RCS cooldown to cold shutdown:</p> <p>a. <b>WHEN</b> RCS pressure is less than 1962 psig (P-11), <b>THEN</b></p> <ul style="list-style-type: none"> <li>• <b>BLOCK</b> low pwr pressure SI.</li> <li>• <b>BLOCK</b> low steam pressure SI.</li> </ul> <p>b. <b>MAINTAIN</b> T-cold cooldown rate less than 100°F in one hour.</p> <p>c. <b>DUMP</b> steam to condenser from Intact S/Gs.</p> <p>d. <b>IF</b> RHR in shutdown cooling mode, <b>THEN USE</b> RHR and S/Gs for cooling.</p>
<p><b>END OF SCENARIO</b></p>		

**Simulator Console Operators Instructions  
NRC Scenario 2**

**SIMULATOR SETUP INFORMATION**

1. **ENSURE** NRC EXAMINATION SECURITY has been established.
2. **RESET** the Simulator to **IC-332**. **(Must have correct password in order to RESET)**.
3. **ENSURE** the following information appears on the Director Summary Display:

<b>Key</b>	<b>Description</b>	<b>Event</b>	<b>Final</b>
rp01c	manual and automatic reactor trip signal failure (atws)	active	
cs02	failure of cs signal by hi-hi cntmt pressure	active	
rx02f	cold leg 2 rtd 2 failure	1	100
rx26g	stm gen pres transmitter failure, chnl I pt-1-27a	2	0
tu02k	main turbine high vibes exciter brg #11	3	95
tu02j	main turbine high vibes exciter brg #10	3	90
tu02i	main turbine high vibes gen brg #9	3	100
th03c	loca - small leak loop 3	4	50
rd01	rod control mg set #1 bkr	6	open
rd02	rod control mg set #2 bkr	6	open
rp15a	reactor trip breaker rta trip	6	open
rp15b	reactor trip breaker rtb trip	6	open
fw07a	electric afw pump a trip	active	
hs-3-118a-1	01160 aux fw pump a-a motor sw (green)	active	off
hs-3-335	intentionally left blank	active	close
hs-3-335-1	hs-3-355 indicating lights	active	off
hs-3-335-2	hs-3-355 indicating lights	active	off
hs-3-118a	hs-3-118a auxiliary feedwater pump a-a motor sw	active	ptlock

4. Place Hold Order Tag on 1A MD AFWP A handswitch, 1-HS-3-118A.
5. Place the simulator in RUN momentarily. Acknowledge alarms and then place the simulator in FREEZE.

1	N/A	Commence power escalation to 90%.
2	1	<p>Loop 2 RCS T-cold instrument fails HIGH.</p> <p><b>ROLE PLAY:</b> 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.</p> <p><b>ROLE PLAY:</b> 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.</p>
3	2	<p>SG #4 pressure transmitter fails LOW.</p> <p><b>ROLE PLAY:</b> 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.</p> <p><b>ROLE PLAY:</b> 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.</p>
4	3	<p>High vibration on turbine bearings 9, 10 and 11.</p> <p><b>ROLE PLAY:</b></p>
5	N/A (malfunction entered as part of setup)	<p>Reactor trip failure (ATWS).</p> <p><b>ROLE PLAY:</b> As Turbine Building AUO, acknowledge direction to open the 480 V breakers to the Rod Drive MG sets.</p> <p><b>ROLE PLAY:</b> As Control Building AUO, acknowledge direction to manually open the Reactor Trip breakers and MG set output breakers.</p> <p><b>Activate Simulator Event 6, in order to begin the sequence of events to locally open breakers after the AUOs have been dispatched.</b></p>
6	4	An RCS leak develops, progressing to a Small Break LOCA.
7	N/A (malfunction entered as part of setup)	Containment Spray fails to actuate on Hi-Hi Containment pressure actuation.

Facility:	<b>Watts Bar</b>	Scenario No.:	<b>3</b>	Op Test No.:	<b>1</b>
Examiners:	_____	Operators:	_____	_____	_____
Initial Conditions:	100% RTP, EOL, RCS boron is 69 ppm.				
Turnover:	1-SI-85-2 was temporarily suspended. Control Bank D rods need to be exercised to complete the surveillance; then reduce power to 95% for removing 1C Condensate Booster Pump from service due to an oil leak. 1A Motor Driven Aux Feed Pump was removed from service 12 hours ago for motor repairs. LCO 3.7.5.b was entered. The 1A MD AFW Pump is expected to be returned to service in 48 hours.				
Event No.	Malf. No.	Event Type*	Event Description		
1	N/A	N-SRO/RO	Perform 1-SI-85-2 Reactivity Control Systems Moveable Assemblies (Mode 1 and 2).		
2	N/A	R-SRO/RO	Power reduction to 95%.		
3	NI07B	I-RO/SRO I-BOP TS-SRO	Power Range N42 Fails High.		
4	CV01A	C-SRO/RO TS-SRO	Charging Pump 1A-A trips on instantaneous overcurrent.		
5	FW06 FW05A	C-SRO/BOP R-RO	Main Feedwater Pump 1A trips due to low bearing oil pressure. Standby Main Feedwater Pump trips on auto start.		
6	FW05B	M-ALL	Main Feedwater Pump 1B trips due to low bearing oil pressure.		
7	ED06B	C-SRO/BOP	Loss of 1B 6.9 KV Shutdown Board on differential.		
8	FW22C	C-SRO/BOP	TDAFDW Pump becomes steam/air bound. (FR-H.1).		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					



Op Test No.: <u>  NRC  </u> Scenario # <u>  3  </u> Event # <u>  1  </u> Page <u>  48  </u> of <u>  66  </u>		
Event Description: Perform 1-SI-85-2, Reactivity Control Moveable Assemblies.		
Time	Position	Applicant's Actions or Behavior

<b>1-SI-85-2, "REACTIVITY CONTROL SYSTEMS MOVABLE CONTROL ASSEMBLIES (MODES 1 AND 2)" Section 6.8, Control Bank D (CBD) and Section 6.9, Restoration will be performed to accomplish this task.</b>		
<b>Section 6.8, Control Bank D (CBD)</b>		
<b>NOTE 1</b> Between rod bank movements, Tavg - Tref deviation may be adjusted using manual rod control or by adjusting turbine load.		
<b>NOTE 2</b> Rod movement is verified by monitoring (RPIs) and Step Counters.		
	RO	<b>[1] ENSURE</b> Tavg - Tref deviation is adjusted to allow for bank movement of ten steps.
<b>NOTE</b> 1-XA-55-4B-87A, ROD INSERTION LIMIT LO, may actuate during the following test sections.		
	RO	<b>[2] RECORD</b> the initial position of the following Step Counters: 1-CBDG1, CONTROL BANK D1: _____ steps. 1-CBDG2, CONTROL BANK D2: _____ steps.
<b>NOTE</b> The operator has the option of moving Control Bank D five Steps in one direction, then ten Steps in the opposite direction and then return to normal. This method will have less overall effect on Reactor Power.		
	RO	<b>[3] PLACE</b> 1-RBSS, ROD BANK SELECT, in CBD.
<b>NOTE</b> 1-XA-55-4A-64F, C-11 BANK D AUTO WITHDRAWAL BLOCKED, will actuate if Control Bank D Rods are withdrawn past 220 Steps.		
	RO	<b>[4] MOVE</b> Control Bank D at least ten Steps in any one direction, as indicated on the appropriate Step Counter, and <b>VERIFY</b> movement of the rods in the proper direction is indicated on the appropriate RPIs. (Acc Crit)
	RO	<b>[5] VERIFY</b> Control Bank D1 and D2 Step Counters agree within plus or minus 2 steps.
	RO	<b>[6] RETURN</b> Control Bank D to its original position as recorded in Step <b>[2]</b> of this section using 1-FLRM, ROD MOTION CONTROL.
		<b>[7] IF</b> Rod Insertion Limit Lo Alarm 87-A does not clear, <b>THEN</b> <ul style="list-style-type: none"> <li>• <b>REFER TO</b> Tech Spec LCO 3.1.7.</li> <li>• <b>CONTACT</b> System Engineer to reset 87-A USING ICS.</li> </ul>

Op Test No.: <u>  NRC  </u> Scenario # <u>  3  </u> Event # <u>  1  </u> Page <u>  49  </u> of <u>  66  </u>		
Event Description: Perform 1-SI-85-2, Reactivity Control Moveable Assemblies.		
Time	Position	Applicant's Actions or Behavior

<b>Section 6.9, Restoration</b>		
<p><b>CAUTION</b> If rod movement demand exists via any of the following methods, the rod bank select switch should be moved through AUTO rapidly to avoid undesired rod movement:</p> <ul style="list-style-type: none"> <li>• Tavg is not within 1°F of program,</li> <li>• Less than 5 minutes has elapsed since any change in rod control input (i.e, Tavg, Tref, or NIS),</li> <li>• Demand is indicated on the Computer Enhanced Rod Position Indication (CERPI) monitors [1-M-4].</li> </ul>		
	RO	<b>[1] PLACE</b> 1-RBSS, ROD BANK SELECT, in MANUAL.
	RO	<b>[2] IF</b> Tavg not on program, <b>THEN RETURN</b> Tavg - Tref within 1.5°F.
	RO	<b>[3] RETURN</b> 1-RBSS, ROD BANK SELECT, to the as found position recorded in Section 4.3, Step [2] (page 6 of 17).
	RO	<b>[4] IF</b> Acceptance Criteria is not met, <b>THEN NOTIFY</b> the SRO as soon as practical after observation of the noncompliance, for consideration of possible entry into LCO 3.1.5.

Op Test No.:   NRC   Scenario #   3   Event #   2   Page   50   of   66  

Event Description: Power Reduction to 95%.

Time	Position	Applicant's Actions or Behavior
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**The following actions are associated with the power reduction from 100% to 95% to remove the 1C Condensate Booster Pump from service.**

	SRO	[1] Operations Superintendent has authorized load reduction.
	SRO	[2] REVIEW of GO-4, "Normal Power Operation", Precautions and Limitations Section 3.0 COMPLETE.
	SRO	[3] <b>IF</b> reducing power for compliance to LCO 3.7.1, <b>THEN</b> : [3.1] <b>ENSURE</b> Reactor Engineering revises neutron flux high reactor trip setpoints per Tech Spec 3.7.1. [3.2] <b>MAINTAIN</b> power less than revised trip setpoint as allowed by Tech Spec 3.7.1.
	SRO	[4] <b>ENSURE</b> RADIATION PROTECTION is notified of impending load reduction.
	SRO	[5] <b>ENSURE</b> Chemistry evaluates status and flowrate of the following for the impending load reduction: <ul style="list-style-type: none"> <li>• Steam Generator Blowdown.</li> <li>• Condensate Polishers.</li> </ul>
	SRO	[6] <b>NOTIFY</b> COND DI Operator is notified of load reduction and to remove beds as needed.
	SRO	[7] <b>NOTIFY</b> Load Coordinator is notified of impending load reduction.
	RO	[8] <b>ENSURE</b> letdown flow is maximized.

- NOTES**
- 1) For a change in the rated thermal power greater than or equal to 15% in 1 hour, Chemistry shall check Reactor Coolant DE I-131 specific activity by initiating 1-SI-68-28 (SR 3.4.16.2).
  - 2) QPTR alarms should be expected during significant load reductions, and the required LCO entries should NOT be considered as unplanned.
  - 3) For core operating recommendations for situations such as End of Life or unusual power maneuvers, contact Reactor Engineering.
  - 4) Turbine load change may be stopped by depressing the HOLD push button, using VPL, or by depressing the MANUAL push button.
  - 5) TI-45, Determination of Preconditioned Reactor Power, identifies rate of power decreases when plant conditions and/or operating limitations do not require a faster reduction in power.
  - 6) The Conditioned Power Level (CPL) needs to be tracked for ramp rate considerations.

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>2</u>	Page	<u>51</u>	of	<u>66</u>
Event Description: Power Reduction to 95%.									
Time	Position	Applicant's Actions or Behavior							

	SRO	[9] <b>DETERMINE</b> the CPL and ramp rate restrictions from TI-45, Determination of Preconditioned Reactor Power, AND <b>RECORD</b> section reviewed / restrictions in narrative log:  <b>RECORD</b> section reviewed / restrictions in table below:
	BOP	[10] <b>INITIATE</b> load reduction by <b>PERFORMING</b> the following on the Turbine EHC panel:  [10.1] <b>IF</b> during any of the following steps the REFERENCE changes in an undesired manner, <b>THEN ADJUST VPL</b> to stop turbine load rise.  <b>OR</b>  <b>PUSH</b> TURBINE MANUAL to place the turbine control mode in manual mode and proceed to section 5.6.
	BOP	[10.2] <b>PUSH</b> REFERENCE CONTROL (lower) button to set desired load in SETTER display.
	BOP	[10.3] <b>SET</b> LOAD RATE as required.
	BOP	[10.4] <b>PUSH</b> GO button.
	BOP	[10.5] <b>MONITOR</b> Generator Megawatts DROPPING.
	BOP	[10.6] <b>CHECK</b> that load change has <b>STOPPED</b> when reference display equals setter  <b>OR</b>  <b>IF</b> desired to stop the load change, <b>THEN STOP</b> the load change by <b>DEPRESSING</b> the HOLD pushbutton
	BOP	[10.7] <b>WHEN</b> desired to resume the load change, <b>THEN PRESS</b> the GO push button and continue to monitor load.
	BOP	[10.8] <b>ADJUST</b> VALVE POSITION LIMIT to $\leq 5\%$ above the Gov Control Indication or as needed.
	BOP	[10.9] <b>REPEAT</b> Steps 5.3[10.2] to 5.3[10.5] to achieve desired load.
<b>CAUTION</b> Do not exceed load rate of 5%/minute, or 10% step change		
	BOP	[11] <b>MONITOR</b> the following during the load reduction:
	BOP	[11.1] TAVG following TREF program.
	BOP	[11.2] All RPIs, Step Counters, Loop $\Delta T$ , and NIS for correct power distribution, quadrant power tilts, rod insertion, rod misalignment, inoperable RPIs, and inoperable rods.
<b>Lead Examiner may cue the next event when the power reduction has been initiated.</b>		

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>3</u>	Page	<u>52</u>	of	<u>66</u>
Event Description: Power Range N42 Fails High.									
Time	Position	Applicant's Actions or Behavior							

Expected Alarms:		
1-M-3C 63-F SG LEVEL DEVIATION		
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		
	RO	Diagnoses and announces failure of Power Range Channel N42.
	BOP	Determines that N42 failure is affecting SG level control associated with SG 2 and 3.
	SRO	Enter and direct actions of AOI-4, "Nuclear Instrumentation Malfunctions, Section 3.4, "Power Range Monitor (PRM) Failure" and directs crew actions.
	RO	1. <b>PLACE</b> control rods in MANUAL.
	RO	2. <b>CHECK</b> rod motion STOPPED.
<b>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.</b>		
<b>NOTE</b> All four bypass reg valves are controlled by auctioneered high nuclear power as an anticipatory input.		
	RO	3. <b>CHECK</b> N41 and N42 NORMAL.
	BOP	<b>3. <u>RESPONSE NOT OBTAINED</u></b> <b>ENSURE</b> S/G levels on PROGRAM: a. <b>PLACE</b> affected S/G MFW reg valves (main and/or bypass) in MANUAL. b. <b>ADJUST</b> FW as required to maintain levels on program. c. <b>PLACE</b> affected S/G LEVEL - NIS BIAS controller in MANUAL. d. <b>MATCH</b> bias controller to demand output on unaffected SGs. e. <b>ENSURE</b> S/G reg valve level demand and level are matched. f. <b>PLACE</b> affected S/G reg valves (main or bypass, as required) in AUTO.
<b>NOTE</b> 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. <b>MAINTAIN</b> T-avg and T-ref within 3°F.
	RO	5. <b>ENSURE</b> 1-NR-92-145 recording operable power range channel.
<b>NOTE</b> 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		

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>3</u>	Page	<u>53</u>	of	<u>66</u>
Event Description: Power Range N42 Fails High.									
Time	Position	Applicant's Actions or Behavior							

range monitor channel.		
	RO	6. <b>ENSURE</b> 1-TR-68-2A placed to operable $\Delta T/OT\Delta T/OP\Delta T$ channel using 1-XS-68-2B, $\Delta T$ RCDR TR-68-2A LOOP SELECT [1-M-5].
	RO	7. <b>DEFEAT</b> affected PRM functions: <ul style="list-style-type: none"> <li>• <b>REFER TO</b> Attachment 1, PRM Function At NIS Rack.</li> </ul>
NOTE TO EVALUATOR: The following steps are taken from AOI-4, Attachment 1, PRM Function at NIS Rack.		
<p><b>NOTE</b> The following annunciators may be affected by defeating a PRM channel:</p> <ul style="list-style-type: none"> <li>• [66-C, 67-C, 68-C, 69-C] N-(#) OVERPOWER ROD STOP BYPASSED.</li> <li>• [82-E] NIS CHANNEL IN TEST.</li> <li>• [83-A] POWER RANGE OVERPOWER ROD WD STOP.</li> <li>• [83-E] POWER RANGE CHANNEL DEVIATION.</li> <li>• [115-C] POWER RANGE FLUX HI.</li> <li>• [115-E] POWER RANGE FLUX RATE HI.</li> </ul>		
	RO	1. <b>PERFORM</b> the following steps for the affected PRM:
	RO	a. <b>PLACE</b> DETECTOR CURRENT COMPARATOR switch for UPPER SECTION to failed channel.
	RO	b. <b>PLACE</b> DETECTOR CURRENT COMPARATOR switch for LOWER SECTION to failed channel.
<p><b>NOTE</b> On the following step, annunciator window 83-A, POWER RANGE OVERPOWER ROD WD STOP will clear (if channel failure was high) and window 66-C, 67-C, 68-C OR 69-C, N-(#) OVERPOWER ROD STOP BYPASSED, will come into alarm depending on which channel is bypassed.</p>		
	RO	c. <b>PLACE</b> ROD STOP BYPASS switch to failed channel.
	RO	d. <b>PLACE</b> POWER MISMATCH BYPASS switch to failed channel.
<p><b>NOTE</b> On the following step, annunciator window 83-E, POWER RANGE CHANNEL DEVIATION, will clear and annunciator window 82-E, NIS CHANNEL IN TEST, will come into alarm.</p>		
	RO	e. <b>PLACE</b> COMPARATOR CHANNEL DEFEAT switch to failed channel.
<p><b>NOTE</b> On the following step, annunciator window 115-E, POWER RANGE FLUX RATE HI, will clear if the positive rate trip light is LIT.</p>		
	RO	f. <b>IF</b> POSITIVE RATE TRIP is LIT, <b>THEN RESET</b> RATE MODE switch.
NOTE TO EVALUATOR: The crew must return to AOI-4, Section 3.4, Step 8 to complete		

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>3</u>	Page	<u>54</u>	of	<u>66</u>
Event Description: Power Range N42 Fails High.									
Time	Position	Applicant's Actions or Behavior							

required actions. The following continues with Step 8.		
<b>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.</b>		
	RO	8. <b>WHEN</b> failed PRM defeated <b>AND</b> AUTO rod control desired, <b>THEN:</b> a. <b>ENSURE</b> T-avg and T-ref within 1°. b. <b>ENSURE</b> zero demand on control rod position indication [1-M-4]. c. <b>PLACE</b> control rods in AUTO.
	SRO	9. <b>INITIATE</b> repairs on failed channel.
	SRO	10. <b>NOTIFY</b> Work Control to have IM trip failed channel bistables.
<b>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.</b>		
	SRO	11. <b>WHEN</b> notified bistables are tripped, <b>CHECK</b> lights and alarms referenced in Appendix A are LIT.
	SRO	12. <b>REFER TO</b> Tech Specs:
	SRO	3.3.1-1, Function 2. Power Range Neutron Flux a. High Condition D Function 2. Power Range Neutron Flux b. Low Condition E Function 3, Power Range Neutron Flux Rate a. High Condition E Function 6, Overtemperature ΔT, Condition W Function 16, Power Range Neutron Flux, P-8, Condition S Function 16, Power Range Neutron Flux, P-9, Condition S Function 16, Power Range Neutron Flux, P-10, Condition S 3.2.4, Quadrant Power Tilt Ratio (QPTR) SR3.2.4.2 Verify QPTR is within limits using the moveable incore detectors ONCE within 12 hours AND 12 hours thereafter.
	SRO	13. <b>NOTIFY</b> Operations Duty Manager and Rx Engineering of failed channel.
	SRO	14. <b>DO NOT CONTINUE</b> with this Instruction UNTIL failed PRM repair is completed.
	CREW	<b>Crew Brief</b> would typically be conducted for this event as time allows prior to the next event.

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 Event Description: Power Range N42 Fails High.

Time	Position	Applicant's Actions or Behavior
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	CREW	<p><b>Notifications</b> should be addressed as applicable if not specifically addressed by the procedure or in the crew brief.</p> <p><u>Operations Management</u> - Shift Manager.</p> <p><u>Maintenance Personnel</u> –Maintenance Shift Supervisor (MSS).                      (<b>Note:</b> Maintenance notification may be delegated to the Shift Manager).</p>

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>4</u>	Page	<u>56</u>	of	<u>66</u>
Event Description: Overcurrent Trip of Charging Pump 1A-A.									
Time	Position	Applicant's Actions or Behavior							

Expected Alarms:		
1-M-1B, 14-E M-1 THRU M-6 MOTOR TRIPOUT		
1-M-5D, 108-A CHARGING FLOW HI/LO		
	RO	Diagnoses and announces trip of 1A CCP.
	BOP	Dispatches an AUO to the 1A CCP to determine cause of trip. Dispatches AUO to 1A 6.9 KV Shutdown Board to check 1A CCP breaker for targets.
	RO	Refers to Annunciator 108-A, CHARGING FLOW HI/LO, for actions
	SRO	Enter and direct actions of AOI-20, "MALFUNCTION OF PRESSURIZER LEVEL CONTROL SYSTEM" and directs crew actions.
<b>CAUTION Charging and letdown must be in service together. If letdown isolates or charging is lost, the other must be isolated.</b>		
	SRO	1. <b>CHECK</b> pzs level program signal NORMAL: <ul style="list-style-type: none"> <li>1-LR-68-339 (green pen).</li> </ul>
<b>NOTE</b> 1-XS-68-339E selects one channel to control level to program and one backup channel for control interlocks.		
	SRO	2. <b>CHECK</b> if 1-XS-68-339E is selected to FAILED channel (control or backup): <ul style="list-style-type: none"> <li>LI-68-339,</li> <li>LI-68-320,</li> <li>LI-68-335.</li> </ul>
	SRO	Step 2 <b>RESPONSE NOT OBTAINED</b> <b>IF</b> pzs level is low <b>OR</b> dropping, <b>THEN</b> <b>** GO TO</b> Step 12.
	SRO	12. <b>CHECK</b> any charging pump RUNNING.
<b>CRITICAL TASK</b>	RO	Step 12 <b>RESPONSE NOT OBTAINED</b> <b>PERFORM</b> the following: a. <b>ISOLATE</b> letdown: <ul style="list-style-type: none"> <li><b>CLOSE</b> letdown orifice(s).</li> <li><b>CLOSE</b> 1-FCV-62-69.</li> <li><b>CLOSE</b> 1-FCV-62-70.</li> </ul>
	RO	b. <b>RESTORE</b> charging and letdown: <ul style="list-style-type: none"> <li><b>REFER TO</b> Attachment 1.</li> </ul>

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>4</u>	Page	<u>57</u>	of	<u>66</u>
Event Description: Overcurrent Trip of Charging Pump 1A-A.									
Time	Position	Applicant's Actions or Behavior							

	SRO	c. <b>** GO TO</b> Step 18.
NOTE TO EVALUATOR: The following steps are contained in AOI-20, Attachment 1, ALIGNMENT OF CHARGING AND LETDOWN.		
	RO	<p>1. <b>IF</b> charging <b>NOT</b> established, <b>THEN PERFORM</b> the following:</p> <p>a. <b>CLOSE</b> 1-FCV-62-89, CHRG HDR-RCP SEALS FLOW CONTROL.</p> <p>b. <b>ENSURE</b> Charging Pump running.</p> <p>c. <b>OPEN</b> 1-FCV-62-90 and 1-FCV-62-91, CHARGING LINE ISOL.</p> <p>d. <b>ENSURE</b> 1-FCV-62-85, NORM CHARGING TO LOOP 1, or 1-FCV-62-86, ALT CHARGING TO LOOP 4, OPEN.</p> <p>e. <b>ADJUST</b> 1-FCV-62-93 to maintain seal injection flow between 8 and 13 gpm for each RCP.</p>
	RO	<p>2. <b>ENSURE</b> letdown isol valves OPEN:</p> <ul style="list-style-type: none"> <li>• 1-FCV-62-69, CVCS LETDOWN ISOLATION.</li> <li>• 1-FCV-62-70, CVCS LETDOWN ISOLATION.</li> <li>• 1-FCV-62-77, CVCS LP LETDOWN ISOLATION.</li> </ul>
	RO	3. <b>PLACE</b> 1-HIC-62-78A, LETDOWN HX OUTLET TEMP TCV-70-192 CNTL, in MANUAL at 25% OPEN.
	RO	4. <b>PLACE</b> 1-HIC-62-81A, LETDOWN PRESS CONTROL, in MANUAL at 40-50% OPEN if using 75 gpm orifice (20-30% OPEN if using 45 gpm orifice).
	RO	5. <b>THROTTLE OPEN</b> 1-FCV-62-89 and <b>ESTABLISH</b> 75 gpm or greater charging flow while maintaining seal injection flow between 8 and 13 gpm for each RCP using 1-FCV-62-93.
	RO	<p>6. <b>OPEN</b> letdown orifices as needed:</p> <ul style="list-style-type: none"> <li>• 1-FCV-62-72 (45 gpm).</li> <li>• 1-FCV-62-73 (75 gpm).</li> <li>• 1-FCV-62-74 (75 gpm).</li> <li>• 1-FCV-62-76 (5 gpm).</li> </ul>
	RO	7. <b>ADJUST</b> 1-HIC-62-81A, LETDOWN PRESS CONTROL, for desired press, (320 psig at normal letdown temp), and <b>PLACE</b> in AUTO.
	RO	8. <b>PLACE</b> 1-HIC-62-78A, LETDOWN HX OUTLET TEMP TCV-70-192 CNTL, in AUTO.
	RO	9. <b>RETURN</b> pZR level to program.

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>4</u>	Page	<u>58</u>	of	<u>66</u>
Event Description: Overcurrent Trip of Charging Pump 1A-A.									
Time	Position	Applicant's Actions or Behavior							

	RO	10. <b>RETURN</b> 1-HIC-62-93A, CHARGING FLOW PZR LEVEL CONTROL, in AUTO.
<b>NOTE TO EVALUATOR: The crew must return to AOI-20, Step 18 after performance of Attachment 1.</b>		
	SRO	18. <b>NOTIFY</b> Work Control to initiate corrective action, if necessary.
		19. <b>EVALUATE</b> system alignment/status: <ul style="list-style-type: none"> <li>• <b>REVIEW</b> actions performed in this Instruction.</li> <li>• <b>REFER TO</b> SOI-62.01, CVCS - Charging and Letdown.</li> </ul>
	SRO	Evaluate Technical Specifications and Technical Requirements based on the loss of the 1A CCP.
		Technical Specifications: 3.5.2 ECCS-Operating, Condition A. Technical Requirements: 3.1.4, Charging Pumps, Operating, Condition A.
	CREW	<b>Crew Brief</b> would typically be conducted for this event as time allows prior to the next event.
	CREW	<b>Notifications</b> should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. <u>Operations Management</u> - Shift Manager. <u>Maintenance Personnel</u> – Maintenance Shift Supervisor (MSS). ( <b>Note:</b> Maintenance notification may be delegated to the Shift Manager).

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>5</u>	Page	<u>59</u>	of	<u>66</u>
Event Description: 1A Main Feed Pump trips due to low bearing oil pressure. Standby Main Feed Pump Trips on Auto Start.									
Time	Position	Applicant's Actions or Behavior							

Expected Alarms:		
1-M-1C 14-E, M-1 THRU M-6 MOTOR TRIPOUT		
Procedure:		
Technical Specifications:		
	BOP	Diagnoses and announces trip of 1A Main Feed Pump, and the trip of the Standby MPF on the start signal.
	RO	Determines that a Balance of Plant Runback is in progress.
	RO	Dispatches an AUO to the 1 A MFP to determine the cause of the trip. Dispatches an AUO to 6.9 KV Unit Board 1D to determine the cause of the trip of the Standby Main Feed Pump.
	SRO	Enter and direct actions of AOI-16, "LOSS OF NORMAL FEEDWATER" and enters Section 3.5, "MFWP TRIP greater than or equal to 800MWe (67% Turbine Load)".
	SRO	1. <b>IF</b> loss of S/G level is imminent, <b>THEN TRIP</b> reactor, and <b>** GO TO E-0</b> , Reactor Trip or Safety Injection.
	SRO	2. <b>CHECK</b> turbine load less than or equal to 1000 MWe (85%).
	BOP	2. <b>RESPONSE NOT OBTAINED</b> <b>ENSURE</b> Standby MFWP running. <b>REDUCE</b> turbine load to less than 1000 MWe with valve position limiter.
	BOP	3. <b>PLACE</b> tripped MFP recirc valve controller in <b>MANUAL</b> , and <b>CLOSE</b> recirc valve.
	SRO	4. <b>CHECK</b> turbine load less than 800 MWe (67%),
	BOP	4. <b>RESPONSE NOT OBTAINED</b> <b>ENSURE</b> Standby MFWP running. <b>IF</b> Standby MFWP <b>NOT</b> available <b>THEN REDUCE</b> turbine load to less than 800 MWe with valve position limiter.
	BOP	5. <b>ENSURE</b> MFWP speed rising to control S/G ΔP and levels on program.
<b>CAUTION Continued load reductions below 800 MWe should be done using normal turbine controls at less than or equal to 5% min.</b>		
	BOP	6. <b>ENSURE</b> adequate feed flow for existing conditions: <ul style="list-style-type: none"> <li>• Feed flow greater than or equal to steam flow.</li> <li>• S/G levels returning to program.</li> </ul>
	RO	7. <b>ENSURE</b> T-avg and T-ref within 3°F.
<b>CAUTION Runback may result in exceeding Tech Spec 3.2.3 limits on Axial Flux</b>		

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>5</u>	Page	<u>60</u>	of	<u>66</u>
Event Description: 1A Main Feed Pump trips due to low bearing oil pressure. Standby Main Feed Pump Trips on Auto Start.									
Time	Position	Applicant's Actions or Behavior							

Difference (AFD).		
	SRO	8. <b>MONITOR</b> AFD within limits of LCO 3.2.3.
	RO	8. <b>RESPONSE NOT OBTAINED</b> <b>INITIATE</b> boration to return AFD within limits.
	BOP	9. <b>IF</b> feed flow greater than 40%, <b>THEN ENSURE</b> tripped MFWP turbine condenser valves CLOSED: <ul style="list-style-type: none"> <li>• Pump A, 1-FCV-2-205 and -210,</li> <li>OR</li> <li>• Pump B, 1-FCV-2-211 and -216.</li> </ul>
	BOP	10. <b>MONITOR</b> reg valves controlling S/G levels on program.
	BOP	11. <b>IF</b> C-7 LOSS OF LOAD STM DUMP INTERLOCK annunciator LIT [66E], <b>THEN</b> <ol style="list-style-type: none"> <li>a. <b>ENSURE</b> steam dump valves have zero demand.</li> <li>b. <b>RESET</b> loss-of-load interlock with steam dump mode switch.</li> </ol>
	SRO	12. <b>ENSURE</b> Condensate System Pumps in service as necessary: <ul style="list-style-type: none"> <li>• <b>REFER TO</b> GO-4, Normal Power Operation.</li> </ul>
	SRO	13. <b>IF</b> reactor power dropped by greater than or equal to 15% in one hour, <b>THEN NOTIFY</b> Chemistry to initiate power change sampling requirements.
	BOP	14. <b>CHECK</b> VALVE POS LIMIT LIT.
	BOP	15. <b>REDUCE</b> turbine load setpoint using REFERENCE CONTROL (lower) AND GO button until VALVE POS LIMIT LIGHT not LIT, <b>THEN SET</b> valve position limiter to 95%.
	SRO	16. <b>INITIATE</b> repairs on failed pump.
	SRO	17. <b>RETURN TO</b> Instruction in effect.
	CREW	<b>Crew Brief</b> would typically be conducted for this event as time allows prior to the next event.
	CREW	<b>Notifications</b> should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. <u>Operations Management</u> - Shift Manager. <u>Maintenance Personnel</u> – Maintenance Shift Supervisor (MSS). ( <b>Note:</b> Maintenance notification may be delegated to the Shift Manager).

**Simulator Console Operators Instructions  
NRC Scenario 3**

**SIMULATOR SETUP INFORMATION**

	BOP	Diagnoses and announces trip of 1B Main Feed Pump, and the trip of the Reactor Trip due to loss of both MFPs.
	RO	Performs E-0 Immediate Operator Actions.
	BOP	Performs E-0 Immediate Operator Actions.
	SRO	Enter and direct actions of E-0, "REACTOR TRIP OR SAFETY INJECTION".
<b>NOTE 1</b> Steps 1 thru 4 are <b>IMMEDIATE ACTION STEPS</b> .		
<b>NOTE 2</b> Status Trees / SPDS should be monitored when transitioned to another instruction.		
	RO	1. <b>ENSURE</b> reactor trip: <ul style="list-style-type: none"> <li>• Reactor trip and bypass breakers OPEN.</li> <li>• RPIs at bottom of scale.</li> <li>• Neutron flux DROPPING.</li> </ul>
	BOP	2. <b>ENSURE</b> Turbine Trip: <ul style="list-style-type: none"> <li>• All turbine stop valves CLOSED.</li> </ul>
	BOP	3. <b>CHECK</b> 6.9 kV shutdown boards: <p>a. At least one board energized from:</p> <ul style="list-style-type: none"> <li>• CSST (offsite), OR</li> <li>• D/G (blackout).</li> </ul>
	RO	4. <b>CHECK</b> SI actuated: <p>a. Any SI annunciator LIT.</p>
	RO	4. <b>RESPONSE NOT OBTAINED</b> <b>DETERMINE</b> if SI required: a. <b>IF ANY</b> of the following exists: <ul style="list-style-type: none"> <li>• S/G press less than 675 psig, OR</li> <li>• RCS press less than 1870 psig, OR</li> <li>• Cntmt press greater than 1.5 psig</li> </ul> <b>THEN</b> <b>ACTUATE</b> SI manually.  <b>IF SI NOT</b> required, <b>THEN</b> <b>** GO TO</b> ES-0.1, Reactor Trip Response.
	SRO	Transitions to ES-0.1, "REACTOR TRIP RESPONSE".
	SRO	Assigns Status Tree Performance to Surrogate STA.
<b>NOTE TO EVALUATOR:</b> The following steps are taken from ES-0.1, "REACTOR TRIP RESPONSE".		
<b>CAUTION</b> Plant conditions, AFW pump start signals and flow requirements should be		

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evaluated as time allows.		
	SRO	1. <b>MONITOR</b> SI actuation criteria: • <b>IF</b> SI actuation occurs during the performance of this Instruction, <b>THEN ** GO TO</b> E-0, Reactor Trip or Safety Injection.
	BOP	2. <b>CHECK</b> Generator PCBs OPEN.
	RO	3. <b>MONITOR</b> RCS temperature stable at or trending to 557°F: • <b>IF</b> any RCP running, <b>THEN MONITOR</b> RCS Loop T-avg trending to 557°F. OR • <b>IF NO</b> RCP running, <b>THEN MONITOR</b> RCS Loop T-cold trending to 557°F.
	BOP	4. <b>ENSURE</b> 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. <b><u>RESPONSE NOT OBTAINED</u></b> a. <b>ESTABLISH</b> feed flow from AFW or MFW as necessary. b. <b>IF</b> heat sink can <b>NOT</b> be established, <b>THEN ** GO TO</b> FR-H.1, Loss Of Secondary Heat Sink.
	SRO	Transitions to FR-H.1, "LOSS OF SECONDARY HEAT SINK".
<b>CAUTION •</b> <ul style="list-style-type: none"> <li>• <b>If total feed flow CAPABILITY of 410 gpm is available, this Instruction should NOT be performed.</b></li> <li>• <b>If an Intact S/G is available, feed flow should NOT be reestablished to any faulted S/G.</b></li> </ul>		
	SRO	1. <b>CHECK</b> 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. <b>ENSURE</b> at least one charging pump RUNNING.
<b>CRITICAL TASK</b>		2. <b><u>RESPONSE NOT OBTAINED</u></b>

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		<b>IF</b> at least one charging pump <b>NOT</b> RUNNING, <b>THEN STOP</b> all RCPs AND <b>** GO TO</b> Cautions prior to Step 18 to initiate RCS bleed and feed.
Since the 1B 6.9 KV Shutdown Board has tripped on differential and is damaged, the SRO must go to Step 18 to initiate RCS bleed and feed.		
	SRO	Directs RO to STOP ALL RCPs
<p><b>CAUTION • Step 18 Through 20 must be performed quickly in order to establish RCS heat removal by RCS bleed and feed.</b></p> <p>• Termination of bleed and feed is required prior to transitioning out of FR-H.1 when heat sink is restored.</p>		
	RO	18. <b>ACTUATE</b> SI.
	RO	19. <b>ENSURE</b> at least one of the following RCS feed paths: <ul style="list-style-type: none"> <li>• At least one charging pump injecting thru BIT,</li> <li>OR</li> <li>• At least one SI Pump running with its injection valves open.</li> </ul>
<p><b>CAUTION • When the reactor vessel head vent block valve is opened, the throttle valve will cycle open and closed.</b></p> <p>• Slowly opening (5 seconds stroke time) the head vent valve will prevent water hammer and pipe damage.</p>		
	RO	20. <b>ENSURE</b> adequate RCS bleed path: <ul style="list-style-type: none"> <li>a. <b>ENSURE</b> all pzs PORVs and pzs PORV block valves OPEN.</li> </ul>
<b>CAUTION WHEN feedwater source is AVAILABLE, THEN feed rate will be controlled by Steps 30 and 31.</b>		
<b>NOTE</b> The details of Steps 4 through 15 may be referred to as necessary to establish feed flow in the following step but procedure performance must continue to terminate RCS bleed and feed.		
	BOP	Contacts Auxiliary Building AUO to determine the status of the TD AFW pump. This is consistent with the above NOTE.
	BOP	May direct the AUO to vent the TDAFW pump after it is shutdown.
	BOP	May contact Work Control to determine the status of the 1A MD AFW pump repairs.
	RO	21. <b>RESET</b> SI, and <b>CHECK</b> the following: <ul style="list-style-type: none"> <li>• SI ACTUATED permissive DARK.</li> <li>• AUTO SI BLOCKED permissive LIT.</li> </ul>
	RO	22. <b>RESET</b> Containment Isolation Phase A and Phase B.
	BOP	23. <b>ENSURE</b> cntmt air in service: <ul style="list-style-type: none"> <li>a. Aux air press greater than 75 psig [M-15].</li> <li>b. Cntmt air supply valves OPEN [M-15]:</li> </ul>

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		<ul style="list-style-type: none"><li>• 1-FCV-32-80.</li><li>• 1-FCV-32-102.</li><li>• 1-FCV-32-110.</li></ul>
		24. <b>PERFORM</b> Steps 1 through 6 of E-0, REACTOR TRIP OR SAFETY INJECTION, while continuing with this Instruction.
		25. <b>MAINTAIN</b> RCS bleed and feed paths: <ul style="list-style-type: none"><li>• MAINTAIN charging pump injection thru BIT.</li><li>• MAINTAIN SI pump flow.</li><li>• MAINTAIN both pzs PORVs and block valves OPEN.</li></ul>
<b>END OF SCENARIO</b>		

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1. **ENSURE** NRC EXAMINATION SECURITY has been established.
2. **RESET** the Simulator to **IC-333**. (**Must have correct password in order to RESET**).
3. **ENSURE** the following information appears on the Director Summary Display:

<b>Key</b>	<b>Description</b>	<b>Event</b>	<b>Final</b>
fw22c	airbound tdafw pump	active	
fw06	electrical feed pump trip	active	
ni07b	pr channel output signal failure pr chnl 2	1	120
cv01a	charging pump trip	2	
fw05a	turbine drive feed pump trip a trip	3	
fw05b	turbine drive feed pump trip b trip	4	
ed06b	Loss of 6.9 kv shutdown board bus 1b-b	19	
fw07a	electric afw pump a trip	active	
hs-3-118a-1	01160 aux fw pump a-a motor sw (green)	active	off
hs-3-335	intentionally left blank	active	close
hs-3-335-1	hs-3-335 indicating lights	active	off
hs-3-335-2	hs-3-335 indicating lights	active	off
hs-3-118a	hs-3-118a auxiliary feedwater pump a-a motor sw	active	ptlock
pi-46-12	02120 mfpt a brg oil press	3	0
pi-46-39	02120 mfpt b brg oil press	4	0

4. Place Hold Order Tag on 1A MD AFWP A handswitch, 1-HS-3-118A.
5. Place the simulator in RUN momentarily. Acknowledge alarms, then place the simulator in FREEZE.

**SIMULATOR SETUP INFORMATION**

1	N/A	Perform 1-SI-85-2 Reactivity Control Systems Moveable Assemblies (Mode 1 and 2).
2	N/A	Power Reduction to 95%.
3	Event 1	<p>Fails PR N42 output to 120%.</p> <p><b>ROLE PLAY:</b> 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.</p> <p><b>ROLE PLAY:</b> 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.</p>
4	Event 2	<p>1A CCP trip.</p> <p><b>ROLE PLAY:</b> As Auxiliary Building AUO, report that the pump motor is hot, and there is a burnt odor in the area.</p> <p><b>ROLE PLAY:</b> As Control Building AUO, report that the 1A CCP tripped on instantaneous overcurrent.</p>
5	Event 3	<p>MFP 1A trips due to low bearing oil pressure.</p> <p><b>ROLE PLAY:</b> As Turbine Building AUO, report that bearing oil pressure indicates 0 psig locally, but there are no apparent leaks.</p> <p>Standby MFP trips on instantaneous overcurrent.</p> <p><b>ROLE PLAY:</b> As Turbine Building AUO, report that the pump motor is hot, and there is a burnt odor in the area.</p> <p><b>ROLE PLAY:</b> As Turbine Building AUO, report that the 1A CCP tripped on instantaneous overcurrent.</p>
6	Event 4	<p>MFP 1B trips due to low bearing oil pressure.</p> <p><b>ROLE PLAY:</b> As Turbine Building AUO, report that bearing oil pressure indicates 0 psig locally, but there are no apparent leaks.</p>
7	Event 19 (automatically enters on reactor trip)	<p>Loss of 1B 6.9 KV Shutdown Board on differential.</p> <p><b>ROLE PLAY:</b> As Control Building AUO, report that the 1B Shutdown board tripped on differential, and that there is substantial damage to the board.</p>
8	Event 19	<p>TDAFDW Pump becomes steam/air bound.</p> <p><b>ROLE PLAY:</b> As the Auxiliary Building AUO, report that the TDAFWP is steam bound. Request that the pump be shutdown in order to attempt venting of the pump.</p>