

Draft Submittal

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SIMULATOR SCENARIOS

DRAFT

Facility:	Surry	Scenario No.:	1	Op-Test No.:	2008-301
Examiners:	_____	Operators:	_____	SRO	
	_____		_____	RO	
	_____		_____	BOP	
Initial Conditions:	<p>Unit 1 is at 100% power and has been since the last refueling outage. The control room instrumentation channels are selected to channel III. All systems and crossties are operable with the following exception:</p> <ul style="list-style-type: none"> AAC DG is tagged out for planned maintenance (major overhaul). The AAC DG is currently in day 4 of the overhaul, which is scheduled to last 12 days. 				
Turnover:	<p>I-PT-18.6I, Pressurizer Block Valve Stroke Test, is required to be performed upon relieving the shift. It has been PSA analyzed for current plant conditions.</p>				
Event No.	Malf. No.	Event Type*	Event Description		
1	MOV535 _Open	N – RO/SRO TS - SRO	Inservice valve stroke test surveillance (One PORV Block valve strokes closed and will not reopen). Team will prebrief evolution prior to entering Simulator.		
2	FW1803	I – BOP/SRO TS - SRO	Selected feed flow channel fails low ('B' SG FT-1487). Requires manual operation of MFRV.		
3	RC4903	I – RO/SRO TS - SRO	Pressurizer level channel fails high, resulting in manual control of charging.		
4	SD0201	C- BOP R – RO/SRO	Loss of High Pressure Drain Pump. Requires team to ramp unit to 75% power.		
5	RC2402	C – RO/SRO	20 – 40 gpm primary to secondary leak.		
6	RC5603 RD18 RC5601 RC5602 MSSOV1 04_Open	M – All C - RO/SRO	Loss of "C" RCP. Reactor does not AUTO trip. "A" and "B" RCP trip on electrical swapper to reserve station service power. Trip complicated by failure of 1-MS-SOV-104 to close, requiring manual closure of 1-MS-MOV-100A-D.		
7	RC2402	M - All	"B" SGTR		
8	DISA_BD 100A- E_ACL	C - BOP/SRO	All SG blowdown TVs fail to close. Must be manually closed		
9	PCV455C _Open	M - All	PORV with working block valve fails to open leading to ECA-3.3 SGTR without pressurizer pressure control.		

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

Surry 2008-301 Scenario #1

Event 1

Surveillance test 1-PT-18.6I, Pressurizer Block Valve Stroke Test, is required to be performed upon shift turnover. Team will brief on the evolution prior to turnover. The RO will verify 1-RC-PCV-1456 is closed and OPMS is in disable and then commence the stroke testing of 1-RC-MOV-1535. The valve will stroke closed within the acceptable range; however, upon re-opening the block valve will fail to re-open.

This failure results in losing one method of RCS depressurization and later causes transition to ECA-3.3.

Verifiable Action: (RO) Close and attempt to open 1-RC-MOV-1535. Place 1-RC-PCV-1456 in manual.

Technical Specification: 3.1.A.6.d (place associated PORV in manual)

Event 2

1-FW-FT-1487 fails low causing 'B' SG level to rise. The BOP should take manual control of 'B' Main Feed Regulating Valve (MFRV) to restore and maintain steam generator program level. The SRO should enter 0-AP-53.00 (Loss of Vital Instrumentation / Controls) and direct the RO and BOP to select the redundant feed flow channel (Channel IV) and return the 'B' MFRV to automatic control

Verifiable Action: (BOP) Takes manual control of 'B' MFRV.

Technical Specification: Table 3.7.1 item 17 (place channel in trip).

Event 3

The selected pressurizer level channel fails high. The RO should perform the immediate actions of 0-AP-53.00 (Loss of Vital Instrumentation / Controls) and take manual control of charging. The SRO should enter AP-53.00 and direct the RO to restore pressurizer level to normal and de-select the failed channel.

Verifiable Action: (RO) Takes manual control of charging (pressurizer level control).

Technical Specification: Table 3.7.1 item 9 (place channel in trip).

SIMULATOR OPERATOR GUIDE
NRC EXAM - SCENARIO 1

Event 4

The HP Heater Drain Pump (1-SD-P-1A) trips while the unit is at 100% power. The SRO should immediately enter 1-AP-18.00, Loss of HP Heater Drain Pump, and direct a rapid load reduction to 75% power in accordance with 0-AP-23.00, Rapid Load Reduction.

Verifiable Actions: (BOP) Starts the third condensate pump, reduces MWe with the turbine limiter and operates the turbine during the ramp.
 (RO) Utilizes the control rods and boric acid during the ramp.

Event 5

A Steam generator tube leak (ramped in to between 20 and 40 gpm) will develop on 'B' SG while the unit is at power. The team will initiate AP-16.00 (Excessive RCS Leakage) and associated ARPs (e.g. N-16 High and AE RM).

Verifiable Actions: (RO) Perform the immediate actions of AP-16.00.

Event 6

The 'C' RCP will degrade and then trip due to a grounded motor; however, the reactor will fail to automatically trip. The team should recognize the need for a trip and the RO should manually trip the reactor and perform the immediate actions of 1-E-0. The SRO should direct the performance of 1-E-0 and transition to 1-ES-0.1. The trip will be complicated with the failure of 'A' and 'B' RCP during electrical plant swap-over and a failure of 1-MS-SOV-104 to close (requires manual operation of 1-MS-MOV-100A-D).

Verifiable Actions: (All) Manual reactor trip.
 (RO) Close 1-MS-MOV-100A, 1-MS-MOV-100B, 1-MS-MOV-100C, 1-MS-MOV-100D

Event 7

Following the reactor trip the Steam Generator Tube leak will degrade into a Steam Generator Tube Rupture that will require initiation of Safety Injection. The crew should recognize this change due to the decrease in pressurizer level combined with the increase in 'B' steam generator level. The crew will return to 1-E-0 and initiate safety injection. The team will then progress through 1-E-0 and transition to 1-E-3.

Verifiable Actions: (All) Isolate ruptured 'B' SG.

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NRC EXAM - SCENARIO 1

Event 8

During the performance of 1-E-0 it will be identified that the steam generator blowdown trip valves have failed to close. The BOP will close these valves in accordance with 1-E-0.

Verifiable Actions: (BOP) Close the inside and outside containment isolation valves for all three steam generators.

Critical Task: [SPS E-1—G] Secure one LHSI pump within 30 minutes of initiation of SI (KOA).

Actions required to accomplish: Secure 1-SI-P-1A

or

Secure 1-SI-P-1B

Event 9

Event 9 will commence upon entry into 1-E-3. The team will perform 1-E-3 and isolate or verify the ruptured steam generator is isolated. The team will cool down the RCS to the target temperature determined in 1-E-3. Following the cooldown, the team will attempt to open 1-RC-PCV-1455C in order to depressurize the RCS in accordance with 1-E-3. 1-RC-PCV-1455C will not open and require the team to transition to 1-ECA-3.3 (SGTR WITHOUT PRESSURIZER PRESSURE CONTROL).

Verifiable Actions: (All) Isolate the ruptured steam generator and perform an RCS cooldown.

Critical Task: [WOG E-3—A] Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs (KOA).

Actions required to accomplish: Close 1-BD-TV-100C
Close 1-BD-TV-100D
Close 1-FW-MOV-151C
Close 1-FW-MOV-151D
Close 1-MS-TV-101B
Close 1-MS-120

Critical Task: [WOG E-3—B] Cooldown the RCS to < target CETCs and stabilize temperature such that transition is not made into an ECA or FR procedure based on RCS subcooling 30 °F or RCS temp , 455 °F (KOA).

Actions required to accomplish: Using Steam Dumps (or SG PORVs) cooldown the RCS to < target CETC.

SIMULATOR OPERATOR GUIDE
NRC EXAM - SCENARIO 1

Initial Conditions: IC #1 100%, MOL – Cycle 21. The unit has been at 100% power since the last refueling outage.

Pre-load malfunctions:

- Failure of 'A' and 'B' RCP on electrical swapover following reactor trip.
- Failure of PORV 1456 block valve to reopen (thermal).
- 1-MS-SOV-104 fails to close during turbine trip.
- SG Blowdown TVs fail to close on SI/AFW Pump start
- PORV 1455C fails shut during SGTR
-

Equipment Status/ Procedures/ Alignments/ Data Sheets/ etc.:

- AAC DG is tagged out for planned maintenance
- 'A' Charging Pump running.
- 'A' and 'C' CN Pumps running.
-

Turnover: Maintain full power operation. Immediately after turnover, perform 1-PT-18.6I, Pressurizer Block Valve Stroke Test. Unit 2 is at 100% power with all systems operable.

The AAC DG is tagged out for planned maintenance (major overhaul). The AAC DG is currently in Day 4 of the overhaul, which is scheduled to last 12 days.

Event	Malf. #'s	Severity	Instructor Notes and Required Feedback
1	MOV535 _Open	N/A	Inservice valve stroke test surveillance (One PORV Block valve strokes closed and will not reopen). Team will prebrief evolution prior to entering Simulator.
2	FW1803	N/A	Selected feed flow channel fails low ('B' SG FT-1487). Requires manual operation of MFRV.
3	RC4903	N/A	Pressurizer level channel fails high, resulting in manual control of charging.
4	SD0201	N/A	Loss of High Pressure Drain Pump. Requires team to ramp unit to 75% power.
5	RC2402	N/A	20 – 40 gpm primary to secondary leak.
6	RC5603 RD18 RC5601 RC5602 MSSOV1 04_Open	N/A	Loss of "C" RCP. Reactor does not AUTO trip. "A" and "B" RCP trip on electrical swapover to reserve station service power. Trip complicated by failure of 1-MS-SOV-104 to close, requiring manual closure of 1-MS-MOV-100A-D.
7	RC2402	N/A	SGTR
8	DISA_BD 100A- E_ACL	N/A	All blowdown TVs fail to close. Must be manually closed
9	PCV455C _Open	N/A	PORV with working block valve fails to open leading to ECA-3.3 SGTR without pressurizer pressure control.
END			After crew transitions to 1-ECA-3.3.

SHIFT TURNOVER INFORMATION

OPERATING PLAN:

- The Unit has been at 100% power since the last refueling outage.
- The AAC DG is tagged out for planned maintenance (major overhaul). The AAC DG is currently in day 4 of the overhaul, which is scheduled to last 12 days.
- Immediately after turnover, perform 1-PT-18.6I, Pressurizer Block Valve Stroke Test.
- Unit 2 is at 100% Power with all systems and crossties operable.
- Maintain full power operation.

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Event Description: Perform 1-PT-18.6I, Pressurizer Block Valve Stroke Test

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	RO	<p>NOTE – Team will pre-brief this evolution prior to entering the simulator. Initial Conditions and Precautions and Limitations will be completed before entering the simulator.</p> <p>Verify closed or close PRZR PORV 1-RC-PCV-1456.</p> <p>Verify key switch for PRZR PORV 1-RC-PCV-1456 OVPRESS Mitigating System is in DISABLE.</p> <p>Verify PRZR PORV Block Valve 1-RC-MOV-1535 is open.</p> <p>Stroke PRZR PORV Block Valve 1-RC-MOV-1535 through one complete cycle, timing valve movement in each direction. Time from signal initiation to complete valve travel.</p> <p>Valve closes and fails to reopen.</p> <p>Refer to Technical Specification 3.1.A.6 for required actions</p>
	SRO	<p>Refer to Technical Specification 3.1.A.6 for required actions.</p> <p>With one block valve inoperable, within 1 hour either restore the block valve to operable status or place the associated PORV in manual. In addition, restore the block valve to operable status in the next 72 hours or, be in at least HSD within the next 6 hours and reduce RCS temperature to < 350°F within the following 6 hours.</p>
	RO	<p>Places 1-RC-PCV-1456 in Close.</p>

End Event #1

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Event Description: Selected Feed Flow channel fails low (CH III – 1-FW-FI-1487)

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	<p>Diagnoses failure FT-1487 with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • 1H-E6 STM GEN 1B FW >< STM FLOW • 1F-C8 STM GEN 1B CH 3 FW < STM FLOW • 1H-G6 STM GEN 1B LVL ERROR. <p>Indications:</p> <ul style="list-style-type: none"> • Step decrease in 1B SG Feed Flow indication CH-3 • Increasing level on 'B' SG.
	SRO	Enters 0-AP-53.00 LOSS OF VITAL INSTRUMENTATION / CONTROLS
	BOP	<p>[1] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL</p> <p>BOP identifies Channel IV indication for feed flow is NORMAL.</p>
	BOP	<p>[2] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION</p> <p>BOP takes manual control of 'B' SG feed reg valve and decreases demand (FF < SF) to restore level to program.</p>
	SRO	NOTE: When the affected instrument/controller malfunction has been addressed by this procedure, recovery actions may continue at Step 12.
	RO	<p>3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS – AFFECTED</p> <ul style="list-style-type: none"> • Nuclear Instrumentation • Pressurizer Pressure control <p>RNO: GO TO Step 6.</p>

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Event Description: Selected Feed Flow channel fails low (CH III – 1-FW-FI-1487)

Cue: By Examiner.

BOP	6. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS – NORMAL
	<ul style="list-style-type: none"> • Steam Pressure • Steam Flow • Feed Flow • Steam Generator Level
BOP	Determines CH III Feed flow instrumentation for 'B' SG is NOT normal. Step 6. RNO IF the selected steam flow, steam pressure, or feed flow input to the SG Water Level Control system has failed, THEN do the following:
BOP	a) Place the associated Feed Reg Valve in MANUAL. Verifies 'B' SG MFRV controller, 1-FW-FCV-1488, in manual
BOP	b) Control SG level at program level (44%, a band may be given). Verifies 'B' SG NR level is returning to program level.
RO	c) Select the redundant channel for affected SG(s) Selects Channel IV Feed Flow for 'B' SG using two-position selector switch on Vertical Board 1-2 (applicant may also place the associated Steam Flow channel in Channel IV)
BOP	d) WHEN SG level returned to normal, THEN place the Feed Reg Valve in AUTOMATIC. Places 'B' SG FRV controller, 1-FW-FCV-1488, in automatic control.

Event Description: Selected Feed Flow channel fails low (CH III – 1-FW-FI-1487)

Cue: By Examiner.

<p>SRO</p>	<p>Step 6. RNO (Continued)</p> <p>Perform follow-up actions:</p> <p>a) Consult with Shift Manager on need to initiate ()-OP-RP-001, ALIGNING CONTROL SYSTEM FOR PERFORMANCE OF CHANNEL I, II, III, AND IV PROCESS AND PROTECTION TESTING.</p> <p><i>If asked the Shift Manager will recommend not performing 1-OP-RP-001 at this time.</i></p> <p>b) Refer to the following Tech Spec 3.7 items:</p> <ul style="list-style-type: none"> • Table 3.7-1, 12 and 17 • Table 3.7-2, 1.c, 1.e, and 3.a • Table 3.7-3, 2.a, and 3.a <p>Determines Table 3.7-1 item 17, is applicable (place channel in trip w/in 72 hours).</p> <p>c) Refer to Attachment 1.</p> <p>d) IF no other instrumentation failure exists, THEN GO TO Step 12.</p>
<p>SRO</p>	<p>12. Review OPT-RX-001, Rx Power Calorimetric using PCS computer program, to determine operability of calorimetric and need to perform OPT-RX-007, Shift Average Power Calculation.</p> <p>SRO/RO determines that OPT-RX-001 is impacted and OPT-RX-007 will need to be performed.</p> <p><i>If it appears that the SRO/RO will take action to perform 1-OPT-RX-007, the Unit 2 Operator will state that he will have the fourth RO perform 1-OPT-RX-007.</i></p>
<p>SRO</p>	<p>13. CHECK FAILED INSTRUMENT - IS A REGULATORY GUIDE 1.97 VARIABLE (Go to Step 14 if not Reg. Guide 1.97)</p> <p><i>SRO directs STA to review Reg. Guide 1.97. The STA will report that 1-FW-FI-1487 is a Reg. Guide 1.97 component.</i></p>

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Event Description: Selected Feed Flow channel fails low (CH III – 1-FW-FI-1487)

Cue: By Examiner.

	SRO	<p>14. REVIEW CEP 99-0029, REG GUIDE 1.97 OPERABILITY, REPORTABILITY, AND ALTERNATE INDICATIONS</p> <p><i>SRO directs STA to review CEP 99-0029. The STA will report that the Reg. Guide 1.97 only requires one channel of Feed Flow indication per steam generator and no actions are required.</i></p>
	SRO	<p>15. Review the following:</p> <ul style="list-style-type: none"> • TS 3.7 • VPAP-2802 • TRM Section 3.3, Instrumentation <p>Determines Table 3.7-1 item 17, is applicable (place channel in trip w/in 72 hours).</p> <p><i>SRO directs STA to review VPAP-2802 and TRM Section 3.3. The STA reports he has completed these reviews and there is no impact.</i></p>
	SRO	<p>16. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"> • Shift Supervision • OMOG • STA (PRA determination) • I&C <p>- END -</p>

End Event #2

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Event Description: Pressurizer level channel fails high (Channel III LT-1461)

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	RO	<p>Diagnoses failure of 1-RC-LI-1461 with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • 1C-C8 PRZR HI LVL HTRS ON • 1E-H3 RX TRIP CH 1 PRZR HI LVL <p>Indications:</p> <ul style="list-style-type: none"> • Charging flow will decrease • VCT level will increase • Pressurizer level (CH 1 and CH 2) will decrease <p>In accordance with the immediate actions of AP-53.00 the RO will take manual control of pressurizer level control by placing 1-CH-FV-1122 in manual and raising flow to maintain program level (per AP-53.00).</p>
	SRO	Enters 0-AP-53.00, Loss of Vital Instrumentation / Controls.
	RO	<p>[1] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL</p> <p>Verifies 1-RC-LI-1459, Pressurizer Level Channel 1, and 1-RC-LI-1460, Pressurizer Level Channel 2 are NORMAL.</p>
	RO	<p>[2] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION</p> <p>Places 1-CH-FV-1122 in manual and raises charging flow.</p>

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Event Description: Pressurizer level channel fails high (Channel III LT-1461)

Cue: By Examiner.

	SRO	NOTE: When the affected instrument/controller malfunction has been addressed by this procedure, recovery actions may continue at Step 12.
	RO	<p>3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS - AFFECTED</p> <ul style="list-style-type: none"> • Nuclear Instrumentation • Pressurizer Pressure control <p>RNO: GO TO Step 6.</p>
	BOP	<p>6. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS – NORMAL</p> <ul style="list-style-type: none"> • Steam Pressure • Steam Flow • Feed Flow • Steam Generator Level <p>Determines all SG parameters are normal for this event. Discussions may occur concerning the fact that a SG Feed Flow Channel Failure has previously occurred.</p>
	BOP	7. CHECK TURBINE FIRST STAGE PRESSURE CHANNELS – NORMAL
	SRO	NOTE: Depending on the instrumentation failure, the Tave input to the Steam Dumps may be invalid, causing the Steam Dumps to stay open longer or never open at all.
	RO	<p>8. CHECK LOOP/MEDIAN ΔT/Tave - NORMAL</p> <ul style="list-style-type: none"> a) Median Tave - NORMAL b) Loop Tave / ΔT - NORMAL

Op-Test No.: Surry 2008-301 Scenario No.: 1 Event No.: 3

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Event Description: Pressurizer level channel fails high (Channel III LT-1461)

Cue: By Examiner.

BOP	<p>9. CHECK STEAM SYSTEM CONTROLS – NORMAL</p> <ul style="list-style-type: none"> a) Steam Dumps/PORVs b) Turbine Controls c) Turbine Valve Positions d) Turbine Monitoring Lights
RO	<p>10. CHECK PRZR LEVEL CONTROL CHANNELS - NORMAL</p> <ul style="list-style-type: none"> a) Check PRZR LVL Instrumentation - NORMAL <p>Determines Channel III Pressurizer Level indication has failed.</p>
<p>RO</p> <p>RO</p> <p>RO</p> <p>SRO</p>	<p>RNO Step 10.a:</p> <p>Do the following:</p> <ul style="list-style-type: none"> 1) Place either of the following in MANUAL: <ul style="list-style-type: none"> • 1-CH-FCV-1122, CHG FLOW CNTRL or • 1-CH-LC-1459G, PRZR LEVEL CNTRL <p>Verifies 1-CH-FCV-1122 is in manual control.</p> <ul style="list-style-type: none"> 2) Control PRZR level at program level. <p>Controls pressurizer level at program (~53%), a band may be given.</p> <ul style="list-style-type: none"> 3) Move PRZR LVL –CH SEL switch to defeat the failed channel. <p>Moves the pressurizer level channel selector switch to defeat the Channel III input into the level control system.</p> <ul style="list-style-type: none"> 4) Move 1-RC-LR-1459, PRZR Level Rec Select Switch , to an operable channel. 5) Move 2-RC-LR-2459, PRZR Level Rec Select Switch , to an operable channel <p>Determines this step is not applicable to Unit 1.</p>

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Event Description: Pressurizer level channel fails high (Channel III LT-1461)

Cue: By Examiner.

	SRO	<p>6) Refer to Tech Spec 3.1.A.5 (if Pressurizer heaters de-energized), Table 3.7-1 Item 9, and Table 3.7-6 Item 13.</p> <p>SRO determines that TS Table 3.7.1, Item 9 is applicable (72-hours to place the channel in trip). SRO determines that 3.1.A.5 is not applicable since pressurizer heaters did not deenergize and that Table 3.7-6 is met.</p>
	SRO	7) Refer to Attachment 3.
	<p>RO</p> <p>RO</p> <p>RO</p>	<p>Step 10 (Continued)</p> <p>b) Verify Pressurizer Heaters – ENERGIZED.</p> <p>c) Check letdown – IN SERVICE</p> <p>d) Check PRZR level control – IN AUTOMATIC</p> <p>RNO – 1) Verify PRZR level restored to program</p> <p>Verifies or restores pressurizer level to program band (~53%)</p> <p>2) Unsaturation 1-CH-LC-1459G, PRZR LEVEL CNTRL, as required.</p> <p>RO may place 1-CH-LC-1459G in manual, adjust demand, and return the controller to automatic to unsaturate the controller.</p> <p>3) Return 1-CH-FCV-1122 to AUTOMATIC by verifying or placing the following in AUTOMATIC:</p> <ul style="list-style-type: none"> • 1-CH-FCV-1122, CHG FLOW CNTRL or • 1-CH-LC-1459G, PRZR LEVEL CNTRL <p>Verifies or places 1-CH-LC-1459G and 1-CH-LCV-1122 in automatic control.</p>

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Event Description: Pressurizer level channel fails high (Channel III LT-1461)

Cue: By Examiner.

	SRO	SRO may recall previous note and is not required to perform Step 11. (Note prior to Step 3: When the affected instrument/controller malfunction has been addressed by this procedure, recovery actions may continue at Step 12.)
	RO RO RO RO RO BOP RO BOP BOP	<p>11. CHECK PROPER OPERATION OF THE FOLLOWING INSTRUMENTS:</p> <ul style="list-style-type: none"> a) Reactor Coolant Flow Instrumentation - NORMAL b) PRZR Pressure Protection Instrumentation – NORMAL c) CTMT Pressure Instrumentation – NORMAL d) RWST Level Instrumentation – NORMAL e) VCT Level Instrumentation – NORMAL f) Underground Fuel Oil Storage Tank Level Instrumentation – NORMAL g) Chemical Addition Tank Level Instrumentation – NORMAL h) Emergency Condensate Makeup Tank Level Instrumentation – NORMAL i) Fire Protection and Domestic Water Tank Level Instrumentation - NORMAL
	SRO	<p>12. Review OPT-RX-001, Rx Power Calorimetric using PCS computer program, to determine operability of calorimetric and need to perform OPT-RX-007, Shift Average Power Calculation.</p> <p>SRO/RO determines that OPT-RX-001 is not impacted and OPT-RX-007 will not need to be performed.</p> <p><i>If it appears that the SRO/RO will take action to perform 1-OPT-RX-007 (due to previous failure), the Unit 2 Operator will state that he will have the fourth RO perform 1-OPT-RX-007.</i></p>
	SRO	<p>13. CHECK FAILED INSTRUMENT - IS A REGULATORY GUIDE 1.97 VARIABLE</p> <p><i>SRO directs STA to review Reg. Guide 1.97. The STA will report that 1-RC-LR-1461 is a Reg. Guide 1.97 component.</i></p>

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Event Description: Pressurizer level channel fails high (Channel III LT-1461)

Cue: By Examiner.

	SRO	<p>14. REVIEW CEP 99-0029, REG GUIDE 1.97 OPERABILITY, REPORTABILITY, AND ALTERNATE INDICATIONS</p> <p><i>SRO directs STA to review CEP 99-0029. The STA will report that the Reg. Guide 1.97 only requires two channels of pressurizer level control and refers the SRO to TS Table 3.7-6.</i></p>
	SRO	<p>15. Review the following:</p> <ul style="list-style-type: none"> • TS 3.7 • VPAP-2802 • TRM Section 3.3, Instrumentation <p>SRO determines that TS Table 3.7.1, Item 9 is applicable (72-hours to place the channel in trip). SRO determines that 3.1.A.5 is not applicable since pressurizer heaters did not deenergize and that Table 3.7-6 is met.</p> <p><i>SRO directs STA to review VPAP-2802 and TRM Section 3.3. The STA reports that he has completed his reviews; VPAP-2802 is not impacted, but the TRM is impacted. The STA reports that a 14-day clock to establish a fire watch and a 60-day return to service clock is in effect.</i></p>
	SRO	<p>16. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"> • Shift Supervision • OMOG • STA (PRA determination) • I&C <p>- END -</p>

END – Event 3

Op-Test No.: Surry 2008-301 Scenario No.: 1 Event No.: 4

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Event Description: 'A' HP Heater Drain Pump trips above 75%.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	<p>Diagnoses the failure with the following indications:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • 1K-D4 4KV BKR AUTO TRIP • 1H-D3 CN POLISHING BYPASS AOV OPEN • 1J-B4 HP HTR DR RCVR TK HI-LO LVL <p>Indications:</p> <ul style="list-style-type: none"> • Main Control Board Amber Light for 'A' HP HTR Drain Pump lit • Zero pump amps. <p>Other alarms may come in, depending on SG level control (1F-C7, 1F-D7, and 1H-E5)</p>
	SRO	Enters 1-AP-18.00, LOSS OF HP HEATER DRAIN PUMP
	BOP	<p>1. CHECK HP HEATER DRAIN PUMP STATUS</p> <ul style="list-style-type: none"> • Check HP Heater Drain Pump – TRIPPED <p>Identifies 'A' HP HTR Drain Pump - TRIPPED</p> <ul style="list-style-type: none"> • Place pump control switch in PTL <p>Places 'A' HP HTR Drain Pump Control Switch in PTL.</p> <ul style="list-style-type: none"> • Continue with Step 2.
	SRO	<p>2. CHECK REACTOR POWER – GREATER THAN OR EQUAL TO 75%</p> <p>Identifies that reactor power is at approximately 100%.</p>

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Event Description: 'A' HP Heater Drain Pump trips above 75%.

Cue: By Examiner.

	BOP	<p>3. START THIRD CONDENSATE PUMP AS REQUIRED BY PLANT CONDITIONS</p> <p>Starts 1-CN-P-1A.</p>
	SRO BOP	<p>NOTE: With unit at 100% power, Turbine load should be decreased approximately 50 MW.</p> <p>4. REDUCE TURBINE LOAD USING LIMITER AS NECESSARY TO MAINTAIN LOOP DeltaTs - LESS THAN 100%</p> <p>Operator reduces the limiter to reduce power. Load may be decreased greater than 50 MWe depending on the Loop ΔTs and the mismatch between steam flow and feed flow.</p>
	SRO	<p>NOTE: Ramping to 75% allows the Condensate Polishing Building to be placed fully in service.</p> <p>5. COMMENCE RAMP TO 75% POWER IAW 0-AP-23.00, RAPID LOAD REDUCTION</p> <p>Enters 0-AP-23.00, RAPID LOAD REDUCTION</p> <p><i>If the SM is asked for a recommended ramp rate, ask what the Unit Supervisor recommends. When authorized by the NRC, the Shift Manager will direct a 1%/minute ramp rate.</i></p> <p>AP-23.00 actions are contained on pages: 22-24</p>
	RO	<p>6. USE CONTROL RODS AND CHEMICAL SHIM TO MAINTAIN delta FLUX IN BAND</p>
	BOP	<p>7. MONITOR MAIN FEED REG VALVE RESPONSE - MAINTAINING SG LEVEL IN BAND</p> <p>Will look at both current SG level and MFRV position.</p>
	BOP	<p>8. CHECK CP BUILDING – BYPASSED</p> <p>CP Building is bypassed by identifying 1-CP-MOV-100 is open.</p>

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Event Description: 'A' HP Heater Drain Pump trips above 75%.

Cue: By Examiner.

	SRO/BOP	<p>9. CHECK HP HEATER DRAIN PUMP TRIP – CAUSED BY NETWORK 90 FAILURE</p> <p>Based on the cause of the trip and local reports from the field the team will identify that the trip was NOT caused by a Network 90 failure.</p> <p><i>If dispatched a field operator will report that 1-EP-BKR-15B6 has tripped on overcurrent trip flag on the 'A' and 'B' phase and a field operator will report an acrid odor from the motor of the 'A' HP HTR Drain pump, but there is no smoke and no fire.</i></p>
	SRO	<p>11. NOTIFY THE FOLLOWING:</p> <ul style="list-style-type: none"> • CP Building • Energy Supply (MOC) • Chemistry • STA
	BOP/RO	<p>12. SECURE RAMP WHEN REACTOR POWER LESS THAN 75%</p>
	BOP	<p>13. CHECK FOLLOWING PARAMETERS:</p> <ul style="list-style-type: none"> • Feed Pump suction pressure - APPROXIMATELY 375 PSIG OR GREATER • Feed Header pressure to Steam Generator pressure DP – APPROXIMATELY 100 PSID OR GREATER <p>RNO: Do the following if required:</p> <ol style="list-style-type: none"> a) Reduce Turbine load. b) WHEN parameters met, THEN perform Step 14.

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Event Description: 'A' HP Heater Drain Pump trips above 75%.

Cue: By Examiner.

	BOP/RO	<p>NOTE: With six polishing beds in service, the ΔP will be approximately 45 psid at 75% power. With seven beds in service the ΔP will be 45 psid at 85% power.</p> <p>14. STABILIZE UNIT CONDITIONS</p> <ol style="list-style-type: none"> a) Maintain Reactor power – LESS THAN 75% b) Verify Turbine Limiter - APPROXIMATELY 2 TO 3 PERCENT ABOVE STEADY STATE POWER LEVEL c) Borate or dilute as necessary to achieve the desired Tave and Delta Flux d) Use either IMP IN or IMP OUT as necessary to assist in stabilizing the Turbine e) Check CP Building - IN SERVICE f) Provide notifications as necessary: <ul style="list-style-type: none"> • OMOG • Maintenance Department
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Event Description: 'A' HP Heater Drain Pump trips above 75%.

Cue: By Examiner.

0-AP-23.00, RAPID LOAD REDUCTION	
SRO	<p>CAUTION: Conservative decision-making must be maintained during rapid load reductions. If uncertain or degrading conditions arise which could adversely affect the safety of the plant, or if any criteria in Attachment 1 is exceeded, the load reduction should be terminated by tripping the Reactor or the turbine, or both, depending on power level.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • Actions that can be completed independently of preceding steps may be performed out of sequence as directed by the SRO. • If at any time plant conditions no longer require rapid load reduction, actions should continue at Step 35. • RCS Tave must be maintained less than or equal to 577°F and RCS pressure must be maintained greater than or equal to 2205 psig. • Tech Spec 3.12.F.1 should be reviewed if either parameter is exceeded. • I & C should be contacted to provide assistance with adjusting IRPIs. • When the turbine is not being actively ramped, the REFERENCE and SETTER values must remain matched to prevent inadvertent ramp. <p>1. INITIATE PLANT LOAD REDUCTION AT 5%/MINUTE OR LESS:</p>
BOP	<p>a) Verify turbine valve position - NOT ON LIMITER</p> <p>The turbine is on the limiter.</p>
BOP	<p>a) RNO Take the turbine off the limiter.</p> <p>The SRO and BOP will ramp the turbine off the limiter. The rate of ramping off the limiter is determined by the crew.</p>
RO	<p>b) Insert control rods in AUTO or MANUAL as necessary to maintain Tave and Tref matched</p>
BOP	<p>c) Verify or place turbine in IMP IN or IMP OUT as determined by Shift Supervision</p>
BOP	<p>d) Adjust SETTER to desired power level</p>
BOP	<p>e) Adjust LOAD RATE %/MIN thumbwheel to desired ramp rate (1%/minute)</p>

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Event Description: 'A' HP Heater Drain Pump trips above 75%.

Cue: By Examiner.

	BOP BOP	<p>f) Initiate Turbine load reduction using OPERATOR AUTO (pushes the white GO button)</p> <p>g) Reduce Turbine Valve Position Limiter as load decreases</p> <p>The BOP will periodically reduce the limiter setpoint during the ramp.</p>
	SRO	<p>2. CHECK EMERGENCY BORATION – REQUIRED TO REDUCE TAVE-TREF MISMATCH</p> <p>The team will decide to emergency borate based on the Tave – Tref difference or the predicted difference.</p>
	SRO RO	<p>NOTE: Step 3 or Step 4 may be performed repeatedly to maintain Tref and Tave matched, ΔFlux in band, and control rod position above the LO-LO insertion limit.</p> <p>3. PERFORM AN EMERGENCY BORATION IAW THE FOLLOWING:</p> <p>a) Verify or raise CHG flow to greater than 75 gpm</p> <p>b) Transfer the in-service BATP to FAST</p> <p>c) Open ()-CH-MOV-()350</p> <p>d) Monitor EMRG BORATE FLOW</p> <ul style="list-style-type: none"> • ()-CH-FI-()110 <p>e) After required emergency boration, perform the following:</p> <p>1) Close ()-CH-MOV-()350</p> <p>2) Transfer the in-service BATP to AUTO</p> <p>3) Restore Charging flow control to normal</p>
	RO	<p>4. ESTABLISH A NORMAL BORATION TO MAINTAIN CONTROL ROD POSITION ABOVE THE LO-LO INSERTION LIMITS IAW ()-OP-CH-007, BLENDER OPERATIONS</p> <p>1-OP-CH-007 Boration instructions on pages 25, 26, and 27.</p>

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Event Description: 'A' HP Heater Drain Pump trips above 75%.

Cue: By Examiner.

	RO	<p>5. INCREASE SURVEILLANCE OF RCS PRESSURE</p> <p>a) Turn all PRZR heaters ON</p> <p>b) Control ramp rate to maintain RCS pressure greater than 2205 psig</p>
	BOP	6. MONITOR STEAM DUMPS FOR PROPER OPERATION
	SRO	<p>7. NOTIFY THE FOLLOWING:</p> <ul style="list-style-type: none"> • Energy Supply (MOC) • Polishing Building • Chemistry • OMO
	SRO	<p>8. EVALUATE THE FOLLOWING:</p> <ul style="list-style-type: none"> • EPIP applicability <p><i>The Shift Manager will review EPIPs for applicability. They are not applicable.</i></p> <ul style="list-style-type: none"> • VPAP-2802, NOTIFICATIONS AND REPORTS, applicability <p><i>SRO directs STA to review VPAP-2802. The STA reports that he has completed his review of VPAP-2802 and no notifications are required.</i></p>
	SRO	<p>*9. CHECK ISOTOPIC ANALYSIS OF RCS – REQUIRED</p> <ul style="list-style-type: none"> • Reactor power has decreased more than 15% in one hour
	SRO	<p>10. HAVE CHEMISTRY PERFORM ISOTOPIC ANALYSIS OF RCS FOR IODINE WITHIN 2 TO 6 HOURS</p> <p><i>SRO directs Chemistry to perform an isotopic analysis of the RCS in 2 to 6 hours. Chemistry will acknowledge the requirement to sample the RCS.</i></p> <p style="text-align: center;">*</p>

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Event Description: 'A' HP Heater Drain Pump trips above 75%.

Cue: By Examiner.

	RO	<p>1-OP-CH-007 Actions</p> <p>RO retrieves a copy of 1-OP-CH-007.</p> <p>RO reviews the initial conditions.</p> <p>3.1 Verify Primary Grade water is available to the Blender.</p> <p>Observes PG pump is running.</p> <p>3.2 Verify at least one Boric Acid Transfer Pump is in Automatic and aligned to the Blender. <u>If</u> the boric acid flow path to the blender is unavailable, <u>THEN</u> enter N/A.</p> <p>Observes a Boric Acid Pump is in automatic and aligned to the Blender</p> <p>RO reviews the Precautions and Limitations</p> <p>4.1 Control rod position, Tave, and/or power level should be observed when making up to the RCS.</p> <p>4.2 Operation of the pressurizer heaters and spray valves should be used to equalize Boron concentration (Cb) when changing Cb.</p> <p>4.3 The blender must be frequently monitored for proper operation during the entire duration of the makeup.</p> <p>4.4 The Reactor Operator shall notify Shift Supervisor before performing any Blender evolution.</p> <p>4.5 Rapidly changing VCT level and pressure may affect RCP Seal leakoff, which should be monitored for normal response.</p> <p>4.6 Calculations involving reactivity must be independently verified.</p> <p>RO goes to Section 5.3 of the procedure.</p>
	RO	<p>5.3 Boration</p> <p>CAUTION: The blender must be frequently monitored for proper operation during the entire duration of the make up.</p> <p>NOTE: This subsection will be used for the first boration of the shift. Attachment 2 will be used as a guide for further borations for the remainder of the shift.</p>

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Event Description: 'A' HP Heater Drain Pump trips above 75%.

Cue: By Examiner.

RO	<p>5.3.1 Notify Shift Supervision of impending Boration.</p> <p>5.3.2 Place the MAKE-UP MODE CNTRL switch in the STOP position.</p> <p>5.3.3 Adjust both of the following controllers for the flow rate and total gallons of Boric Acid for the boration. IF the BA FLOW CNTRL controller setpoint has previously been set, THEN enter N/A for that substep.</p> <p>a. 1-CH-FC-1113A, BA FLOW CNTRL (N/A) _____ GPM (IAW Attachment 5)</p> <p>b. 1-CH-YIC-1113, BA SUPPLY BATCH INTEGRATOR (GAL) _____ GAL</p> <ol style="list-style-type: none"> 1. Depress PRESET A Button (Controller will read the last value entered into the controller; reads in tenths of gallons.) 2. To clear PRESET A, depress the CLR Button. Enter N/A if not required. 3. Enter desired PRESET A value. Enter N/A if not required. 4. Depress ENT Button.
RO	5.3.4 Place the MAKE-UP MODE SEL switch in the BORATE position.
RO	5.3.5 Place the MAKE-UP MODE CNTRL switch in the START position.
RO	<p>5.3.6 Verify all of the following conditions.</p> <p>a. 1-CH-FCV-1113A, BORIC ACID TO BLENDER, is controlling in AUTO.</p> <p>b. 1-CH-FCV-1113B, BLENDER TO CHG PUMP, is open.</p> <p>c. 1-CH-FCV-1114A, PGW TO BLENDER, is closed.</p> <p>d. 1-CH-FCV-1114B, BLENDER TO VCT, is closed.</p>
RO	<p>CAUTION: There is potential for the Blender Integrator to lock up if the RATE function is in use at the end of make up. (Integrator lock up does not affect the Blender AUTO function.)</p> <p>NOTE: The rate of Boric Acid addition may be seen by depressing the C RATE/TOTAL Button on the Boric Acid Integrator. The total amount of Boric Acid added may be seen by depressing the C RATE/TOTAL Button again.</p>

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Event Description: 'A' HP Heater Drain Pump trips above 75%.

Cue: By Examiner.

	RO	5.3.7	IF performing a unit ramp, THEN adjust Boric Acid flow on 1-CH-FC-1113A as required. Otherwise, enter N/A.
	RO	5.3.8	IF it is desired to stop the Boration before the selected amount, THEN place the MAKE-UP MODE CNTRL switch in the STOP position. IF the BA SUPPLY BATCH INTEGRATOR (GAL) is used to stop the flow, THEN enter N/A for this step.
	RO	5.3.9	WHEN the desired amount of makeup has been reached, THEN verify 1-CH-FCV-1113B closes.
	RO	5.3.10	WHEN boration is complete, THEN do the following. IF boric acid is to remain in the Blender to support ramping the Unit, THEN enter N/A. <ul style="list-style-type: none"> a. Manually blend approximately 20 gallons to flush the boration path IAW Subsection 5.5. b. Enter N/A for Steps 5.3.11 through 5.3.14.
	RO	5.3.11	Place the MAKE-UP MODE CNTRL switch in the STOP position.
	RO	5.3.12	Place the MAKE-UP MODE SEL switch in the AUTO position.
	RO	5.3.13	Place the MAKE-UP MODE CNTRL switch in the START position.
	RO	5.3.14	Notify Shift Supervision of Blender status.

End of Event #4

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Event Description: 20 – 40 gpm primary to secondary leak.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	Team	<p>Diagnoses the failure with the following indications:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • N-16 Alert • N-16 High • Air Ejector RM Alert / Failure (~2 minute delay) • SG Blowdown Radiation Monitor Alert/Failure alarm (~5 minute delay) <p>Indications:</p> <ul style="list-style-type: none"> • Decreasing pressurizer level • Increasing charging flow • Air Ejector Counts increasing <p><i>Unit 2 will silence Radiation Monitors and report the alarms to the Unit Supervisor. The Unit 2 operator will also perform the associated ARPs if so directed.</i></p>
	SRO	Direct initiation of AP-16.00, EXCESSIVE RCS LEAKAGE
	SRO RO	<p>Note: If SI Accumulators are isolated, 1-AP-16.01, SHUTDOWN LOCA, should be used for guidance.</p> <p>Note: RCS average temperature has a direct impact on pressurizer level.</p> <p>[1] INCREASE CHG FLOW USING 1-CH-FCV-1122 IN MANUAL TO MAINTAIN PRZR LEVEL AT PROGRAM SETPOINT, AS NECESSARY</p> <p>RO places charging in manual and maintains level at program (dependent on current power level) (immediate action)</p>

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Event Description: 20 – 40 gpm primary to secondary leak.

Cue: By Examiner.

	RO	<p>[2] CHECK RCS LEAK RATE</p> <ul style="list-style-type: none"> • Pressurizer level – Decreasing (or) • Charging Flow – 25 gpm above pre-event value <p>RO estimates RCS leak rate is > 25 gpm (immediate action)</p>
	RO	<p>[3] VERIFY CLOSED OR CLOSE NORMAL AND EXCESS LETDOWN ISOLATIONS:</p> <ul style="list-style-type: none"> • 1-CH-LCV-1460A • 1-CH-LCV-1460B • 1-RC-HCV-1557A • 1-RC-HCV-1557B • 1-RC-HCV-1557C • 1-RH-HCV-1142 <p>Closes 1-CH-LCV-1460A and 1-CH-LCV-1460B (immediate action).</p>
	RO	<p>[4] VERIFY THE FOLLOWING PARAMETERS – STABLE OR INCREASING</p> <ul style="list-style-type: none"> • PRZR Level • PRZR Pressure • RCS Subcooling <p>Identifies all parameters are stable or increasing</p>
	RO	<p>5. EVALUATE STOPPING COMPONENTS:</p> <ul style="list-style-type: none"> • CTMT Sump Pumps • CTMT Vacuum Pumps <p>Determines the pumps are not running and do not need to be secured for a Steam Generator Tube Leak.</p>

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Event Description: 20 – 40 gpm primary to secondary leak.

Cue: By Examiner.

	<p>SRO</p> <p>RO</p>	<p>Note: Shift Supervision and STA must remain informed of RCS leak rate for EPIP applicability.</p> <p>*6. CHECK REACTOR TRIP – REQUIRED</p> <ul style="list-style-type: none"> • Adequate makeup not being provided by blender • Leak location • Leak Rate – GREATER THAN 50 GPM <p>Determines that a reactor trip is not required. Blender makeup is acceptable and leak rate is less than 50 gpm.</p> <p>RNO – GO TO Step 9</p> <p><i>BOOTH: If the team decides that the leak rate is greater than 50 gpm and that a reactor trip is required, the booth will insert Event #6 while the team is aligning Unit 1 Charging Pumps to the RWST.</i></p>
	<p>BOP</p> <p>SRO</p>	<p>9. CHECK SECONDARY RADIATION – NORMAL OR STABLE IF THERE IS A PRE-EXISTING TUBE LEAK</p> <ul style="list-style-type: none"> • Air Ejector Rad Monitor • SG Blowdown Rad Monitor • Main Steam Line Rad Monitors • Secondary Sample • N-16 Rad Monitors <p>Identifies increasing trend on Air Ejector Radiation Monitor and N-16 RM.</p> <p>RNO a) Consult with Shift Manager</p> <p>b) <u>IF</u> Reactor Trip <u>NOT</u> required, <u>THEN</u> initiate AP-24.00, MINOR SG TUBE LEAK</p> <p>A reactor trip is not required and the team initiates AP-24.00</p> <p>AP-24.00 actions contained on pages 32-33.</p>
	RO	<p>10. CHECK RCS LEAK RATE – LESS THAN 10 GPM</p> <p>Identifies that RCS Leak Rate is greater than 10 gpm.</p>

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Event Description: 20 – 40 gpm primary to secondary leak.

Cue: By Examiner.

	SRO/RO	<p>10 RNO</p> <p>a) Initiate Unit Shutdown IAW appropriate operating procedures</p> <p>b) Control charging flow and seal injection to maintain prz level</p> <p>c) Evaluate EPIP applicability</p> <p>Determines that a down power is already in progress and will continue to reduce power.</p>
	RO	<p>11. CHECK UNIT CONDITIONS - STABLE</p> <ul style="list-style-type: none"> • PRZR Level • PRZR Pressure • Tave <p>Identifies all conditions are stable considering a ramp is in progress.</p>

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Event Description: 20 – 40 gpm primary to secondary leak.

Cue: By Examiner.

		AP-24.00, MINOR SG TUBE LEAK
	SRO	Note: This is an OC-93 applicable procedure. *1. CHECK REACTOR TRIP - REQUIRED RNO a. Initiate AP-23.00, RAPID LOAD REDUCTION. Must be less than 50% in one hour and in HSD in the following two hours. b. GO TO Step 4
	SRO	4. CONSULT WITH OMOG ON THE NEED TO BYPASS THE POLISHER SRO identifies that the polisher has already been bypassed (loss of HP HTR DRN Pump)
	BOP	5. CHECK PCS (ERFCS, if not removed) POINTS USING GROUP 80 REVIEW OR MAIN STEAM P&ID: <ul style="list-style-type: none"> • R1RM204C, RI-MS-124 • R1RM205C, RI-MS-125 • R1RM206C, RI-MS-126
	BOP	6. MONITOR TREND ON SG BLOWDOWN RADIATION MONITORS: <ul style="list-style-type: none"> • RI-SS-112 • RI-SS-113
	BOP	7. MONITOR TREND ON AIR EJECTOR RADIATION MONITOR: <ul style="list-style-type: none"> • RI-SV-111
	SRO	8. CONSULT WITH OMOG AND HP ON NEED TO ALIGN CONDENSER AIR EJECTOR TO CTMT. <i>OMOG and HP will not recommend aligning the air ejectors to containment at this time.</i>

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Event Description: 20 – 40 gpm primary to secondary leak.

Cue: By Examiner.

	Team	<p>9. IDENTIFY AFFECTED SG(S)</p> <ul style="list-style-type: none"> • Unexpected rise in any SG narrow range level • High radiation from any SG MS line monitor • High radiation from any SG Blowdown line • High radiation from any SG sample • High radiation from any SG N-16 monitor <p>SRO/BOP identifies rising counts on the 'B' SG Blowdown RM and 'B' MS RM.</p>
	SRO	10. REFER TO TECH SPEC 3.6 FOR SG SECONDARY SIDE ACTIVITY LIMITS
	BOP	<p>11. MINIMIZE SECONDARY CONTAMINATION:</p> <ol style="list-style-type: none"> a) Locally shift Aux Steam to Unit 2 b) Reduce or terminate affected SG blowdown c) Locally close steam supply valve from affected SG to TDAFW pump <ul style="list-style-type: none"> • 1-MS-120 for SG 'B' d) Sample turbine building sumps for contamination and secure sump pumps as necessary.
	SRO	<p>12. PROVIDE NOTIFICATIONS:</p> <ul style="list-style-type: none"> • HP • STA • OMO

END – Event Terminates upon entry into AP-24.00 or the determination of the need to trip the reactor.

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Event Description: Degradation and subsequent loss of 'C' RCP with failure of reactor to automatically trip. 'A' and 'B' RCPs trip on electrical swapover to Reserve Station Service Power following trip.

Cue: Upon initiation of AP-24.00, determination that a reactor trip is required or by lead examiner.

Time	Position	Applicant's Action or Behavior
	Team	Diagnose the failure of the 'C' RCP with a failure of the reactor to automatically trip: Alarms: <ul style="list-style-type: none"> • 1E-B10, LOSS OF COOL FLOW PWR >P8 • 1E- A/B/C4 RC LOOP 1C LO FLOW CH-1/2/3 Indications: <ul style="list-style-type: none"> • 'C' RCS Loop Low Flow indicators decrease. • OTΔT and OP ΔT changes.
	RO	Trips reactor after recognizing first out alarm and failure of automatic trip. Informs SRO that reactor failed to automatically trip.
	SRO	Direct RO to perform the Immediate Actions of E-0, REACTOR TRIP OR SAFETY INJECTION
	RO	[1] VERIFY REACTOR TRIP: a) Manually trip reactor Pushes the reactor trip push buttons. b) Check the following: <ul style="list-style-type: none"> • All Rods On Bottom light – LIT • Reactor trip and bypass breakers – OPEN • Neutron flux - DECREASING

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Event Description: Degradation and subsequent loss of 'C' RCP with failure of reactor to automatically trip. 'A' and 'B' RCPs trip on electrical swapper to Reserve Station Service Power following trip.

Cue: Upon initiation of AP-24.00, determination that a reactor trip is required or by lead examiner.

	RO	<p>[2] VERIFY TURBINE TRIP:</p> <p>a) Manually trip the turbine</p> <p>Pushes the turbine trip push buttons.</p> <p>b) Verify all turbine stop valves - CLOSED</p> <p>c) Isolate reheaters by closing MSR steam supply SOV</p> <ul style="list-style-type: none"> • 1-MS-SOV-104 <p>RO</p> <p>c) RNO – identifies that MS-SOV-104 does not close and closes MSR steam supply valves</p> <ul style="list-style-type: none"> • 1-MS-MOV-100A • 1-MS-MOV-100B • 1-MS-MOV-100C • 1-MS-MOV-100D <p>d) Verify generator output breakers – OPEN (Time Delayed)</p>
	RO	[3] VERIFY BOTH AC EMERGENCY BUSES - ENERGIZED
	RO	<p>[4] CHECK IF SI INITIATED:</p> <p>a) Check if SI is actuated:</p> <ul style="list-style-type: none"> • LHSI pumps – RUNNING • SI annunciators – LIT <ul style="list-style-type: none"> • A-F-3 SI INITIATED – TRAIN A • A-F-4 SI INITIATED – TRAIN B <p>a) RNO - Check is SI is required or imminent as indicated by any of the following:</p> <ul style="list-style-type: none"> • Low PRZR Pressure

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Event Description: Degradation and subsequent loss of 'C' RCP with failure of reactor to automatically trip. 'A' and 'B' RCPs trip on electrical swapover to Reserve Station Service Power following trip.

Cue: Upon initiation of AP-24.00, determination that a reactor trip is required or by lead examiner.

	SRO	<p>Identifies that pressurizer pressure is slowly recovering (or stable).</p> <ul style="list-style-type: none"> High CTMT Pressure <p>Identifies that containment pressure is stable at about 10.5 psia</p> <ul style="list-style-type: none"> High Steamline Differential Pressure <p>Identifies that there is a minor steam line differential, but not 120 psid, due to the loss of RCPs</p> <ul style="list-style-type: none"> High Steam Line Flow with Low Tave or Low Line Pressure <p>Identifies no steam flow indicated and determines that SI is not required.</p> <p><u>IF</u> SI is <u>NOT</u> required, <u>THEN</u> GO TO 1-ES-0.1, REACTOR TRIP RESPONSE</p>
	SRO	<p>The team will hold a transition brief. During the brief it will be identified that all three RCPs have tripped for various reasons.</p> <p><i>The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal with the exception of the previously identified alarms. He will also state that containment conditions and the electrical conditions are as you see them.</i></p> <p>Following the brief the team will transition to 1-ES-0.1 and discuss the need to enter AP-39.00</p>
	SRO	<p>SRO directs performance of AP-39.00 (Natural Circulation) and initiates 1-ES-0.1</p>

END – Event Terminates upon completion of transition brief.

Op-Test No.: Surry 2008-301 Scenario No.: 1 Event No.: 7

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Event Description: 'B' SG Tube Leak degrades into a SGTR.

Cue: Upon completion of transition brief (initiation of 1-ES-0.1) or by lead examiner.

Time	Position	Applicant's Action or Behavior
	Team	<p>Diagnose that the 'B' SG Tube Leak increases to a SGTR.</p> <p>Alarms:</p> <ul style="list-style-type: none"> • 1E-H6, PRZR Lo LVL CH 1 • 1C-B8, PRZR Lo Press <p>Indications:</p> <ul style="list-style-type: none"> • Pressurizer level decreases. • RCS Pressure decreases • 'B' SG Level increase faster than other SGs • 'B' MS RM indication on PCS increasing <p>RO may raise charging flow in an attempt to stabilize pressurizer level. This will not be successful based on the size of the SGTR.</p>
	SRO	SRO will direct entry into 1-E-0 and initiation of Safety Injection at Step 4.
	RO	<p>Only the performance of the high level steps 1,2, and 3 are required:</p> <p>[1] VERIFY REACTOR TRIP [2] VERIFY TURBINE TRIP [3] VERIFY BOTH AC EMERGENCY BUSES - ENERGIZED</p> <p>[4] CHECK IF SI INITIATED:</p> <p>a) Check if SI is actuated:</p> <ul style="list-style-type: none"> • LHSI pumps – RUNNING • SI annunciators – LIT <ul style="list-style-type: none"> • A-F-3 SI INITIATED – TRAIN A • A-F-4 SI INITIATED – TRAIN B <p>b) Manually initiate SI</p> <p>RO will manually initiate safety injection if an automatic safety injection has not occurred.</p> <p>Time SI initiated _____. This starts clock for critical task to secure one LHSI pump within 30 minutes.</p>

Op-Test No.: Surry 2008-301 Scenario No.: 1 Event No.: 7

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Event Description: 'B' SG Tube Leak degrades into a SGTR.

Cue: Upon completion of transition brief (initiation of 1-ES-0.1) or by lead examiner.

	SRO	<p>The team will hold a transition brief. During the brief it will be identified that SI was initiated and the SGTL has degraded into a SGTR.</p> <p><i>The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal with the exception of the previously identified alarms. He will also state that containment conditions and the electrical conditions are as you see them.</i></p> <p>Following the brief the team will perform 1-E-0 and applicable attachments.</p>
	SRO/BOP	5. Initiate Attachment 1 (Attachment 1 actions contained under Event 8 on pages 43- 46)
	SRO/RO	SRO may direct the BOP to perform Attachment 10 of 1-E-0 for Ruptured SG Isolation and AFW Control. This may or may not be initiated at any time during the performance of E-0. Attachment 10 actions are contained on pages 41 – 42.
	RO	<p>*6. CHECK RCS AVERAGE TEMPERATURE</p> <ul style="list-style-type: none"> • STABLE AT 547°F <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • TRENDING TO 547°F <p>The team will identify that RCS temperature is decreasing. The team should attribute this to the injection of SI into the RCS and AFW flow to the SGs. It is acceptable for the team to enter the RNO portion of this step and perform the applicable steps (summarized below):</p> <ul style="list-style-type: none"> Stop dumping steam Reduce AFW flow to the SG Close MSTVs if cooldown continues

Event Description: 'B' SG Tube Leak degrades into a SGTR.

Cue: Upon completion of transition brief (initiation of 1-ES-0.1) or by lead examiner.

	RO	<p>7. CHECK PRZR PORVs AND SPRAY VALVES:</p> <ul style="list-style-type: none"> a) PRZR PORVs – CLOSED b) PRZR spray controls <ul style="list-style-type: none"> • Demand at Zero (or) • Controlling Pressure c) PORV block valves - AT LEAST ONE OPEN <p>RO identifies that only one block valve is open.</p>
	SRO RO	<p>NOTE: Seal injection flow should be maintained to all RCPs.</p> <p>*8. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:</p> <ul style="list-style-type: none"> a) Charging Pumps – AT LEAST ONE RUNNING AND FLOWING TO RCS <p>Two or three Charging pumps will be running and flowing to the RCS.</p> <ul style="list-style-type: none"> b) RCS subcooling - LESS THAN 30°F [85°F] <p>RCS subcooling will NOT be less than 30 °F</p> <p>RNO for the step is to go to step 9.</p>
	BOP	<p>9. CHECK IF SGs ARE NOT FAULTED:</p> <ul style="list-style-type: none"> • Check pressures in all SGs <ul style="list-style-type: none"> a) STABLE OR INCREASING AND b) GREATER THAN 100 PSIG <p>BOP will observe a slightly decreasing trend on SG pressures. This will be attributed to the RCS cooldown. The team will not transition to 1-E-2.</p>

Op-Test No.: Surry 2008-301 Scenario No.: 1 Event No.: 7

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Event Description: 'B' SG Tube Leak degrades into a SGTR.

Cue: Upon completion of transition brief (initiation of 1-ES-0.1) or by lead examiner.

	BOP	<p>10. CHECK IF SG TUBES ARE NOT RUPTURED:</p> <ul style="list-style-type: none"> • Condenser air ejector radiation – NORMAL • SG blowdown radiation – NORMAL • SG MS radiation – NORMAL • TD AFW pump exhaust radiation – NORMAL • SG NR Level - NOT INCREASING IN AN UNCONTROLLED MANNER <p>BOP should observe 'B' SG NR level going up uncontrollably.</p>
	SRO	<p>RNO: GO TO 1-E-3, STEAM GENERATOR TUBE RUPTURE.</p>
	SRO	<p>The team will hold a transition brief. During the brief it will be identified that 'B' SG is ruptured, current isolation status of the ruptured SG and that the team is transitioning to 1-E-3.</p> <p><i>The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal with the exception of the previously identified alarms. He will also state that containment conditions and the electrical conditions are as you see them.</i></p>

Op-Test No.: Surry 2008-301 Scenario No.: 1 Event No.: 7

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Event Description: 'B' SG Tube Leak degrades into a SGTR.

Cue: Upon completion of transition brief (initiation of 1-ES-0.1) or by lead examiner.

		<p>ATTACHMENT 10 of 1-E-0</p> <p>This attachment can be performed at any time during 1-E-0. It is a pre-emptive action, so it is not required to be performed.</p>
	BOP	<p>1. Verify SI is in progress. <u>IF</u> SI is <u>NOT</u> in progress, <u>THEN</u> return to procedure step in effect.</p> <p>BOP identifies that SI is in progress.</p>
	BOP	<p>ATTACHMENT 10 of 1-E-0</p> <p>2. Identify Ruptured SG by one of the following conditions:</p> <ul style="list-style-type: none"> • Unexpected rise in any SG Narrow Range level • High radiation from any SG MS line monitor • High radiation from any SG Blowdown line <p>BOP with SRO concurrence identifies 'B' SG as the ruptured SG</p>
	BOP	<p>ATTACHMENT 10 of 1-E-0</p> <p>3. Verify running or start AFW Pumps, as necessary</p> <ul style="list-style-type: none"> • 1-FW-P-3A • 1-FW-P3B • 1-FW-P-2
	BOP	<p>ATTACHMENT 10 of 1-E-0</p> <p>4. When ruptured SG Narrow Range level is greater than 12%, then isolate feed flow to ruptured SG by closing SG AFW Isolation MOVs:</p> <ul style="list-style-type: none"> • SG B, 1-FW-MOV-151C and 1-FW-MOV-151D <p>BOP closes 1-FW-MOV-151C/D when SG level is greater than 12% Narrow Range.</p> <p><i>Partial completion of the critical task (WOG E-3—A) to isolate the SG is accomplished by performance of this step.</i></p>

Op-Test No.: Surry 2008-301 Scenario No.: 1 Event No.: 7

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Event Description: 'B' SG Tube Leak degrades into a SGTR.

Cue: Upon completion of transition brief (initiation of 1-ES-0.1) or by lead examiner.

	BOP	<p>ATTACHMENT 10 of 1-E-0</p> <p>5. Defeat the auto open signal for the ruptured SG AFW MOVs (1-FW-MOV-151C and 151D) using the following switches:</p> <ul style="list-style-type: none"> • 1-FW-43-3-AFW-S, H TRAIN DISABLE SELECTOR SWITCH • 1-FW-43-4-AFW-S, J TRAIN DISABLE SELECTOR SWITCH
	BOP	<p>ATTACHMENT 10 of 1-E-0</p> <p>6. Place both of the following key switches in the DISABLE SELECTED position:</p> <ul style="list-style-type: none"> • 1-FW-43-1-AFW-E, H TRAIN AUTO OPEN ENABLE SWITCH • 1-FW-43-2-AFW-E, J TRAIN AUTO OPEN ENABLE SWITCH
	BOP	<p>ATTACHMENT 10 of 1-E-0</p> <p>CAUTION: At least one SG must be maintained available for RCS cooldown.</p> <p>7. Locally close steam supply valve to the TD AFW pump:</p> <ul style="list-style-type: none"> • 1-MS-120 <p>BOP directs field operator to close 1-MS-120.</p> <p><i>The field operator will acknowledge the requirement to close 1-MS-120. The field operator will later report that 1-MS-120 is closed.</i></p> <p><i>Partial completion of the critical task (WOG E-3—A) to isolate the SG is accomplished by performance of this step.</i></p>
	BOP	<p>ATTACHMENT 10 of 1-E-0</p> <p>8. Control Feed Flow to the SG IAW the following requirements:</p> <ul style="list-style-type: none"> • Minimum AFW flow is 350 gpm with SI initiated, until one SG Narrow Range level is greater than 12% • When minimum heat sink has been verified, AFW MOVs should be controlled to maintain intact SG Narrow Range levels between 22% and 50%. <ul style="list-style-type: none"> ○ SG A, 1-FW-MOV-151E and 1-FW-MOV-151F ○ SG C, 1-FW-MOV-151A and 1-FW-MOV-151B
		<p>Critical Task: [WOG E-3—A] Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs (KOA).</p>

Op-Test No.: Surry 2008-301 Scenario No.: 1 Event No.: 8

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Event Description: Blowdown trip valves fail to closed during SI.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	<p>ATTACHMENT 1 OF E-0</p> <p>1. VERIFY FW ISOLATION:</p> <ul style="list-style-type: none"> • Feed pump discharge MOVs – CLOSED <ul style="list-style-type: none"> • 1-FW-MOV-150A • 1-FW-MOV-150B • MFW pumps – TRIPPED • Feed REG valves – CLOSED • SG FW bypass flow valves – DEMAND AT ZERO • SG blowdown TVs – CLOSED <p>Identifies blowdown TVs do not automatically close and manually closes each valve.</p> <ul style="list-style-type: none"> • 1-BD-TV-100A • 1-BD-TV-100B • 1-BD-TV-100C (Critical Step Linked) • 1-BD-TV-100D (Critical Step Linked) • 1-BD-TV-100E • 1-BD-TV-100F <p><i>Partial completion of the critical task (WOG E-3—A) to isolate the SG is accomplished by performance of this step.</i></p>
	BOP	<p>2. VERIFY CTMT ISOLATION PHASE I:</p> <ul style="list-style-type: none"> • Phase I TVs – CLOSED • 1-CH-MOV-1381 – CLOSED • 1-SV-TV-102A – CLOSED • PAM isolation valves – CLOSED <ul style="list-style-type: none"> • 1-DA-TV-103A • 1-DA-TV-103B

Op-Test No.: Surry 2008-301 Scenario No.: 1 Event No.: 8

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Event Description: Blowdown trip valves fail to closed during SI.

Cue: By Examiner.

	BOP	<p>3. VERIFY AFW PUMPS RUNNING:</p> <p>a) MD AFW pumps – RUNNING (Time Delayed)</p> <p>b) TD AFW pump - RUNNING IF NECESSARY</p>
	BOP	<p>4. VERIFY SI PUMPS RUNNING:</p> <ul style="list-style-type: none"> • CHG pumps – RUNNING • LHSI pumps - RUNNING
	BOP	<p>5. CHECK CHG PUMP AUXILIARIES:</p> <ul style="list-style-type: none"> • CHG pump CC pump – RUNNING • CHG pump SW pump - RUNNING
	BOP	<p>6. CHECK INTAKE CANAL:</p> <ul style="list-style-type: none"> • Level - GREATER THAN 24 FT • Level - BEING MAINTAINED BY CIRC WATER PUMPS
	BOP	<p>7. CHECK IF MAIN STEAMLINES SHOULD BE ISOLATED:</p> <p>a) Check if ANY of the following annunciators - HAVE BEEN LIT</p> <ul style="list-style-type: none"> • E-F-10 (High Steam Flow SI) • B-C-4 (Hi Hi CLS Train A) • B-C-5 (Hi Hi CLS Train B) <p>Identifies annunciators not lit and goes to step 8.</p>

Op-Test No.: Surry 2008-301 Scenario No.: 1 Event No.: 8

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Event Description: Blowdown trip valves fail to closed during SI.

Cue: By Examiner.

	BOP	<p>*8. CHECK IF CS REQUIRED:</p> <p>a) CTMT pressure – HAS EXCEEDED 23 PSIA</p> <p>Identifies pressure has not exceeded 23 or 17.7 psia and goes to step 10.</p>
	BOP	<p>*10. BLOCK LOW PRZR PRESS SI SIGNAL:</p> <p>a) Check PRZR pressure – LESS THAN 2000 psig</p> <p>b) Turn both LO PRZR PRESS & STM HDR/LINE □P switches to block</p> <p>c) Verify Permissive Status light C-2 - LIT</p> <p>BOP may block the low pressurizer pressure SI signal depending on current RCS pressure.</p>
	BOP	<p>*11. BLOCK LOW TAVE SI SIGNAL:</p> <p>Step may not be performed at this time (if Tave is greater than 543°F).</p> <p>a) Check RCS Tave - LESS THAN 543°F</p> <p>b) Turn both HI STM FLOW & LO TAVG OR LP switches to block</p> <p>c) Verify Permissive Status light F-1 - LIT</p>
	BOP	<p>NOTE:</p> <ul style="list-style-type: none"> • CHG pumps should be run in the following order of priority: C, B, A. • Subsequent SI signals may be reset by re-performing Step 12. <p>12. VERIFY SI FLOW:</p> <p>a) HHSI to cold legs - FLOW INDICATED</p> <ul style="list-style-type: none"> • 1-SI-FI-1961 (NQ) • 1-SI-FI-1962 (NQ) • 1-SI-FI-1963 (NQ) • 1-SI-FI-1943 or 1-SI-FI-1943A <p>b) Check CHG pumps - THREE RUNNING</p>

Op-Test No.: Surry 2008-301 Scenario No.: 1 Event No.: 8

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Event Description: Blowdown trip valves fail to closed during SI.

Cue: By Examiner.

		<p>c) Reset SI.</p> <p>d) Stop one CHG pump and out in AUTO</p> <p>e) RCS pressure - LESS THAN 185 PSIG</p> <p>RNO: e) IF two LHSI pumps are running, THEN do the following:</p> <ol style="list-style-type: none"> 1) Verify reset or reset SI. 2) Stop one LHSI pump and put in AUTO. 3) GO TO Step 13. <p>Critical Task: [SPS E-1—G] Secure one LHSI pump within 30 minutes of initiation of SI (KOA).</p> <p>Time 1st LHSI Pump secured: _____</p>
	BOP	<p>13. VERIFY TOTAL AFW FLOW - GREATER THAN 350 GPM [450 GPM]</p>
	BOP	<p>14. CHECK AFW MOVs - OPEN</p> <p>BOP will identify that all AFW MOVs are not open and will read the RNO portion of this step and manually align valves as necessary.</p>
	BOP	<p>15. INITIATE SI VALVE ALIGNMENT IAW ATTACHMENT 2</p> <p>See attached copy of Attachment 2.</p>
	BOP	<p>16. INITIATE VENTILATION ALIGNMENT AND AC POWER ALIGNMENT IAW ATTACHMENT 3</p> <p>See attached copy of Attachment 3:</p> <p><i>Unit 2 Operator will state that Unit 2 is at 100% power (if asked)</i></p> <p><i>Unit 2 will also accept responsibility to complete Attachment 3 if it is given to Unit 2 at the point where differential pressure indications are requested.</i></p>

END – Event Terminates upon completion of Attachment 2 and 3.

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Event Description: E-3, SGTR with transition to ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	RO	<p>1-E-3 Actions</p> <p>NOTE: Seal injection flow should be maintained to all RCPs.</p> <p>*1. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:</p> <p>a) Charging Pumps – AT LEAST ONE RUNNING AND FLOWING TO RCS</p> <p>RO will identify that two charging pumps are running.</p> <p>b) RCS subcooling - LESS THAN 30°F [85°F]</p> <p>RO will identify that RCS subcooling is greater than 30°F</p> <p>RNO is to go to step 2</p>
	SRO	<p>2. IDENTIFY RUPTURED SG(s):</p> <ul style="list-style-type: none"> • Unexpected rise in any SG narrow range level OR • High radiation from any SG MS line monitor OR • High radiation from any SG blowdown line OR • High radiation from any SG sample <p>Crew should observe 'B' SG NR level going up unexpectedly.</p>

Event Description: E-3, SGTR with transition to ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL.

Cue: By Examiner.

	<p>SRO</p> <p>BOP</p>	<p>CAUTION:</p> <ul style="list-style-type: none"> • If the TD AFW pump is the only available source of feed flow, steam supply to the TD AFW pump must be maintained from at least one SG. • At least one SG must be maintained available for RCS cooldown. <p>3. ISOLATE RUPTURED SG(s):</p> <ol style="list-style-type: none"> a) Adjust ruptured SG PORV controller setpoint to 1035 psig b) Check ruptured SG(s) PORV – CLOSED c) Verify blowdown TVs from ruptured SG(s) – CLOSED d) Locally close steam supply valve(s) to TD AFW pump: <ul style="list-style-type: none"> • 1-MS-120 for 'B' SG e) Close ruptured SG(s) MSTV (B) <p><i>Partial completion of the critical task (WOG E-3—A) to isolate the SG is accomplished by performance of this step.</i></p>
	<p>BOP</p>	<p>CAUTION: If any ruptured SG is faulted, feed flow to that SG should remain isolated during subsequent recovery actions unless needed for RCS cooldown.</p> <p>* 4. CHECK RUPTURED SG LEVEL:</p> <ol style="list-style-type: none"> a) Narrow range level - GREATER THAN 12% [18%] b) Stop feed flow to ruptured SG(s) <p><i>Partial completion of the critical task (WOG E-3—A) to isolate the SG is accomplished by performance of this step if not previously accomplished.</i></p> <ol style="list-style-type: none"> c) Defeat the auto open signal for the ruptured SG AFW MOVs using the following switches: <ul style="list-style-type: none"> • 1-FW-43-3-AFW-S, H TRAIN DISABLE SELECTOR SWITCH • 1-FW-43-4-AFW-S, J TRAIN DISABLE SELECTOR SWITCH

Op-Test No.: Surry 2008-301 Scenario No.: 1 Event No.: 9

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Event Description: E-3, SGTR with transition to ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL.

Cue: By Examiner.

	BOP	<p>d) Place both of the following key switches in the DISABLE SELECTED position:</p> <ul style="list-style-type: none"> • 1-FW-43-1-AFW-E, H TRAIN AUTO OPEN ENABLE SWITCH • 1-FW-43-2-AFW-E, J TRAIN AUTO OPEN ENABLE SWITCH <p>Critical Task: [WOG E-3—A] Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs (KOA).</p>
	BOP	<p>CAUTION: Major steam flow paths from the ruptured SG should be isolated before initiating RCS cooldown.</p> <p>5. CHECK RUPTURED SG PRESSURE – GREATER THAN 350 PSIG</p>
	RO	<p>*6. BLOCK LOW PRZR PRESS SI SIGNAL:</p> <ul style="list-style-type: none"> a) Check PRZR pressure - LESS THAN 2000 PSIG b) Turn both LO PRZR PRESS & STM HDR/LINE DP switches to block c) Verify Permissive Status light C-2 - LIT <p>Depending on RCS pressure the team will either block low pressure SI at this point, during the RCS cooldown, or identify that blocking was performed in E-0 Attachment 1.</p>
	RO	<p>*7. BLOCK LOW TAVE SI SIGNAL:</p> <ul style="list-style-type: none"> a) Check RCS Tave - LESS THAN 543°F b) Turn both HI STM FLOW & LO TAVG OR LP switches to block c) Verify Permissive Status light F-1 – LIT d) Hold the STM DUMP CNTRL switch in BYP INTLK e) Verify Bypass Status light D-2 - LIT <p>Depending on RCS temperature the team will either block low pressure SI at this point, during the RCS cooldown, or identify that blocking was performed in E-0 Attachment 1.</p>

Event Description: E-3, SGTR with transition to ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL.

Cue: By Examiner.

SRO/BOP	CAUTION: Flow on each Main Steamline should be kept less than 1.0 x 1E6 PPH to prevent Main Steamline isolation during RCS cooldown with the Steam Dumps.																		
SRO	CAUTION: If no RCPs are running, RCS cooldown and depressurization may cause a false Integrity Status Tree indication on the ruptured loop. The cold leg indication on the ruptured loop should be disregarded until after the performance of Step 35.																		
SRO	NOTE: RCP trip criteria does NOT apply after initiation of an operator controlled cooldown.																		
RO/SRO	<p>8. INITIATE RCS COOLDOWN:</p> <p>a) Determine required core exit temperature (ONE TIME):</p> <table border="1" data-bbox="532 1021 1136 1372"> <thead> <tr> <th data-bbox="532 1021 828 1085">LOWEST RUPTURED SG PRESSURE (PSIG)</th> <th data-bbox="893 1021 1136 1085">CORE EXIT TEMPERATURE (°F)</th> </tr> </thead> <tbody> <tr> <td data-bbox="532 1117 828 1149">BETWEEN 1001 AND 1085</td> <td data-bbox="933 1117 1039 1149">495 [440]</td> </tr> <tr> <td data-bbox="532 1149 828 1181">BETWEEN 901 AND 1000</td> <td data-bbox="933 1149 1039 1181">485 [430]</td> </tr> <tr> <td data-bbox="532 1181 828 1212">BETWEEN 801 AND 900</td> <td data-bbox="933 1181 1039 1212">470 [415]</td> </tr> <tr> <td data-bbox="532 1212 828 1244">BETWEEN 701 AND 800</td> <td data-bbox="933 1212 1039 1244">455 [400]</td> </tr> <tr> <td data-bbox="532 1244 828 1276">BETWEEN 601 AND 700</td> <td data-bbox="933 1244 1039 1276">440 [385]</td> </tr> <tr> <td data-bbox="532 1276 828 1308">BETWEEN 501 AND 600</td> <td data-bbox="933 1276 1039 1308">420 [365]</td> </tr> <tr> <td data-bbox="532 1308 828 1340">BETWEEN 401 AND 500</td> <td data-bbox="933 1308 1039 1340">400 [345]</td> </tr> <tr> <td data-bbox="532 1340 828 1372">BETWEEN 350 AND 400</td> <td data-bbox="933 1340 1039 1372">385 [335]</td> </tr> </tbody> </table>	LOWEST RUPTURED SG PRESSURE (PSIG)	CORE EXIT TEMPERATURE (°F)	BETWEEN 1001 AND 1085	495 [440]	BETWEEN 901 AND 1000	485 [430]	BETWEEN 801 AND 900	470 [415]	BETWEEN 701 AND 800	455 [400]	BETWEEN 601 AND 700	440 [385]	BETWEEN 501 AND 600	420 [365]	BETWEEN 401 AND 500	400 [345]	BETWEEN 350 AND 400	385 [335]
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BETWEEN 501 AND 600	420 [365]																		
BETWEEN 401 AND 500	400 [345]																		
BETWEEN 350 AND 400	385 [335]																		
BOP	Based on current ruptured SG pressure the RO will determine the CETC temperature following the impending cooldown.																		
BOP	b) Place Steam Dump Mode Select switch in Steam Pressure mode																		
BOP	c) Dump steam to main condenser from from intact SG(s) at maximum rate																		
	<p><i>Partial completion of the critical task (WOG E-3—B) to cooldown the RCS is accomplished during this step.</i></p> <p>RO will manually increase demand on the Steam Dump Controller until demand is at least 25% (full open demand signal to cooldown steam dumps) or 1E6 lbm/hr is reached.</p>																		

Op-Test No.: Surry 2008-301 Scenario No.: 1 Event No.: 9

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Event Description: E-3, SGTR with transition to ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL.

Cue: By Examiner.

	RO	<p>d) Check CETCs - LESS THAN REQUIRED TEMPERATURE</p> <p>The first time this is read, CETC temperatures will not be less than the required temperature. The SRO will proceed to the RNO portion of this step and continue in the procedure. Step 8e and 8f will be performed once CETCs are less than the required temperature in accordance with the RNO of step 8d.</p> <p>e) Stop RCS cooldown</p> <p>f) Maintain CETCs - LESS THAN REQUIRED TEMPERATURE</p>
	BOP	<p>* 9. CHECK INTACT SG LEVELS:</p> <p>a) Any narrow range level - GREATER THAN 12% [18%]</p> <p>b) Check emergency buses – BOTH ENERGIZED</p> <p>c) Control feed flow to maintain narrow range level between 22% and 50%</p>
	SRO RO	<p>Caution: If any PRZR PORV opens because of high PRZR pressure, the PORV must be verified closed or isolated after pressure decreases to less than 2335 psig.</p> <p>*10. CHECK PRZR PORVs AND BLOCK VALVES:</p> <p>a) Power to PRZR PORV block valves - Available</p> <p>b) PRZR PORVs – CLOSED</p> <p>c) PORV block valves - AT LEAST ONE OPEN</p> <p>RO will report that only one PORV block valve is open.</p>
	RO	<p>11. RESET BOTH TRAINS OF SI</p> <p>SI will either be reported as previously reset or it can be reset again.</p>

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Event Description: E-3, SGTR with transition to ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL.

Cue: By Examiner.

	RO	<p>12. RESET CLS:</p> <p>a) Check CTMT pressure – HAS EXCEEDED 17.7 psia</p> <p>Containment pressure has not exceeded 17.7 psia, the RNO has the team proceed to Step 13.</p>
	RO	<p>13. VERIFY INSTRUMENT AIR AVAILABLE:</p> <p>a) Check annunciator B-E-6 - NOT LIT</p> <p>b) Check at least one CTMT IA compressor – RUNNING</p> <ul style="list-style-type: none"> • 1-IA-C-4A or 4B <p>c) Verify 1-IA-TV-100 - OPEN</p> <p>RO will report 1B-E6 is not lit, a containment instrument air compressor is running, and 1-IA-TV-100 is open.</p>
	BOP/RO	<p>14. ALIGN CONDENSER AIR EJECTOR TO CTMT:</p> <p>a) Verify the following:</p> <ul style="list-style-type: none"> • 1-SV-TV-102 – OPEN • 1-SV-TV-103 – CLOSED <p>b) Open the following valve:</p> <ul style="list-style-type: none"> • 1-SV-TV-102A <p>The BOP will open 1-SV-TV-102A.</p>

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Event Description: E-3, SGTR with transition to ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL.

Cue: By Examiner.

<p>SRO</p> <p>RO</p>	<p>CAUTION: RCS pressure should be monitored. If RCS pressure decreases in an uncontrolled manner to less than 250 psig [400 psig], one LHSI pump must be manually restarted to supply water to the RCS.</p> <p>15. CHECK IF LHSI PUMPS SHOULD BE STOPPED:</p> <ul style="list-style-type: none"> a) Check LHSI pumps – Any running with suction aligned to RWST b) RCS pressure - GREATER THAN 250 PSIG [400 PSIG] c) Stop LHSI pumps and put in AUTO <p>The RO will stop the final remaining LSHI pump.</p>
<p>RO</p>	<p>16. Check if RCS Cooldown should be stopped</p> <ul style="list-style-type: none"> a) Check CETCs – LESS THAN REQUIRED TEMPERATURE b) Stop RCS Cooldown c) Maintain CETCs – LESS THAN REQUIRED TEMPERATURE <p>Cooldown the RCS to < target CETCs and stabilize temperature such that transition is not made into an ECA or FR procedure based on RCS subcooling 30 °F or RCS temp , 455 °F (KOA)</p>
<p>BOP</p>	<p>17. CHECK RUPTURED SG(s) PRESSURE - STABLE OR INCREASING</p> <p>BOP should report that ruptured SG pressure is stable or increasing.</p>
<p>RO</p>	<p>18. CHECK RCS SUBCOOLING BASED ON CETCs - GREATER THAN 50°F [105°F]</p> <p>RO will report that subcooling is greater than 50 °F.</p>

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Event Description: E-3, SGTR with transition to ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL.

Cue: By Examiner.

	RO	<p>19. DEPRESSURIZE RCS TO MINIMIZE BREAK FLOW AND REFILL PRZR:</p> <p>a) Check normal spray - AVAILABLE</p> <ul style="list-style-type: none"> • RCP C <u>AND</u> 1-RC-PCV-1455B - BOTH AVAILABLE <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> • RCPs A and B <u>AND</u> 1-RC-PCV-PCV-1455A – BOTH AVAILABLE <p>RNO: a) GO TO Step 20.</p>
	SRO	<p>CAUTION: The PRT may rupture if a PRZR PORV is used for RCS depressurization. Rupturing the PRT may result in abnormal containment conditions.</p> <p>CAUTION: Cycling of the PRZR PORV should be minimized.</p> <p>NOTE: The upper head region may void during RCS depressurization if the RCPs are not running. This will result in a rapidly increasing PRZR level.</p>
	RO	<p>20. DEPRESSURIZE RCS USING PRZR PORV TO MINIMIZE BREAK FLOW AND REFILL PRZR:</p> <p>a) PRZR PORV - AT LEAST ONE AVAILABLE</p> <p>b) Open one PRZR PORV until any of the following conditions satisfied:</p> <ul style="list-style-type: none"> • PRZR Level – greater than 69% (or) • RCS Subcooling based on CETCs less than 30°F (or) • Both of the following exist: <ul style="list-style-type: none"> 1) RCS Pressure – less than Ruptured SG pressure (and) 2) PRZR level – greater than 22% <p>RNO for PORV not opening - GO TO 1-ECA-3.3, SGTR WITHOUT PRESSURE CONTROL.</p>
	SRO	<p>The team will hold a transition brief. During the brief it will be identified that RCS pressure control is not available and the team will transition to 1-ECA-3.3.</p>

Event Description: E-3, SGTR with transition to ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL.

Cue: By Examiner.

	RO	<p>1-ECA-3.3 Actions</p> <p>1. CHECK RUPTURED SG(S) NARROW RANGE LEVEL - LESS THAN 75% [73%]</p> <p>RO will either report that 'B' SG Level is greater than 75%.</p> <p>1. RNO - GO TO Step 6</p>																	
	RO	<p>6. CHECK IF SI CAN BE TERMINATED:</p> <p>a) Check RCS subcooling based on CETCs - GREATER THAN 30°F [85°F]</p> <p>RO will identify that RCS subcooling is greater than 30°F.</p> <p>b) Check secondary heat sink:</p> <ul style="list-style-type: none"> • Total feed flow to SGs – GREATER THAN 350 GPM [450 GPM] AVAILABLE <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • Narrow range level in at least one intact SG - GREATER THAN 12% [18%] <p>c) Check RVLIS indication - GREATER THAN VALUE FROM TABLE</p> <table border="1" data-bbox="637 1364 1219 1683"> <thead> <tr> <th rowspan="2">RCPs Running</th> <th colspan="2">RVLIS INDICATION</th> </tr> <tr> <th>Full Range</th> <th>Dynamic Range</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>GREATER THAN 63%</td> <td></td> </tr> <tr> <td>1</td> <td></td> <td>GREATER THAN 63%</td> </tr> <tr> <td>2</td> <td></td> <td>GREATER THAN 63%</td> </tr> <tr> <td>3</td> <td></td> <td>GREATER THAN 63%</td> </tr> </tbody> </table> <p>RO will identify that RVLIS Full Range is Greater than 63%.</p> <p>d) Check any ruptured SG narrow range level - INCREASING IN AN UNCONTROLLED MANNER OR OFFSCALE HIGH</p> <p>BOP will identify that 'B' SG Level is Off-Scale High.</p>	RCPs Running	RVLIS INDICATION		Full Range	Dynamic Range	0	GREATER THAN 63%		1		GREATER THAN 63%	2		GREATER THAN 63%	3		GREATER THAN 63%
RCPs Running	RVLIS INDICATION																		
	Full Range	Dynamic Range																	
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Event Description: E-3, SGTR with transition to ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL.

Cue: By Examiner.

	RO	<p>7. STOP ALL BUT ONE CHG PUMP AND PUT IN AUTO</p> <p>RO will secure one of the running charging pumps</p>
	RO	<p>8. ISOLATE HHSI TO COLD LEGS:</p> <p>a) Verify the following:</p> <p>1) CHG pump suctions from RWST - OPEN</p> <ul style="list-style-type: none"> • 1-CH-MOV-1115B • 1-CH-MOV-1115D <p>2) Check CHG pump miniflow recirc valves - OPEN</p> <ul style="list-style-type: none"> • 1-CH-MOV-1275A • 1-CH-MOV-1275B • 1-CH-MOV-1275C • 1-CH-MOV-1373 <p>b) Close HHSI to Cold Leg:</p> <ul style="list-style-type: none"> • 1-SI-MOV-1867C • 1-SI-MOV-1867D • 1-SI-MOV-1842

END – Event is terminated upon reduction of SI flow (i.e. Step 7 of ECA-3.3).

END – Scenario 1

SIMULATOR OPERATOR GUIDE

Simulator Setup

Initial Conditions:

Recall 100% IC and enter the following malfunctions or recall the IC 252 and implement TRIGGER #16 to activate all passive malfunctions. **VERIFY** Trigger #16 implemented.

Open the monitor window and add the following points to it:

- ASP_AO_OFF = True
- Verify AAC System Test Switch in TEST

Enter the following MALFUNCTIONS:

Malfunction	Delay	Ramp	Trigger	Value	Final	Trigger Type
FW1803 – ‘B’ SG Main Feed Flow XMTR Failure	15	10	1	0	-1	Manual
RC4903 - Pressurizer Level Control Transmitter CH3 Failure	15	10	3	0	1	Manual
SD0201 – ‘A’ HP Heater Drain Pump Over-current Trip	15	0	5	False	True	Manual
RC2402 - Steam Generator ‘B’ Tube Rupture	15	10	7	0	4.5	Manual
RC5603 - 1-RC-P-1C Spurious Trip	45	0	9	False	True	Manual
RC5601 - 1-RC-P-1A Spurious Trip	0	0	11	False	True	Auto
RC5602 - 1-RC-P-1B Spurious Trip	0	0	11	False	True	Auto
RC2402 - ‘B’ SG Tube Rupture Degrades	N/A	N/A	N/A	4.5	45	Manual update of final value
RD18 - Failure of Auto Reactor Trip	0	N/A	16	False	True	Passive

SIMULATOR OPERATOR GUIDE

Enter the following REMOTE FUNCTIONS:

Remote Function	Delay	Ramp	Trigger	Value	Final	Trigger Type (Auto or Manual)
DISA_BD100A_ACL – Disable auto-close of 1-BD-TV-100A	0	0	16	Enable	Disable	Passive
DISA_BD100B_ACL – Disable auto-close of 1-BD-TV-100B	0	0	16	Enable	Disable	Passive
DISA_BD100C_ACL – Disable auto-close of 1-BD-TV-100C	0	0	16	Enable	Disable	Passive
DISA_BD100D_ACL – Disable auto-close of 1-BD-TV-100D	0	0	16	Enable	Disable	Passive
DISA_BD100E_ACL – Disable auto-close of 1-BD-TV-100E	0	0	16	Enable	Disable	Passive
DISA_BD100F_ACL – Disable auto-close of 1-BD-TV-100F	0	0	16	Enable	Disable	Passive
RCMOV594 Loop Isolation Valve Position	15	10	9	100	70	Manual

SIMULATOR OPERATOR GUIDE

Enter the following OVERRIDES:

Override	Delay	Ramp	Trigger	Value	Final	Trigger Type (Auto or Manual)
MOV535_Open Disable 1-RC-MOV-1535 from re-opening.	0	0	16	Off	Off	Passive
MSSOV104_Open Prevent 1-MS-SOV-104 from closing.	0	0	16	Off	Off	Passive
PCV455C_Open Disable 1-RC-PCV-1455C from opening.	0	0	16	Off	On	Passive

SIMULATOR OPERATOR GUIDE

TRIGGER	TYPE	DESCRIPTION
1	Manual	1-FW-FT-1487 Fails low (MFRVs open).
3	Manual	1-RC-LT-1461 Fails high (Charging Flow decreases).
5	Manual	Loss of 'A' HP HTR Drain Pump.
7	Manual	Commence SGTL in 'B' SG.
9	Manual	Degradation and eventual failure of 'C' RCP
11	Auto on MG Trip	Loss of 'A' and 'B' RCP
MANUAL UPDATE	MANUAL UPDATE	Increase the size of SGTL in 'B' SG to a SGTR.
16	Passive	Disable Auto Closure of all Blowdown Trip Valves, prevent closure of 1-MS-SOV-104, prevent opening 1-RC-MOV-1535 and 1-RC-PCV-1455C, and prevent an Automatic Reactor Trip.

SIMULATOR OPERATOR GUIDE

Verify the following control room setup:

- Place the simulator in RUN and verify normal 100% power operation indications.
- Verify Red Magnets on the following components:

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Verify 1-RM-RI-112 aligned to A/C SG and 1-RM-RI-113 aligned to B SG (magnets).
- Verify Ovation System operating.
- Reset ICCMs.
- Verify Component Switch Flags.
- Verify Brass Caps properly placed.
- Verify SG PORVs set for 1035 psig.
- Verify Rod Control Group Step Counters indicate properly.
- Verify Ovation CRT display
- Advance Charts the following charts:

Master chart advance switch

- Verify Turbine Thumb Wheel Settings @120 rpm/min and Position 6
- Verify Containment Instrument Air Compressors are on Inside Suction (all RMs reset)
- Verify all ARPs have been cleaned
- Verify CLEAN copies of the following procedures are in place:

<input type="checkbox"/> AP-53.00 (2)	<input type="checkbox"/> AP-18.00	<input type="checkbox"/> AP-16.00	<input type="checkbox"/> AP-23.00
<input type="checkbox"/> AP-9.00	<input type="checkbox"/> AP-10.07	<input type="checkbox"/> AP-24.00	<input type="checkbox"/>
<input type="checkbox"/> E-0 (2)	<input type="checkbox"/> ES-0.1	<input type="checkbox"/> E-3	<input type="checkbox"/> ECA-3.3
<input type="checkbox"/> OP-CH-007	<input type="checkbox"/> Reactivity Sheet		
<input type="checkbox"/> OP-ZZ-002	<input type="checkbox"/>		

- Copy of 1-PT-18.6I (Pressurizer Block Valve Stroke Test)**
- Verify Reactivity Placard is current.

SIMULATOR OPERATOR GUIDE**Brief**

This simulator performance scenario is performed in the EVALUATION MODE. You should not direct questions to the evaluators. Otherwise, you should perform as if you were in the MCR.

Your ability to maintain a log is not being graded, but maintaining a rough log is recommended to help during briefs.

If you need to communicate with the Unit 2 operator, verbally state, "Unit 2" and an instructor will locate to the Unit 2 area and respond to you as quickly as possible.

In the unlikely event that the simulator fails such that illogical indications result, the session will be terminated. In other words, respond to what you see. If there is a problem with the simulation, the session will be terminated or adjusted as appropriate based on the specific problem.

Assign operating positions.

Ask for and answer questions.

SIMULATOR OPERATOR GUIDEConduct shift turnover:

Provide normal shift turnover materials reflecting the below initial conditions:

The initial conditions have Unit #1 operating steady state at 100% power with a current boron concentration of 750 ppm. All Unit #1 systems and crossties are operable with the following exceptions:

- The AAC Diesel Generator is tagged out for planned maintenance (major overhaul). The maintenance is expected to last 12 days. It is currently the fourth day of the maintenance package .

Unit #2 is at 100% power with all systems and crossties operable.

Shift orders are to maintain 100% power on Unit #1. 1-PT-18.6I, Pressurizer Block Valve Stroke Test, is required to be performed upon relieving the shift. It has been PSA analyzed for current plant conditions.

The last shift performed two 50-gallon dilutions.

When the team has accepted the shift, proceed to the Session Conduct Section.

SIMULATOR OPERATOR GUIDE**Session Conduct:**

Ensure conditions in Simulator Set-up are established.

Ensure Trigger 16 is active prior to team entering the simulator.

Verify Exam Security has been established and ASP_AO_OFF = True.

EVENT 1 Performance of 1-PT-18.6I (1-RC-MOV-1535 will not re-open)

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of the block valve for 1-RC-PCV-1456 to re-open. The individual(s) contacted will also acknowledge any TS LCOs.
- **If contacted**, will take responsibility for writing the WR and CR.

Maintenance:

- **If contacted**, will acknowledge the failure of the block valve and commence investigations.

SIMULATOR OPERATOR GUIDE

STA:

- **If contacted**, will acknowledge the failure of the block valve for 1-RC-PCV-1456. The individual(s) contacted will also acknowledge any TS LCOs. The STA will not confirm or deny any TS decisions.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If asked**, the STA will add the failure into the risk assessment.

Field Operators:

- **If contacted**, field operators will report the breaker for 1-RC-MOV-1535 is normal.

Role play as other individuals as needed.

SIMULATOR OPERATOR GUIDE**EVENT 2 Selected Feed Flow Channel Fails Low on 'B' SG**

When cued by examiner, implement Trigger #1.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of 1-FW-FT-1487. The individual(s) contacted will also acknowledge any TS LCOs and entry into AP-53.00.
- **If contacted**, will recommend to the team that channels remain as they are for now (i.e., do not perform 1-OP-RP-001 at this time).
- **If contacted**, will take responsibility for writing the WR and CR.

STA:

- **If contacted**, will acknowledge the failure of 1-FW-FT-1487. The individual(s) contacted will also acknowledge (but not confirm/deny) any TS LCOs.
- **If asked**, the STA will report that 1-FW-FT-1487 is a Reg. Guide 1.97 component. The STA will also report that upon review of CEP 99-0029 that only one channel of SG feed flow is required per SG, so no actions for Reg. Guide 1.97 are required.
- **If asked**, the STA will review VPAP-2802 and TRM Section 3.3 and report that he has completed his review and this failure does not impact these documents.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

SIMULATOR OPERATOR GUIDE**Maintenance:**

- **If contacted**, will acknowledge instrumentation failure and commence investigations and/or efforts to place the channel in trip.

Field Operators:

- **If contacted**, field operators will report no issues at the MFRVs.

Unit 2:

- If team directs performance of 1-OPT-RX-007, Shift Average Power Calculation, state that you will have the 4th RO perform the procedure.

Role play as other individuals as needed.

SIMULATOR OPERATOR GUIDE**EVENT 3 1-RC-LT-1461 Fails High**

When cued by examiner, implement Trigger #3.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of 1-RC-LT-1461. The individual(s) contacted will also acknowledge any TS LCOs and entry into AP-53.00.
- **If contacted**, will take responsibility for writing the WR and CR.

STA:

- **If contacted**, will acknowledge the failure of 1-RC-LT-1461. The individual(s) contacted will also acknowledge (but not confirm/deny) any TS LCOs.
- **If asked**, the STA will report that 1-FW-LR-1461 is a Reg. Guide 1.97 component. The STA will also report that upon review of CEP 99-0029 only two channels of pressurizer level are required, so no actions for Reg. Guide 1.97 are required.
- **If asked**, the STA will review VPAP-2802 and TRM Section 3.3. The STA will report that he has completed his review and this failure does not impact VPAP-2802, but the TRM is impacted. The STA will report that a 14-day clock to establish fire watch is required and a 60-day return to service clock is required in accordance with the TRM. He will also state that the TRM does refer you to TS 3.7.6.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

SIMULATOR OPERATOR GUIDE**Maintenance:**

- **If contacted**, will acknowledge instrumentation failure and commence investigations and/or efforts to place the channel in trip.

Role play as other individuals as needed.

SIMULATOR OPERATOR GUIDE**EVENT 4 Loss of 'A' HP Heater Drain Pump**

When cued by examiner, implement Trigger #5.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of the 'A' HP Heater Drain Pump and the need to ramp at 1%/minute to 75% power.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If contacted**, will acknowledge entry into AP-18.00 and AP-23.00.
- **If asked** for a recommended ramp rate, ask what the Unit Supervisor recommends. When authorized by the NRC, the Shift Manager will direct a 1%/minute ramp rate.

STA:

- **If contacted**, will acknowledge the failure of the 'A' HP Heater Drain Pump and the need to ramp at 1%/minute to 75% power.
- **If asked**, the STA will acknowledge the need to borate and use rods (will acknowledge the team review of OP-RX-010, if performed). If asked to perform the OP-RX-010 review, the STA will state that he is not able to at this time.
- **After directed**, the STA will report that he has reviewed VPAP-2802 and no notifications were required.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

SIMULATOR OPERATOR GUIDE

Field Operators:

- **If contacted**, field operators will report that there are no abnormalities with the 'A' HP Heater Drain pump with the exception of an acrid odor coming from the motor. He will state there is no fire or smoke present.
- **If contacted**, the operator will an over-current on 1-EP-BKR-15B6 on the 'A' and 'B' phase.
- **If contacted**, the condensate polishing building operator will acknowledge the need to ramp the unit to place the polisher back in-service in accordance with AP-18.00/23.
- **If asked**, the condensate polishing building operator will report current polishing building ΔP (read from simulator screen).

Maintenance:

- **If contacted**, will acknowledge the failure and commence investigations.
- **If contacted**, will acknowledge the requirements to sample the RCS.

Role play as other individuals as needed.

SIMULATOR OPERATOR GUIDE**EVENT 5 Steam Generator Tube Leak into 'B' Steam Generator**

When cued by examiner, implement Trigger #7.

BOOTH: Depending on the ramp and current power level the team may believe the ~40 gpm leak rate exceeds 50 gpm and decide to trip the reactor. If this decision is made, initiate Trigger 9.

Operations Supervisor/Management:

- **If contacted**, will acknowledge RCS leakage into the 'B' SG (if informed). Will also acknowledge any TS information (time permitting) and information related to radiation monitors alarming.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If contacted**, will acknowledge entry into AP-16.00 and the initiation of AP-24.00.
- **If asked**, it will not be recommended to align air ejectors to containment at this time.

Unit 2 Operator:

- **When** radiation alarms sound on the radiation alarm panel, silence the alarms when directed and report the alarm to the Unit 1 SRO.
- **If directed** perform the associated RM ARP without leaving the confines of the Unit 2 control area. If actions or verifications are required on the Unit 1 side, inform the Unit 1 SRO of the need for an operator to complete the ARP.

SIMULATOR OPERATOR GUIDE

STA:

- **If contacted**, will acknowledge the RCS leakage into the 'B' SG.
- **If asked** to calculate the RCS leak rate, state that it is difficult to ascertain at this time, but you will continue to monitor as time permits.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal with the exception of the previously identified radiation monitor alarms. He will also state that containment conditions and the electrical conditions are as you see them.

Role play as other individuals as needed.

SIMULATOR OPERATOR GUIDE**EVENT 6 Degradation and Subsequent Failure of 'C' RCP**

Implement Trigger 9 when

- prompted by the lead examiner or
- upon initiation of AP-24.00 or
- upon team decision to trip the reactor.

Trigger 11 will automatically initiate upon tripping of the Main Generator.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the degradation and subsequent trip of 1-RC-P-1C. Will also acknowledge the trip of 1-RC-P-1A and 1-RC-P-1B.
- **If contacted**, will acknowledge the entry into AP-39.00 and ES-0.1.

STA:

- **If asked**, will acknowledge the degradation and subsequent trip of 1-RC-P-1C. Will also acknowledge the trip of 1-RC-P-1A and 1-RC-P-1B.
- **If contacted**, will enter the control room and commence reviewing status trees and prepare for the transient brief.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

SIMULATOR OPERATOR GUIDE

Field Operators:

- **If directed**, field operators will perform local manipulations (e.g., close 1-MS-120)

Role play as other individuals as needed.

SIMULATOR OPERATOR GUIDE**EVENT 7 SGTL on 'B' SG Degrades into a SGTR**

When cued by examiner, implement increase the SGTL into a SGTR. This should occur upon completion of the transition brief and entrance into ES-0.1 or AP-24.01 (AP-24.01 may be entered if the team tripped the reactor due to a large (>50 gpm) SGTL).

BOOTH: The current degradation of RC2402 is 4.5. Increase the degradation to 45 with no delay and no ramp.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the fact that the tube leak on the 'B' SG has degraded into a tube rupture. Will also acknowledge entry back into E-0, the subsequent SI and the need to go to E-3.
- **If contacted**, will acknowledge the isolation of 'B' SG (if informed).

STA:

- **If asked**, will report that he will calculate the time to 'B' fill, time permitting.
- **If contacted**, will enter the control room and commence reviewing status trees and prepare for the transient brief (items are reported "as you see them or previously reported").

Field Operators:

- **If directed**, field operators will perform local manipulations (e.g., close 1-MS-120)

Role play as other individuals as needed.

SIMULATOR OPERATOR GUIDE**EVENT 9 ECA-3.3**

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of 1-RC-PCV-1455C to open and the need to enter ECA-3.3.

STA:

- **If contacted**, will acknowledge the failure of 1-RC-PCV-1455C to open and the need to enter ECA-3.3.

The scenario will end upon reduction of SI flow (i.e., securing one Charging Pump).

Facility:	Surry	Scenario No.:	2	Op-Test No.:	2008-301
Examiners:	_____	Operators:	_____	SRO	
	_____		_____	RO	
	_____		_____	BOP	
Initial Conditions:	Unit 1 is at 100% power and has been since last refueling outage. The control room instrumentation channels are selected to channel III. All systems and cross-ties are operable with the following exception:				
	<ul style="list-style-type: none"> 1-FW-P-3A is tagged out for bearing replacement. 60 hours remain in the 72-hour clock. 				
Turnover:	Maintain 100% power.				
Event No.	Malf. No.	Event Type*	Event Description		
1	CH4702 CH4202	C – RO/SRO TS - SRO	Spurious trip of running charging pump (1-CH-P-1B) and failure of 'B' charging pump discharge check valve (open).		
2	N/A	N– BOP/SRO	Place normal letdown in service.		
3	RC4802	I – RO/SRO TS - SRO	1-RC-PT-1445 fails high resulting in associated PORV opening.		
4	GL0101	R – RO/SRO	Loss of Isolated Phase Bus Duct Cooling.		
5	CN1202 DISA_CN P1A_AST RT	C - BOP/SRO	Loss of running condensate pump. Standby pump fails to autostart		
6	MS0401 TU03 TU04	M - All C – RO/SRO	Commence steam break in safeguards ('A' Steam Generator) The subsequent reactor trip is complicated by a failure of main turbine to trip upon manual reactor trip.		
7	DISA_F WP2_AS TRT	C - BOP/SRO	TD AFW pump (1-FW-P-2) fails to automatically start.		
8	MS0401 FW0702 FW1101	M - All	MSLB in Safeguards degrades leading to a sequential loss of AFW and entry into FR-H.1 for recovery with Unit 2 AFW.		

9	CC1102 DISA_CC P1A_AST RT	C - BOP/SRO	Spurious trip of 1-CC-P-1B with a failure of 1-CC-P-1A to automatically start.
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(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Surry 2008-301 Scenario #2

Event 1

1-CH-P-1B trips, this results in a loss of letdown (all charging pump breakers open) and the start of 1-CH-P-1A and C. The event is complicated by a failure of the discharge check valve for 1-CH-P-1B to close. The team should identify the failure of 1-CH-P-1B and the fact that 1-CH-P-1A and C are running and supplying minimal water to the RCS. The SRO should direct entry into 1-AP-8.00 (Loss of Normal Charging Flow), which will isolate the 'B' Charging Pump and restore charging system to a normal line-up.

Verifiable Actions: (RO) Takes manual control of charging flow to minimize the rate of pressurizer fill, isolates the 'B' Charging Pump and secures either 'A' or 'C' Charging Pump.

Technical Specifications: TS 3.2 and 3.3

Event 2

Letdown will be placed in-service in accordance with 1-OP-CH-020 (Placing Letdown in Service Following an Automatic or Manual Isolation). The team will brief on the performance of 1-OP-CH-020 and then place letdown back in service. Charging flow may remain in manual until pressurizer level is restored to normal.

Verifiable Actions: (BOP) Multiple manipulations to place letdown in service.

Event 3

1-RC-PT-1445 will fail high causing 1-RC-PCV-1456 to open. The RO should close 1-RC-PCV-1456 and the SRO will direct entry into 0-AP-53.00 (Loss of Vital Instrumentation / Controls) and transition to AP-31.00 (Increasing or Decreasing RCS Pressure)

Verifiable Actions: (RO) Close 1-RC-PCV-1456.

Technical Specifications: TS 3.1.A.6

Event 4

The 'A' Iso phase bus duct cooling fan will trip and will not be able to be re-started. In accordance with the ARP, the team will ramp the unit to 78% power at 1%/minute and then continue to ramp at the normal ramp rate until generator amps are less than 14250. The SRO will implement 0-AP-23.00, Rapid Load Reduction.

Verifiable Actions: (RO) Utilizes the control rods and boric acid during the ramp.
 (BOP) will operate the turbine during the load decrease.

Event 5

'B' condensate pump (1-CN-P-1B) trips and the standby condensate pump (1-CN-P-1A) fails to automatically start. The BOP should start standby CN pump and refer to 1J-G4, CN PPS DISCH HDR LO PRESS or 1H-F8, FW PP SUCT HDR LO PRESS. The SRO should direct the BOP to start 1-CN-P-1A in accordance with the ARPs if BOP does not do this independently.

Verifiable Action: (BOP) start standby condensate pump.

Event 6

A steam break will commence in Unit 1 Safeguards. This will be identifiable by elevated steam flow or a local report from security that steam is issuing from the top of Unit 1 Safeguards (depending on the initial size of the break). The team will determine a reactor trip is warranted and the SRO will direct the RO to perform the immediate actions of 1-E-0. The reactor trip will be complicated by a failure of the main turbine to trip. The RO will utilize the RNO section of step 2 of 1-E-0 and close the Main Steam Trip Valves.

Verifiable Actions: (All) Manual reactor trip.
 (RO) Close the main steam trip valves

Event 7

During the performance of 1-E-0 it will be identified that the TD AFW pump has failed to automatically start. The BOP will start this pump in accordance with 1-E-0.

Verifiable Actions: (BOP) Start 1-FW-P-2 [1-FW-P-3A is tagged out]

Event 8

Following the trip of the reactor, the steam break will degrade requiring the team to perform a safety injection and faulted SG isolation. Depending on power level the team was at prior to the reactor trip, a safety injection may occur during the reactor trip.

Verifiable Actions: (BOP) Isolate faulted SG IAW E-0 Attachment 9 or E-2

Critical Task: [WOG E-2—A] Isolate feed flow to and steam flow from the faulted SG before RCS temperature is less than 400°F.

Actions required to complete this task:	Close 1-MS-TV-101A
	Close 1-FW-MOV-151E
	Close 1-FW-MOV-151F

Later in the sequence of this event, the Unit 1 AFW pumps will sequentially trip due to the steam filled environment of Unit 1 Safeguards. Since SG levels will be less than 12% narrow range, the team will be required to transition to FR-H.1 when directed by 1-E-0 or upon transition out of 1-E-0.

Verifiable Actions: (All) FR-H.1.
(BOP) Establish AFW crosstie from Unit 2

Critical Task: [WOG FR-H.1] Establish feed flow to ≥ 1 SG and trip RCPs before level in ≥ 2 SGs are $< 7\%$ WR (PSA).

Actions required to complete this task:	Open Unit 1 AFW MOVs (for non-faulted SG)
	Close Unit 2 AFW MOVs
	Open 1-FW-MOV-160A/B
	Start Unit 2 AFW Pumps

Event 9

Upon exit of 1-FR-H.1, 1-CC-P-1B will trip spuriously. This event will be complicated by the fact that 1-CC-P-1A will not automatically start.

Verifiable Actions: (BOP) Start 1-CC-P-1A

SIMULATOR OPERATOR GUIDE
NRC EXAM - SCENARIO 2

Initial Conditions: IC #1 100%, MOL – Cycle 21. The unit has been at 100% since the last refueling outage.

Pre-load malfunctions:

- Standby condensate pump fails to automatically start.
- Failure of automatic or manual turbine trip on reactor trip.
- TD AFW pump fails to autostart.
-

Equipment Status/ Procedures/ Alignments/ Data Sheets/ etc.:

- 1-FW-P-3A is tagged out for bearing replacement.
- Control Room instrumentation channels are selected to Channel III.
-
- 'B' Charging Pump running.
- 'B' and 'C' CN Pumps running.

Turnover: Maintain full power operation.

Event	Malf. #'s	Severity	Instructor Notes and Required Feedback
1	CH4702 CH4202	NA	Spurious trip of running charging pump (1-CH-P-1B) and failure of 'B' charging pump discharge check valve (open).
2	N/A	NA	Place normal letdown in service.
3	RC4802	NA	1-RC-PT-1445 fails high resulting in associate PORV opening.
4	GL0101	NA	Loss of Isolated Phase Bus Duct Cooling.
5	CN1202 DISA_CN P1A_AST RT	NA	Loss of running condensate pump. Standby pump fails to autostart
6	MS0401 TU03 TU04	NA	Commence steam break in safeguards ('A' Steam Generator) Failure of main turbine to trip upon manual reactor trip
7	DISA_F WP2_AS TRT	NA	TD AFW Pump (1-FW-P-2) fails to automatically start.
8	MS0401 FW0702 FW1101	NA	MSLB in Safeguards degrades leading to a sequential loss of AFW and entry into FR-H.1 for recovery with Unit 2 AFW.
9	CC1102 DISA_CC P1A_AST RT	NA	Spurious trip of 1-CC-P-1B with a failure of 1-CC-P-1A to automatically start.
END			After crew restores feed flow IAW FR-H.1.

SHIFT TURNOVER INFORMATION

OPERATING PLAN:

- The Unit has been at 100% power since last refueling outage.
- 1-FW-P-3A is tagged out for bearing replacement. 60 hours remain in the 72-hour clock
- Unit 2 is at 100% Power with all systems and crossties operable.
- Maintain full power operation.

Op-Test No.: Surry 2008-301 Scenario No.: 2 Event No.: 1

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Event Description: Trip of running (B) charging pump and failure of (B) pump discharge check valve.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	RO	Identifies: 1-CH-P-1B trips Alarms: <ul style="list-style-type: none"> • 1D-E5 CHG PP TO REGEN HX HI-LO FLOW • 1D-F5 CHG PP TO REGEN HX LO PRESS • 1C-D/E/F3 RCP 1A/B/C SHAFT SEAL WTR LO INJ FLOW Indications: <ul style="list-style-type: none"> • PRZR level increasing. • High amps on 1-CH-P-1A and 1-CH-P-1C • Low pump discharge pressure • Low seal injection flow Letdown will isolate automatically (via 1-CH-HCV-1200A and 1200B).
	SRO	Enters 1-AP-8.00, LOSS OF NORMAL CHARGING FLOW.

Op-Test No.: Surry 2008-301 Scenario No.: 2 Event No.: 1

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Event Description: Trip of running (B) charging pump and failure of (B) pump discharge check valve.

Cue: By Examiner.

	RO	<p>NOTE: If CHG pump suction source is lost, the non-running CHG pump(s) must be placed in PTL.</p> <p>1. CHECK CHG PUMPS - AT LEAST ONE RUNNING</p> <p>RO reports that both 1-CH-P-1A and 1-CH-P-1C are running.</p>
	RO	<p>2. CHECK CHG PUMP FOR GAS BINDING:</p> <ul style="list-style-type: none"> • Running CHG pump suspected of gas binding <p style="text-align: center;"><u>AND</u></p> <ul style="list-style-type: none"> • One of the following conditions exists: <ul style="list-style-type: none"> • CHG pump discharge pressure – ERRATIC • Charging flow – ERRATIC • Motor amps - ERRATIC <p>RNO: <u>IF</u> any Unit 1 CHG pump available to provide flow, <u>THEN</u> GO TO Step 6.</p> <p>RO will report that the running charging pump was not suspected of gas binding. The team will proceed to Step 6.</p>
	SRO/RO	<p>6. CHECK CHG PUMPS - MANIPULATIONS IN PROGRESS</p> <ul style="list-style-type: none"> • Swapping CHG pumps (OPTs, tagouts) <p>RO will report no charging pump manipulations were in progress.</p> <p>RNO: <u>IF</u> Charging and Letdown systems intact, <u>THEN</u> do the following:</p> <p>a) <u>IF</u> CHG pump check valve failure suspected, <u>THEN</u> GO TO Step 7.</p> <p><i>If local operator is dispatched, report charging and letdown intact, can hear/feel flow at discharge of 'B' charging pump.</i></p>

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Event Description: Trip of running (B) charging pump and failure of (B) pump discharge check valve.

Cue: By Examiner.

	BOP	<p>7. CHECK FOR CHG PUMP CHECK VALVE FAILURE:</p> <p>a) Close normal and alternate discharge MOVs on one standby CHG pump</p> <ul style="list-style-type: none"> • 1-CH-MOV-1286A, B, or C • 1-CH-MOV-1287A, B, or C <p>Closes 1-CH-MOV-1286B and 1-CH-MOV-1287B.</p>
	RO	<p>b) Verify running or start lead CHG pump</p> <p>Reports that 1-CH-P-1A and 1-CH-P-1C are running.</p>
	RO	<p>c) Check Charging flow and pressure - RETURNED TO NORMAL</p> <p>Determines that charging flow and pressure return to normal with 'B' charging pump discharge MOVs closed.</p> <p>d) Initiate a Work Request on failed check valve</p> <p><i>If SM or STA is contacted, they will accept the responsibility of writing a Work Request on the failed discharge check valve.</i></p>
	RO	<p>e) GO TO Step 35</p>
	RO	<p>35. OPERATE 1-CH-FCV-1122 OR 1-CH-305 TO RETURN PRZR LEVEL TO NORMAL</p>
	RO	<p>36. CHECK CC FLOW TO RCP THERMAL BARRIERS - NORMAL</p>
	RO	<p>37. ADJUST RCP SEAL INJECTION FLOW TO BETWEEN 6 GPM AND 13 GPM USING 1-CH-HCV-1186 AS NECESSARY</p>

Op-Test No.: Surry 2008-301 Scenario No.: 2 Event No.: 1

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Event Description: Trip of running (B) charging pump and failure of (B) pump discharge check valve.

Cue: By Examiner.

	RO	<p>38. VERIFY CH PUMP AND SYSTEM PARAMETERS - NORMAL</p> <ul style="list-style-type: none"> • Header Pressure • Flow • Pump amps • PCS Temperatures • Local check of Lube oil flow and temperature • Vent Damper position <p><i>If local operator is dispatched, the operator will report the damper for 1-CH-P-1A and 1C are open while the damper for 1-CH-P-1B is closed. The operator will also report that lube oil flow and temperatures are normal for the condition of all three charging pumps.</i></p>
	RO	<p>39. CHECK UNIT 1 CHARGING PUMPS – ONLY ONE RUNNING</p> <p>Reports that 1-CH-P-1A and 1-CH-P-1C are running.</p> <p>RNO: Do the following:</p> <ol style="list-style-type: none"> a) Secure CHG pump(s) as directed by Shift Supervision. b) Place non-running CHG pump(s) in AUTO as directed by Shift Supervision. <p>Secures either 1-CH-P-1A or 1-CH-P-1C as directed by the Unit Supervisor. The associated control switch is then placed in automatic.</p>
	RO	<p>40. CHECK UNIT 1 NORMAL CHARGING – IN SERVICE</p> <p>Reports that normal charging is in service.</p>

Op-Test No.: Surry 2008-301 Scenario No.: 2 Event No.: 1

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Event Description: Trip of running (B) charging pump and failure of (B) pump discharge check valve.

Cue: By Examiner.

	RO	<p>41. CHECK CHARGING CROSSTIE – IN SERVICE</p> <p>Reports charging crosstie is NOT is service.</p> <p>RNO: GO TO STEP 43</p>
	RO	<p>43. RETURN LETDOWN TO SERVICE AS NECESSARY</p> <ul style="list-style-type: none"> • Normal letdown IAW 1-OP-CH-020, PLACING LETDOWN IN SERVICE FOLLOWING AUTO OR MANUAL ISOLATION <p style="text-align: center;"><u>OR</u></p> <ul style="list-style-type: none"> • Excess letdown IAW 1-OP-CH-006, SHIFTING OR INCREASING /DECREASING LETDOWN FLOW <p>1-OP-CH-020 is initiated and actions are contained within Event 2.</p>
	SRO	<p>44. REVIEW THE FOLLOWING TECH SPECS</p> <ul style="list-style-type: none"> • TS 3.2, Chemical and Volume Control System • TS 3.3, Safety Injection System <p>Determines 3.2.A and 3.3.A.3 (72 hour LCO) is applicable.</p>
		<p>45. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"> • OMOG • Maintenance Department • Shift Supervision

End Event #1

Op-Test No.: Surry 2008-301 Scenario No.: 2 Event No.: 2

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Event Description: Place normal letdown in service.

Cue: Initiated via AP-8.00.

Time	Position	Applicant's Action or Behavior
	BOP	<p><u>Examiner Cue:</u> <i>Ensure the BOP Operator places letdown in service.</i></p> <p>Obtains a copy of 1-OP-CH-020</p> <p>RO reviews the procedure and may provide the SRO a brief on his intended actions.</p> <p>Initial Conditions:</p> <p>3.1 Verify Normal Letdown is not in service.</p> <p>3.2 Verify Excess Letdown is not in service.</p> <p>Precautions and Limitations:</p> <p>4.1 Letdown Ion Exchangers should be initially bypassed when Letdown is returned to service to avoid a temperature or Boron transient. This bypass may not be necessary when Letdown has been out of service for a short duration.</p> <p>4.2 To make certain that the design flow of 60 gpm will not be exceeded, the Cation Bed Demin will not be in service when putting in Normal Letdown.</p> <p>4.3 Letdown Pressure Control Valve, 1-CH-PCV-1145, shall be fully open before an orifice isolation valve is opened.</p> <p>4.4 Valve 1-CC-TCV-103 shall be monitored for proper operation as soon as letdown flow is established.</p> <p>RO reviews and initials applicable sections.</p>
	BOP	<p>5.1 Placing Letdown in Service Following Auto or Manual Isolation</p> <p>CAUTION: To make certain that the design flow of 60 gpm will not be exceeded, the Cation Bed Demin will not be in service when putting in Normal Letdown.</p> <p>5.1.1 Verify removed or remove the Cation Bed Demin from service IAW 1-OP-CH-012.</p> <p>From the initial conditions, recalls that the Cation Bed is NOT in service.</p>

Op-Test No.: Surry 2008-301 Scenario No.: 2 Event No.: 2

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Event Description: Place normal letdown in service.

Cue: Initiated via AP-8.00.

BOP	<p>5.1.2 Verify PRZR level is greater than 14.4 percent on selected channels.</p> <p>Identifies that pressurizer level is approximately 53%</p> <p>5.1.3 Verify Annunciator 1C-E8, PRZR LO LVL HTRS OFF & LETDOWN ISOL, is NOT LIT.</p> <p>Identifies that 1C-E8 is not lit.</p> <p>5.1.4 Verify or place at least one CC pump is in service.</p> <p>Identifies that at least one CC pump is in service.</p> <p>5.1.5 Verify closed or close all of the following valves.</p> <ul style="list-style-type: none"> • 1-CH-LCV-1460A, LETDOWN LINE ISOL • 1-CH-LCV-1460B, LETDOWN LINE ISOL • 1-CH-HCV-1200A, LETDOWN ORIFICE ISOL • 1-CH-HCV-1200B, LETDOWN ORIFICE ISOL • 1-CH-HCV-1200C, LETDOWN ORIFICE ISOL <p>Closes or verifies closed 1-CH-HCV-1200A/B/C.</p> <p>5.1.6 Verify open or open both of the Letdown Line Trip valves.</p> <ul style="list-style-type: none"> • 1-CH-TV-1204A, LETDOWN LINE I/S TV • 1-CH-TV-1204B, LETDOWN LINE O/S TV <p>5.1.7 Verify or adjust 1-CH-PCV-1145, LETDOWN LINE PRESS CNTRL, setpoint as required. (approximately 5.0 for 300 psig)</p> <p>5.1.8 Verify or place 1-CH-PCV-1145, LETDOWN LINE PRESS CNTRL, in MAN and OPEN (0% demand).</p> <p>Places 1-CH-PCV-1145 in manual and reduces demand to 0%.</p>
BOP/SRO	<p>5.1.9 Verify or place 1-CH-TCV-1143, LETDOWN LINE DIVERT, in the DIVERT position. Enter N/A if Shift Supervision determines that IXs are to remain in service.</p> <p>SRO directs or RO requests to leave 1-CH-LCV-1143 in its current position, as the IXs will remain in service. RO will N/A this step.</p>
BOP/SRO	<p>5.1.10 Verify or place 1-CH-HCV-1244, DEBOR DEMINS DIVERT, in the NORMAL position. Enter N/A if Shift Supervision determines that IX is to remain in service.</p>

Event Description: Place normal letdown in service.

Cue: Initiated via AP-8.00.

	BOP	<p>SRO directs or RO requests to leave 1-CH-HCV-1244 in its current position, as the IXs will not be placed in service. RO will N/A this step.</p> <p>5.1.11 Verify or place 1-CH-LCV-1115A, VCT LEVEL DIVERT, in AUTO and is aligned to the VCT (red light LIT).</p> <p>Verifies 1-CH-LCV-1115A is in AUTO and the associated red light is lit.</p> <p>NOTE: Flashing in the Non-Regen Heat Exchanger is indicated by unstable letdown flow as indicated on 1-CH-FI-1150.</p> <p>5.1.12 Initiate Normal Charging and Letdown by performing the following substeps.</p> <p>a. Open 1-CH-FCV-1122, CHG FLOW CNTR, and establish a charging flow of greater than or equal to 45 gpm as indicated on 1-CH-FI-1122A, CHG LINE FLOW.</p> <p>Raises demand on 1-CH-FCV-1122 to establish approximately 45 gpm charging flow.</p> <p>b. Open both of the following Letdown Line Isolation valves.</p> <ul style="list-style-type: none"> • 1-CH-LCV-1460A, LETDOWN LINE ISOL • 1-CH-LCV-1460B, LETDOWN LINE ISOL <p>Opens both letdown isolation valves.</p> <p>NOTE: If RCS pressure is low, both 60 gpm orifices or all three may need to be placed in service.</p> <p>NOTE: The 45 gpm orifice should normally be placed in service first.</p> <p>NOTE: Care must be taken to ensure letdown flow does not exceed 125 gpm. Alarm setpoint for 1D-F4, LO PRESS LETDOWN LINE HI FLOW, is 130 gpm.</p> <p>c. Open one of the following valves and place the control switch in AUTO.</p> <ul style="list-style-type: none"> • 1-CH-HCV-1200A, LETDOWN ORIFICE ISOL • 1-CH-HCV-1200B, LETDOWN ORIFICE ISOL • 1-CH-HCV-1200C, LETDOWN ORIFICE ISOL <p>Opens 1-CH-HCV-1200A and places control switch in AUTO.</p> <p>d. Verify 1-CH-FI-1150, LETDOWN LINE FLOW, indicates proper flow rate based on orifice placed in service.</p> <p>e. Verify 1-CC-TCV-103, NRHX OUTLET TEMP CNTRL, is controlling in AUTO as indicated by output demand.</p>
	SRO/BOP	
	BOP	

Op-Test No.: Surry 2008-301 Scenario No.: 2 Event No.: 2

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Event Description: Place normal letdown in service.

Cue: Initiated via AP-8.00.

	BOP	<p>controlling in AUTO as indicated by output demand.</p> <p>f. Verify 1-CH-TI-1144, NON-REGEN HX OUTLET TEMP, is at approximately 100°F.</p> <p>NOTE: If two additional orifices will be placed in service at this time, only one may be placed in service at a time and flow rates must be allowed to stabilize before the third orifice is placed in service.</p> <p>5.1.13 IF additional orifices are desired at this time, THEN place additional Letdown Orifices(s) in service IAW the following substeps. Otherwise, enter N/A.</p> <p>SRO directs or RO requests placing two letdown orifices in service (45 gpm and 60 gpm).</p> <p>a. Open and place in AUTO the following Letdown Orifice Isolation valves, as required.</p> <p>___ 1-CH-HCV-1200A, LETDOWN ORIFICE ISOL</p> <p>___ 1-CH-HCV-1200B, LETDOWN ORIFICE ISOL</p> <p>___ 1-CH-HCV-1200C, LETDOWN ORIFICE ISOL</p> <p>b. Verify 1-CH-FI-1150, LETDOWN LINE FLOW, indicates correct flow for orifices in service.</p> <p>5.1.14 Slowly close 1-CH-PCV-1145 to obtain letdown line pressure between 300 psig and 350 psig as indicated on 1-CH-PI-1145, and then place in AUTO.</p> <p>Slowly increases demand on 1-CH-PCV-1145 until letdown pressure indicates approximately 300 psig.</p> <p>5.1.15 Verify Letdown parameters are normal for existing plant conditions and that there are no signs of flashing in the letdown system. Adjust charging flow as required.</p> <p>5.1.16 IF Ion Exchangers are NOT in service, THEN return Letdown Ion Exchangers to service IAW 1-OP-CH-011. Otherwise, enter N/A.</p> <p>5.1.17 Manipulate charging flow as required for existing plant conditions.</p> <p>Adjusts charging flow to return pressurizer level to program, but does not decrease it such that letdown flashes.</p>
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END – Event 2

Op-Test No.: Surry 2008-301 Scenario No.: 2 Event No.: 3

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Event Description: 1-RC-PT-1445 fails high resulting in associated PORV opening.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	RO	<p>Diagnose the failure with the following indications:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • 1C-D7 PRZR PWR RELIEF LINE HI TEMP • 1C-F8 PRZR HI PRESS • 1C-F7 PRZR RELIEF TK HI PRESS • 1D-H4 PRZR SFTY VV PWR RELIEF VV OPEN <p>Indications:</p> <ul style="list-style-type: none"> • Decreasing PRZR pressure • 1-RC-PCV-1456 open light ON <p>The following actions will be taken in accordance with AP-53.00:</p> <ul style="list-style-type: none"> • Verifies PRZR pressure is low. • Places control switch for 1-RC-PCV-1456 to CLOSE.
	SRO	Enters 0-AP-53.00, Loss of Vital Instrumentation / Controls.
	RO	<p>[1] VERIFY REDUNDANT INSTRUMENT CHANNEL (S) INDICATION - NORMAL</p> <p>Verifies 1-RC-PI-1444 (RCS pressure) is indicating normally. Team may look at pressure on CETC or the RCS pressure protection channels.</p>

Event Description: 1-RC-PT-1445 fails high resulting in associated PORV opening.

Cue: By Examiner.

	RO	<p>[2] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION</p> <p>Closes the Pressurizer PORV (1-RC-PCV-1456).</p> <p>Although the SRO may not report it at this time, TS 3.1.A.6 is applicable.</p>
	SRO	NOTE: When the affected instrument/controller malfunction has been addressed by this procedure, recovery actions may continue at Step 12.
	RO	<p>3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS – AFFECTED</p> <ul style="list-style-type: none"> • Nuclear Instrumentation • Pressurizer Pressure control
	RO	<p>4. CHECK PRZR SPRAY VALVE CONTROLLERS – NORMAL.</p> <p>Spray Controllers are operating normally.</p>
	SRO	<p>5. GO TO THE APPROPRIATE ABNORMAL PROCEDURE</p> <ul style="list-style-type: none"> • (-)AP-4.00, Nuclear Instrumentation Malfunction • (-)AP-31.00, Increasing or Decreasing RCS Pressure. <p>Team transitions to AP-31.00, Increasing or Decreasing RCS Pressure.</p>
	SRO	Enters 1-AP-31.00, INCREASING OR DECREASING RCS PRESSURE
	SRO	<p>NOTE: EIPs may be applicable.</p> <p>1. CHECK TURBINE LOAD - STABLE</p>
	RO	2. CHECK RCS PRESSURE - DECREASING.

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Event Description: 1-RC-PT-1445 fails high resulting in associated PORV opening.

Cue: By Examiner.

SRO	<p>CAUTION:</p> <ul style="list-style-type: none"> • Decreasing RCS pressure will cause the OT ΔT setpoint to decrease. • A Safety Injection may occur if the unit is not tripped prior to RCS pressure decreasing below 2100 psig. <p>NOTE:</p> <ul style="list-style-type: none"> • PRZR PORV 1-RC-PCV-1455C should be declared inoperable if the Master Controller is placed in Manual. • RCS pressure decrease will cause a slight decrease in RCS Tave due to negative reactivity from the moderator pressure coefficient. <p>RO</p> <p>3. CHECK MASTER CONTROLLER RESPONSE - NORMAL FOR PLANT CONDITIONS</p> <ul style="list-style-type: none"> • 1-RC-PC-1444J <p>Reports no issues with the master pressure controller.</p>
RO	<p>4. CHECK RCS PRESSURE – STILL DECREASING.</p> <p>Reports RCS pressure is not decreasing.</p> <p>RNO : GO TO Step 17</p> <p>Team may answer this question as if no actions were taken in AP-53.00 (acceptable method). If so, the team will ...</p> <ol style="list-style-type: none"> 5. Verify no pressure loss through the PRZR PORVs <ol style="list-style-type: none"> a) Close or verify close PRZR PORVs b) Close Block MOV to isolate any PORV which will not close or is leaking. 6. Turn on all PRZR Heaters 7. Verify Closed or close 1-CH-HCV-1311, Aux Spray Isolation. 8. Check Aux Spray Line – Leakage Suspected 8. RNO – GO TO STEP 10 10. Place Spray Valve Controllers in Manual and adjust demand to zero. 11. Check either of the following conditions: <ul style="list-style-type: none"> ○ Either Spray Valve will not close ○ Either Spray valve is suspected of leaking 11. RNO – GO TO STEP 13 13. Check RCS Pressure – Stabilizing or increasing 14. GO TO STEP 17

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Event Description: 1-RC-PT-1445 fails high resulting in associated PORV opening.

Cue: By Examiner.

	SRO	<p>17. NOTIFY THE FOLLOWING:</p> <ul style="list-style-type: none"> • OM on call • STA • Instrument Shop
	SRO/RO	<p>18. CHECK PRZR PORVS – EITHER INOPERABLE</p> <ul style="list-style-type: none"> • 1-RC-PCV-1455C • 1-RC-PCV-1456 <p>Reports that 1-RC-PCV-1456 is inoperable.</p> <p>If the team placed the spray valves in manual, they may place them back in automatic control.</p>
	RO	<p>19. CLOSE BLOCK VALVE FOR INOPERABLE PORV</p> <ul style="list-style-type: none"> • 1-RC-MOV-1536 if 1-RC-PCV-1455C inoperable • 1-RC-MOV-1535 if 1-RC-PCV-1456 inoperable <p>Closes 1-RC-MOV-1535.</p>
	SRO	<p>SRO Exits 1-hour TS clock to close the associated block valve for an inoperable PORV (i.e., PORV is in manual)</p>
	BOP	<p>20. MAINTAIN STABLE TURBINE LOAD UNTIL PRESSURE CONTROL SYSTEM IS RETURNED TO NORMAL</p>
	SRO	<p>Determines applicable Technical Specifications:</p> <ul style="list-style-type: none"> • LCO 3.12.F.2 if pressurizer pressure was less than 2205 psig. • LCO 3.1.A.6.b for PORV 1456 (close block valve w/in 1 hour).

End Event #3

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Event Description: Loss of Isolated Phase Bus Duct Cooling.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	<p>Diagnoses trip of 'A' Iso Phase Bus Duct Cooling Fan with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • 1G-E5 GEN LEADS CLG TRBL
	BOP	<p>NOTE: Computer point T2817A, GEN LEAD COOLING AIR TEMP, may be used to monitor duct temperature trend.</p> <p>BOP may trend T2817A on the PCS.</p> <ol style="list-style-type: none"> 1. SEND OPERATOR TO LOCAL ANNUNCIATOR PANEL 2. LOCALLY CHECK DROP - LOW AIR FLOW <p><i>If contacted/dispatched, the field operator will report that low air flow is indicated for the 'A' Iso bus duct cooling fan.</i></p> <p>NOTE:</p> <ul style="list-style-type: none"> • Low air flow drop may be caused by low air flow, loss of power to the air flow switch(es), or failure of the air flow sensor(s). • Ammeters on the Bus Duct Cooling Fan breakers should be checked to determine fan status. <ol style="list-style-type: none"> 3. LOCALLY CHECK ISO BUS DUCT COOLING (IBDC) FANS - ONE OR MORE STOPPED <ul style="list-style-type: none"> • 1-EP-F-1A, Breaker 1A2-2-1B • 1-EP-F-1C, Breaker 1C2-2-1D <p><i>Booth (cue) report no amps indicated on breaker 1A2-2-1B for 1-EP-F-1A, 'A' Iso Bus Duct Cooling Fan.</i></p>

Event Description: Loss of Isolated Phase Bus Duct Cooling.

Cue: By Examiner.

<p>SRO</p> <p>BOP</p> <p>SRO</p>	<p>CAUTION:</p> <ul style="list-style-type: none"> • If one or more fan is inoperable, a unit ramp down to the self cooled rating of 14,250 amps should be initiated immediately. • Power should be reduced at the rate of 1% power per minute to 78% power. Power reduction should continue from 78% power to 14,250 amps at the normal rate of 155 MWe/Hr. <p>4. ATTEMPT TO RESTART FAN:</p> <p>a) Locally check circuit breakers:</p> <ul style="list-style-type: none"> • MCC 1A2-2-1B, GEN LEADS CLR PH A FAN • MC 1C2-2-1D, GEN LEADS CLR PH C FAN <p><i>Booth (cue) If directed, report thermal O/L for the 'A' IBDC fan has actuated.</i></p> <p>b) Try to start fan</p> <p><i>Booth (cue) If directed, the reset of the overload of the 'A' IBDC fan failed.</i></p> <p>c) Check fan running (check ammeters on breakers)</p> <p><i>If asked the field operator reports zero amps on the 'A' IBDC fan.</i></p> <p>RNO: Do the following</p> <p>1) Initiate a ramp down to reduce generator amps to 14,250 amps in Accordance with 0-AP-23.00, RAPID LOAD REDUCTION.</p> <p>Per previous caution, SRO should immediately initiate a ramp to 78% power at 1%/min per 0-AP-23.00. (AP-23.00 actions on pages 23 - 25)</p> <p>2) GO TO Step 8.</p>
<p>SRO</p>	<p>8. INITIATE A WORK REQUEST TO REPAIR ANNUNCIATOR</p> <p><i>If SM or STA is contacted, they will accept the responsibility of writing a Work Request on the isolated phase bus duct fan.</i></p>

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Event Description: Loss of Isolated Phase Bus Duct Cooling.

Cue: By Examiner.

	RO	9. CLEAR MCR ALARM BY LOCALLY USING 1-EP-HS-BDUC2, GEN BUS DUCT COOLING ANNUNCIATOR SIGNAL RESET SW Directs field operator to reset local alarm panel. <i>If contacted, the field operator will reset the local alarm panel and clear the annunciator in the MCR.</i>
		10. NOTIFY SHIFT SUPERVISOR - END ARP – AP-23.00 CONTINUES ON NEXT PAGE

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Event Description: Loss of Isolated Phase Bus Duct Cooling.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		0-AP-23.00, RAPID LOAD REDUCTION
	SRO	<p>CAUTION: Conservative decision-making must be maintained during rapid load reductions. If uncertain or degrading conditions arise which could adversely affect the safety of the plant, or if any criteria in Attachment 1 is exceeded, the load reduction should be terminated by tripping the Reactor or the turbine, or both, depending on power level.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • Actions that can be completed independently of preceding steps may be performed out of sequence as directed by the SRO. • If at any time plant conditions no longer require rapid load reduction, actions should continue at Step 35. • RCS Tave must be maintained less than or equal to 577°F and RCS pressure must be maintained greater than or equal to 2205 psig. • Tech Spec 3.12.F.1 should be reviewed if either parameter is exceeded. • I & C should be contacted to provide assistance with adjusting IRPIs. • When the turbine is not being actively ramped, the REFERENCE and SETTER values must remain matched to prevent inadvertent ramp. <p>1. INITIATE PLANT LOAD REDUCTION AT 5%/MINUTE OR LESS:</p>
	BOP	a) Verify turbine valve position - NOT ON LIMITER
	RO	b) Insert control rods in AUTO or MANUAL as necessary to maintain Tave and Tref matched
	BOP	c) Verify or place turbine in IMP IN or IMP OUT as determined by Shift Supervision
	BOP	d) Adjust SETTER to desired power level
	BOP	e) Adjust LOAD RATE %/MIN thumbwheel to desired ramp rate (1%/minute)
	BOP	f) Initiate Turbine load reduction using OPERATOR AUTO (pushes the white GO button)
	BOP	g) Reduce Turbine Valve Position Limiter as load decreases

Event Description: Loss of Isolated Phase Bus Duct Cooling.

Cue: By Examiner.

		The BOP will periodically reduce the limiter setpoint during the ramp.
	SRO	<p>2. CHECK EMERGENCY BORATION – REQUIRED TO REDUCE TAVE-TREF MISMATCH</p> <p>The team will decide to emergency borate based on the Tave – Tref difference.</p>
	SRO	NOTE: Step 3 or Step 4 may be performed repeatedly to maintain Tref and Tave matched, Δ Flux in band, and control rod position above the LO-LO insertion limit.
	RO	<p>3. PERFORM AN EMERGENCY BORATION IAW THE FOLLOWING:</p> <p>a) Verify or raise CHG flow to greater than 75 gpm</p> <p>b) Transfer the in-service BATP to FAST</p> <p>c) Open ()-CH-MOV-()350</p> <p>d) Monitor EMRG BORATE FLOW</p> <ul style="list-style-type: none"> • ()-CH-FI-()110 <p>e) After required emergency boration, perform the following:</p> <p>1) Close ()-CH-MOV-()350</p> <p>2) Transfer the in-service BATP to AUTO</p> <p>3) Restore Charging flow control to normal</p>
	RO	<p>4. ESTABLISH A NORMAL BORATION TO MAINTAIN CONTROL ROD POSITION ABOVE THE LO-LO INSERTION LIMITS IAW ()-OP-CH-007, BLENDER OPERATIONS</p> <p>1-OP-CH-007 Boration instructions on pages 26, 27, and 28.</p>
	RO	<p>5. INCREASE SURVEILLANCE OF RCS PRESSURE</p> <p>a) Turn all PRZR heaters ON</p> <p>b) Control ramp rate to maintain RCS pressure greater than 2205 psig</p>

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Event Description: Loss of Isolated Phase Bus Duct Cooling.

Cue: By Examiner.

	BOP	6. MONITOR STEAM DUMPS FOR PROPER OPERATION
	SRO	7. NOTIFY THE FOLLOWING: <ul style="list-style-type: none"> • Energy Supply (MOC) • Polishing Building • Chemistry • OMO
	SRO	8. EVALUATE THE FOLLOWING: <ul style="list-style-type: none"> • EPIP applicability <p><i>The Shift Manager will review EPIPs for applicability. They are not applicable.</i></p> <ul style="list-style-type: none"> • VPAP-2802, NOTIFICATIONS AND REPORTS, applicability <p><i>SRO directs STA to review VPAP-2802. The STA reports that he has completed his review of VPAP-2802 and no notifications are required..</i></p>
	SRO	*9. CHECK ISOTOPIC ANALYSIS OF RCS – REQUIRED <ul style="list-style-type: none"> • Reactor power has decreased more than 15% in one hour
	SRO	10. HAVE CHEMISTRY PERFORM ISOTOPIC ANALYSIS OF RCS FOR IODINE WITHIN 2 TO 6 HOURS <p><i>SRO directs Chemistry to perform an isotopic analysis of the RCS in 2 to 6 hours. Chemistry will acknowledge the requirement to sample the RCS.</i></p>

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Event Description: Loss of Isolated Phase Bus Duct Cooling.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	RO	<p>1-OP-CH-007 Actions</p> <p>RO retrieves a copy of 1-OP-CH-007.</p> <p>RO reviews the initial conditions.</p> <p>3.1 Verify Primary Grade water is available to the Blender.</p> <p>Observers PG pump is running.</p> <p>3.2 Verify at least one Boric Acid Transfer Pump is in Automatic and aligned to the Blender. <u>If</u> the boric acid flow path to the blender is unavailable, <u>THEN</u> enter N/A.</p> <p>Observes a Boric Acid Pump is in automatic and aligned to the Blender</p> <p>RO reviews the Precautions and Limitations</p> <p>4.1 Control rod position, Tave, and/or power level should be observed when making up to the RCS.</p> <p>4.2 Operation of the pressurizer heaters and spray valves should be used to equalize Boron concentration (Cb) when changing Cb.</p> <p>4.3 The blender must be frequently monitored for proper operation during the entire duration of the makeup.</p> <p>4.4 The Reactor Operator shall notify Shift Supervisor before performing any Blender evolution.</p> <p>4.5 Rapidly changing VCT level and pressure may affect RCP Seal leakoff, which should be monitored for normal response.</p> <p>4.6 Calculations involving reactivity must be independently verified.</p> <p>RO goes to Section 5.3 of the procedure.</p>

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Event Description: Loss of Isolated Phase Bus Duct Cooling.

Cue: By Examiner.

		<p>5.3 Boration</p>
RO		<p>CAUTION: The blender must be frequently monitored for proper operation during the entire duration of the make up.</p> <p>NOTE: This subsection will be used for the first boration of the shift. Attachment 2 will be used as a guide for further borations for the remainder of the shift.</p>
RO	5.3.1	Notify Shift Supervision of impending Boration.
	5.3.2	Place the MAKE-UP MODE CNTRL switch in the STOP position.
	5.3.3	<p>Adjust both of the following controllers for the flow rate and total gallons of Boric Acid for the boration. IF the BA FLOW CNTRL controller setpoint has previously been set, THEN enter N/A for that substep.</p> <p>a. 1-CH-FC-1113A, BA FLOW CNTRL (N/A) _____ GPM (IAW Attachment 5)</p> <p>b. 1-CH-YIC-1113, BA SUPPLY BATCH INTEGRATOR (GAL) _____ GAL</p> <ol style="list-style-type: none"> 1. Depress PRESET A Button (Controller will read the last value entered into the controller; reads in tenths of gallons.) 2. To clear PRESET A, depress the CLR Button. Enter N/A if not required. 3. Enter desired PRESET A value. Enter N/A if not required. 4. Depress ENT Button.
RO	5.3.4	Place the MAKE-UP MODE SEL switch in the BORATE position.
RO	5.3.5	Place the MAKE-UP MODE CNTRL switch in the START position.
RO	5.3.6	<p>Verify all of the following conditions.</p> <p>a. 1-CH-FCV-1113A, BORIC ACID TO BLENDER, is controlling in AUTO.</p> <p>b. 1-CH-FCV-1113B, BLENDER TO CHG PUMP, is open.</p> <p>c. 1-CH-FCV-1114A, PGW TO BLENDER, is closed.</p>

Event Description: Loss of Isolated Phase Bus Duct Cooling.

Cue: By Examiner.

		d. 1-CH-FCV-1114B, BLENDER TO VCT, is closed.
RO		<p>CAUTION: There is potential for the Blender Integrator to lock up if the RATE function is in use at the end of make up. (Integrator lock up does not affect the Blender AUTO function.)</p> <p>NOTE: The rate of Boric Acid addition may be seen by depressing the C RATE/TOTAL Button on the Boric Acid Integrator. The total amount of Boric Acid added may be seen by depressing the C RATE/TOTAL Button again.</p>
RO	5.3.7	IF performing a unit ramp, THEN adjust Boric Acid flow on 1-CH-FC-1113A as required. Otherwise, enter N/A.
RO	5.3.8	IF it is desired to stop the Boration before the selected amount, THEN place the MAKE-UP MODE CNTRL switch in the STOP position. IF the BA SUPPLY BATCH INTEGRATOR (GAL) is used to stop the flow, THEN enter N/A for this step.
RO	5.3.9	WHEN the desired amount of makeup has been reached, THEN verify 1-CH-FCV-1113B closes.
RO	5.3.10	WHEN boration is complete, THEN do the following. IF boric acid is to remain in the Blender to support ramping the Unit, THEN enter N/A. <ul style="list-style-type: none"> a. Manually blend approximately 20 gallons to flush the boration path IAW Subsection 5.5. b. Enter N/A for Steps 5.3.11 through 5.3.14.
RO	5.3.11	Place the MAKE-UP MODE CNTRL switch in the STOP position.
RO	5.3.12	Place the MAKE-UP MODE SEL switch in the AUTO position.
RO	5.3.13	Place the MAKE-UP MODE CNTRL switch in the START position.
RO	5.3.14	Notify Shift Supervision of Blender status.

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Event Description: Loss of running condensate pump (1-CN-P-1B) with failure of standby pump to automatically start (1-CN-P-1A).

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	<p>Diagnose the failure with the following indications:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • 1J-G4 CN PPS DISCH HDR LO PRESS • 1K-D4 4KV BKR AUTO TRIP • 1J-B4 HP HTR DR RCVR TK HI-LO LVL • 1H-G5/6/7 STM GEN 1A(B)(C) LVL ERROR • 1H-D3 CN POLISHING BYPASS AOV OPEN <p>Indications:</p> <ul style="list-style-type: none"> • Abnormal MCB light indications for 'B' CN pump • Zero amps for 'B' CN pump <p>BOP may independently start 'A' CN pump after checking for no CN or FW rupture (per 1J-G4, performing the automatic start of the pump, or per AP-21.00).</p> <p>Informs SRO that standby CN pump did not auto start.</p> <p>NOTE: The Main Feed Pumps will trip if suction pressure drops to 55 psig after a 15 second time delay.</p>
	SRO	Direct actions of 1J-G4 or AP-21.00

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Event Description: Loss of running condensate pump (1-CN-P-1B) with failure of standby pump to automatically start (1-CN-P-1A).

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		AP-21.00, Loss of Main Feedwater Flow
	BOP	<p>Evaluator Note: IF the team uses ARP 1J-G4, refer to pages 33, 34, and 35.</p> <p>[1] CHECK MAIN FEED PUMPS – ONLY ONE RUNNING</p> <p>The RO should identify that 2 MFPs are running.</p> <p>[1] RNO - IF two Main Feed Pumps running, THEN GO TO step 4.</p>
	BOP	<p>[4] START A THIRD CONDENSATE PUMP</p> <p>The BOP should start the stand-by condensate pump.</p>
	BOP	<p>[5] REDUCE TURBINE LOAD TO MATCH STEAM FLOW WITH FEED FLOW</p> <ul style="list-style-type: none"> • Use Valve Position Limiter <p>The BOP may reduce turbine load. This may or may not be required, depending on the speed at which the standby condensate pump was started.</p>
	BOP	<p>6. CHECK CONDENSATE POLISHING BLDG BYPASS - REQUIRED</p> <ul style="list-style-type: none"> • Main Feed Pump Suction Pressure – LESS THAN 400 PSIG <p>Checks Suction Pressure less than 400 psig (Suction pressure was <400# before the standby pump was started)</p>
	BOP	<p>7. OPEN MOV-CP-100</p> <p>Checks 1-CP-MOV-100 open</p> <p>If team starts the stand-by pump quickly, the CP Bypass MOV may not open.</p>

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Event Description: Loss of running condensate pump (1-CN-P-1B) with failure of standby pump to automatically start (1-CN-P-1A).

Cue: By Examiner.

	BOP	<p>8. VERIFY STEAM DUMP OPERATION – REDUCING TAVE/TREF MISMATCH BASED ON DEMAND SIGNAL</p> <p>Checks no Tave/Tref Deviation exists</p>
	BOP	<p>NOTE: Depending on initial plant conditions, rod insertion or boration may be used to stabilize RCS temperature and maintain Δflux in band.</p> <p>9. CHECKS CONTROL RODS – INSERTING AS NECESSARY</p> <p>Manually inserts rods as required. Ramp may be in progress</p>
	BOP	<p>10. VERIFY ANNUNCIATOR 1E-E3 ΔFLUX DEVIATION – NOT LIT</p> <p>Verifies no delta flux alarm exists. May insert or withdraw rods to control flux.</p>
	BOP	<p>11. VERIFY ALL SG FLOWS – STEAM FLOW IS LESS THAN OR EQUAL TO FEED FLOW.</p> <p>Verifies steam flow is less than feed flow.</p>
	BOP	<p>12. VERIFY ALL SG LEVELS – AT OR TRENDING TO PROGRAMMED LEVEL</p> <p>Verifies SG levels are at program level (or trending to program)</p>
	RO	<p>13. VERIFY TAVE – MATCHED WITH TREF</p> <p>RO may adjust rods/boron as needed.</p>
	BOP	<p>14. VERIFY FEED HEADER TO STEAM HEADER ΔP – AT LEAST 50 PSID.</p> <p>Verifies SG pressures are within 50 psid of header pressure.</p>

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Event Description: Loss of running condensate pump (1-CN-P-1B) with failure of standby pump to automatically start (1-CN-P-1A).

Cue: By Examiner.

	BOP	<p>15. VERIFIES AMPS ON EACH MOTOR OF THE RUNNING MAIN FEED PUMPS – LESS THAN 420 AMPS</p> <p>Checks MFP amps less than 420</p>
	BOP	<p>16. CHECK OPERATION OF MAIN FEED PUMPS</p> <ul style="list-style-type: none"> • Recirc valve position • Discharge MOV position • Pump Amps <p>Verifies normal MFP parameters and alignment.</p>
	RO	<p>17. VERIFY REACTOR POWER CHANGE – LESS THAN 15% IN ONE HOUR</p> <p>Verifies power change is greater than 15% and notifies chemistry per the RNO.</p> <p><i>If contacted, Chemistry will acknowledge the power change. This call may not be made, if contact was made during AP-23.00.</i></p>
	SRO	<p>18. NOTIFY THE FOLLOWING:</p> <ul style="list-style-type: none"> • OMO • Maintenance Foreman <p>- END -</p>

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Event Description: Loss of running condensate pump (1-CN-P-1B) with failure of standby pump to automatically start (1-CN-P-1A).

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		NOTE: These pages are only applicable if the applicant uses annunciator 1J-G4 to start the Main Condensate Pump.
	SRO	Direct actions of 1J-G4 SRO may elect to stop the load reduction. SRO may direct operators to bypass CP Bldg per 1H-F8.
	SRO	NOTE: <ul style="list-style-type: none"> • The Main Feed Pumps will trip on low suction pressure if pressure as indicated on 1-CN-PI-150A or 1-CN-PI-150B decreases to 55 psig for 15 seconds. • The standby Main Condensate Pump should auto-start when this alarm is received.
	BOP	1. CHECK MAIN CONDENSATE SYSTEM - BEING SECURED BY OPERATOR ACTION RNO: GO TO Step 3.
	BOP	3. CHECK MAIN CONDENSATE OR MAIN FEED RUPTURE - INDICATED <ul style="list-style-type: none"> • Amps on CN and MFW pumps – OSCILLATING • Hotwell level – DECREASING • Local report or audible indication RNO: GO TO Step 6.

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Event Description: Loss of running condensate pump (1-CN-P-1B) with failure of standby pump to automatically start (1-CN-P-1A).

Cue: By Examiner.

	BOP	6. CHECK STANDBY MAIN CONDENSATE PUMP - RUNNING
	BOP	<p>Step 6 RNO:</p> <p>Check the following parameters:</p> <ul style="list-style-type: none"> • FW Header pressure • FW Pump Suction pressure • MFW flow <p>IF standby CN pump required, THEN do the following:</p> <p>a) Start standby pump.</p> <p>b) GO TO Step 7.</p>
	BOP	<p>7. LOCALLY CHECK BREAKER AND PUMP FOR ANY CN PUMP WHICH HAS TRIPPED</p> <p><i>If dispatched, the field operator will report that the breaker for 1-CN-P-1B has a ground over-current trip.</i></p>
	BOP	* 8. CHECK MAIN FEED FLOW – GREATER THAN OR EQUAL TO MAIN STEAM FLOW
	BOP	<p>9. CHECK CONDENSER HOTWELL LEVEL - GREATER THAN OR EQUAL TO 26%</p> <ul style="list-style-type: none"> • LI-CN-103

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Event Description: Loss of running condensate pump (1-CN-P-1B) with failure of standby pump to automatically start (1-CN-P-1A).

Cue: By Examiner.

	BOP	<p>NOTE:</p> <ul style="list-style-type: none"> • Condensate recirculation valve flow greater than 3600 gpm could cause serious piping erosion/corrosion and valve damage. • The Condensate Recirc valve will fail open when Instrument Air or power is lost. <p>10. CHECK CONDENSATE RECIRC VALVE - CORRECT FOR CURRENT POWER LEVEL</p> <p><i>If dispatched, the field operator will report that the condensate recirc valve is closed and correctly set.</i></p>
	BOP	<p>11. LOCALLY CHECK CN PUMP SUCTION STRAINERS</p> <ul style="list-style-type: none"> • Strainer DP - ALL LESS THAN OR EQUAL TO NORMAL <p><i>If dispatched, the field operator will report that the suction strainers are normal (just like he saw them on operator rounds).</i></p>
	BOP	<p>12. CHECK CP BUILDING DP – NORMAL</p> <p><i>If contacted, the field operator will report that CP building differential pressure is normal (value to be taken from simulator during event) (ΔP is zero if CP Building is bypassed).</i></p>
	BOP	<p>13. CHECK CAUSE OF LOW HEADER PRESSURE - CORRECTED</p>
	SRO	<p>14. PLACE ONE CN PUMP IN STANDBY IAW SHIFT SUPERVISOR DIRECTION</p> <p><i>If contacted, the Shift Supervisor/Manager will request that 1-CN-P-1B remain as is (i.e. quarantined).</i></p>
	SRO	<p>15. PROVIDE NOTIFICATIONS AS NECESSARY</p> <ul style="list-style-type: none"> • OMO • STA • System Engineering <p>- END -</p>

END – Event 5

Op-Test No.: Surry 2008-301 Scenario No.: 2 Event No.: 6

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Event Description: Main Steam Line Break with a failure of the Turbine to Trip Automatically or Manually.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	Team	<p>Diagnoses the 'A' SG is faulted with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • 1C-B8 PRZR LO PRESS • 1H-A4 Tavg >< Tref DEVIATION <p>Indications:</p> <ul style="list-style-type: none"> • Steam flow on all SG will increase • MWe will decrease • Feed flow on all SG will increase • Reactor Power will increase • RCS Pressure will decrease <p>Other annunciators may also alarm as the transient continues.</p>
	SRO	Direct RO to perform the Immediate Actions of E-0, REACTOR TRIP OR SAFETY INJECTION
	RO	<p>[1] VERIFY REACTOR TRIP:</p> <p>a) Manually trip reactor</p> <p>Pushes the reactor trip push buttons.</p> <p>b) Check the following:</p> <ul style="list-style-type: none"> • All Rods On Bottom light – LIT • Reactor trip and bypass breakers – OPEN • Neutron flux - DECREASING

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Event Description: Main Steam Line Break with a failure of the Turbine to Trip Automatically or Manually.

Cue: By Examiner.

	RO	<p>[2] VERIFY TURBINE TRIP:</p> <p>a) Manually trip the turbine</p> <p>Pushes the turbine trip push buttons.</p>
	RO	<p>b) Verify all turbine stop valves - CLOSED</p> <p>Identifies that the stop valves are not closed.</p>
	RO	<p>b) RNO - Identifies that the turbine did not trip by noting:</p> <ul style="list-style-type: none"> • All turbine governor valves not closed (or) • Turbine speed not decreasing (or) • Generator motoring not initiated <p>Closes Main Steam Trip Valves.</p> <p>c) Isolate reheaters by closing MSR steam supply SOV</p> <ul style="list-style-type: none"> • 1-MS-SOV-104 <p>d) Verify generator output breakers – OPEN (Time Delayed)</p> <p>d) RNO – If the generator output breakers do NOT open within 30 seconds, THEN manually open the output breakers AND place the excitation control switch in OFF.</p> <p>Opens the MG output breakers and places the excitation switch in off.</p>
	RO	<p>[3] VERIFY BOTH AC EMERGENCY BUSES - ENERGIZED</p>

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Event Description: Main Steam Line Break with a failure of the Turbine to Trip Automatically or Manually.

Cue: By Examiner.

	RO	NOTE: Main Steam Leak will be increasing, requiring team to manually initiate Safety Injection or to verify automatic initiation of Safety Injection.
	RO	<p>[4] CHECK IF SI INITIATED:</p> <p>a) Check if SI is actuated:</p> <ul style="list-style-type: none"> • LHSI pumps – RUNNING • SI annunciators – LIT <ul style="list-style-type: none"> • A-F-3 SI INITIATED – TRAIN A • A-F-4 SI INITIATED – TRAIN B <p>b) Manually Initiate SI</p>
	RO	Depresses SI Actuation buttons.
	SRO	<p>The team will hold a transient brief. During the brief it will be identified that the 'A' Steam Generator is Faulted and that the main turbine failed to trip and the Main Steam Trip Valves (MSTVs) had to be closed.</p> <p>Team members will discuss various parameters and could identify failures.</p> <p><i>The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal with the exception of any previously identified alarms. He will also state that containment conditions and the electrical conditions are as you see them.</i></p>
	SRO/BOP	5. Initiate Attachment 1 (Attachment 1 actions contained under Event 7 on pages 45-49).
	SRO/BOP	SRO may direct the BOP to perform Attachment 9 of 1-E-0 for Faulted SG Isolation and AFW Control. This may or may not be initiated at any time during the performance of E-0. Attachment 9 actions are contained on pages 41-44.

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Event Description: Main Steam Line Break with a failure of the Turbine to Trip Automatically or Manually.

Cue: By Examiner.

	RO	<p>*6. CHECK RCS AVERAGE TEMPERATURE</p> <ul style="list-style-type: none"> • STABLE AT 547°F <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • TRENDING TO 547°F <p>The team will identify that RCS temperature is decreasing. The team should attribute this to the injection of SI into the RCS, AFW flow to the SGs, and the faulted SG and proceed to the RNO section of the step.</p>
	RO	<p>6. RNO – <u>IF</u> temperature less than 547°F <u>AND</u> decreasing, <u>THEN</u> do the following:</p> <ul style="list-style-type: none"> a) Stop dumping steam. b) <u>IF</u> cooldown continues, <u>THEN</u> control total feed flow. Maintain total feed flow greater than 350 gpm [450 gpm] until narrow range level greater than 12% [18%] in at least one SG. <p>If AFW was not isolated to the faulted SG with Attachment 9, the RO should isolate AFW to the faulted SG at this point.</p> <ul style="list-style-type: none"> c) <u>IF</u> cooldown continues, <u>THEN</u> close MSTVs. <p>The MSTVs were previously closed by the RO during the immediate actions of 1-E-0.</p>
	RO	<p>7. CHECK PRZR PORVs AND SPRAY VALVES:</p> <ul style="list-style-type: none"> a) PRZR PORVs – CLOSED b) PRZR spray controls <ul style="list-style-type: none"> • Demand at Zero (or) • Controlling Pressure c) PORV block valves - AT LEAST ONE OPEN

Event Description: Main Steam Line Break with a failure of the Turbine to Trip Automatically or Manually.

Cue: By Examiner.

SRO	<p>NOTE: Seal injection flow should be maintained to all RCPs.</p> <p>*8. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:</p> <p>a) Charging Pumps – AT LEAST ONE RUNNING AND FLOWING TO RCS</p> <p>Two or three Charging pumps will be running and flowing to the RCS.</p> <p>b) RCS subcooling - LESS THAN 30°F [85°F]</p> <p>RCS subcooling will NOT be less than 30 °F</p> <p>RNO for the step is to go to step 9.</p>
RO	
BOP	<p>9. CHECK IF SGs ARE NOT FAULTED:</p> <ul style="list-style-type: none"> • Check pressures in all SGs <ul style="list-style-type: none"> a) STABLE OR INCREASING AND b) GREATER THAN 100 PSIG <p>BOP will observe a significant decrease in the steam pressure of ‘A’ SG. It will not be stable or increasing and depending on when the team arrives at this step pressure may be less than 100 psig. The team will proceed to the RNO portion of this step.</p> <p>9. RNO – <u>IF</u> any SG pressure decreasing in an uncontrolled manner <u>OR</u> is completely depressurized, <u>THEN</u> GO TO 1-E-2, FAULTED STEAM GENERATOR ISOLATION.</p>
SRO	<p>The team will hold a transition brief. During the brief it will be identified that ‘A’ SG is faulted, current isolation status of the faulted SG and that the team is transitioning to 1-E-2 (refer to Event 8).</p> <p><i>The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal with the exception of any previously identified alarms. He will also state that containment conditions and the electrical conditions are as you see them.</i></p>

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Event Description: Main Steam Line Break with a failure of the Turbine to Trip Automatically or Manually.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	RO	<p>ATTACHMENT 9 of 1-E-0</p> <p>ATTACHMENT 9 of 1-E-0 **PART A**</p> <p>This attachment can be performed at any time during 1-E-0. It is a pre-emptive action, so it is not required to be performed.</p> <p>1. Verify SI is in progress. <u>IF</u> SI is <u>NOT</u> in progress, <u>THEN</u> return to procedure step in effect.</p> <p>RO identifies that SI is in progress.</p>
	RO/BOP	<p>ATTACHMENT 9 of 1-E-0 **PART A**</p> <p>2. Verify running or start AFW Pumps, as necessary</p> <ul style="list-style-type: none"> • 1-FW-P-3A – identifies pump is tagged out • 1-FW-P3B • 1-FW-P-2 – will start if not started by BOP
	RO	<p>ATTACHMENT 9 of 1-E-0 **PART A**</p> <p>3. Identify Faulted SG by one of the following conditions:</p> <ul style="list-style-type: none"> • Any SG depressurizing in an uncontrolled manner • Any SG completely depressurized <p>RO with SRO concurrence identifies 'A' SG as the faulted SG</p>
	RO RO	<p>ATTACHMENT 9 of 1-E-0 **PART A**</p> <p>CAUTION: At least one SG must be maintained available for RCS cooldown.</p> <p>4. Isolate the faulted SG(s) by performing the following:</p> <p>a) Verify closed or close the faulted SG(s) MSTV</p> <ul style="list-style-type: none"> • SG A, 1-MS-TV-101A • SG B, 1-MS-TV-101B • SG C, 1-MS-TV-101C <p>RO will identify that 1-MS-TV-101A was previously closed.</p>

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Event Description: Main Steam Line Break with a failure of the Turbine to Trip Automatically or Manually.

Cue: By Examiner.

	RO	<p>ATTACHMENT 9 of 1-E-0 **PART A**</p> <p>b) Verify closed or close the faulted SG(s) AFW Isolation MOVs:</p> <ul style="list-style-type: none"> • SG A, 1-FW-MOV-151E and 1-FW-MOV-151F • SG B, 1-FW-MOV-151C and 1-FW-MOV-151D • SG C, 1-FW-MOV-151A and 1-FW-MOV-151B <p>BOP will close 1-FW-MOV-151E and 1-FW-MOV-151F.</p> <p><i>Critical task (WOG E-2—A) is completed when the 'A' SG is isolated by closing 1-MS-TV-101A and 1-FW-MOV-151E/F.</i></p> <p>c) Verify closed or close the faulted SG(s) PORV:</p> <ul style="list-style-type: none"> • SG A, 1-MS-RV-101A • SG B, 1-MS-RV-101B • SG C, 1-MS-RV-101C <p>RO will identify that 1-MS-RV-101A is closed.</p> <p>d) Defeat the auto open signal for the faulted SG AFW MOVs using the following switches:</p> <ul style="list-style-type: none"> • 1-FW-43-3-AFW-S, H TRAIN DISABLE SELECTOR SWITCH • 1-FW-43-4-AFW-S, J TRAIN DISABLE SELECTOR SWITCH <p>e) Place both of the following key switches in the DISABLE SELECTED position:</p> <ul style="list-style-type: none"> • 1-FW-43-1-AFW-E, H TRAIN AUTO OPEN ENABLE SWITCH • 1-FW-43-2-AFW-E, J TRAIN AUTO OPEN ENABLE SWITCH
	RO	<p>BOP will select the switches to defeat the automatic open feature of the 'A' SG AFW MOVs.</p>

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Event Description: Main Steam Line Break with a failure of the Turbine to Trip Automatically or Manually.

Cue: By Examiner.

		<p>ATTACHMENT 9 of 1-E-0 **PART A**</p> <p>CAUTION: Feed flow should remain isolated to any faulted SG if intact SG(s) are available for heat sink.</p> <p>5. Control Feed flow to the intact SGs IAW the following requirements:</p> <ul style="list-style-type: none"> • Minimum AFW flow is 350 gpm [450 gpm] with SI initiated, until one SG Narrow Range level is greater than 12% [18%]. • When minimum heat sink has been verified, AFW MOVs should be controlled to maintain intact SG Narrow Range levels between 22% and 50% by throttling AFW Isoaltion MOVs: <ul style="list-style-type: none"> • SG A, 1-FW-MOV-151E and 1-FW-MOV-151F • SG B, 1-FW-MOV-151C and 1-FW-MOV-151D • SG C, 1-FW-MOV-151A and 1-FW-MOV-151B <p>RO will throttle AFW to the 'B' and 'C' SG as needed.</p>
	SRO	<p>ATTACHMENT 9 of 1-E-0 **PART B**</p> <p>The SRO may not assign the BOP to perform this section of the Attachment until Attachment 1 of 1-E-0 is completed. All actions in Attachment 9 will be either verified in 1-E-2 or performed in 1-E-2.</p>
	RO/BOP	<p>ATTACHMENT 9 of 1-E-0 **PART B**</p> <p>6. <u>WHEN</u> faulted SG has blown dry, <u>THEN</u> adjust intact SG PORV setpoints to current SG pressure IAW the following:</p> <ol style="list-style-type: none"> a) Verify the controller is in LOCAL by verifying LED L is LIT. <u>IF</u> LED L is <u>NOT</u> LIT, <u>THEN</u> press the A/M button and verify LED L is LIT. <u>IF</u> LED L is still <u>NOT</u> LIT, <u>THEN</u> notify I&C. b) <u>WHEN</u> the controller is in LOCAL, <u>THEN</u> place the controller in Manual by pressing the A/M key as necessary until LED M is LIT. c) <u>WHEN</u> the controller is in MANUAL, <u>THEN</u> press and release the SEL key until the LED above the left bargraph is LIT. <p>RO/BOP will make adjustments as necessary to place the controller in manual.</p>

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Event Description: Main Steam Line Break with a failure of the Turbine to Trip Automatically or Manually.

Cue: By Examiner.

	RO/BOP	<p>ATTACHMENT 9 of 1-E-0 **PART B**</p> <p>d) Verify or adjust the controller setpoint by pressing and holding the Increase or Decrease keys until the desired setpoint is obtained.</p> <p>RO/BOP will depress the Decrease and Increase keys as needed until the PORV setpoints are approximately the same as current SG pressure.</p> <p>e) Place the controller in Automatic by pressing the A/M key as necessary until LED A is LIT.</p> <p>f) Press and release the SEL key until the LED above the left bargraph is LIT.</p> <p>g) Adjust the PORV setpoint as necessary to maintain current SG pressure.</p>
	RO/BOP	<p>ATTACHMENT 9 of 1-E-0 **PART B**</p> <p>7. Verify closed or close the faulted SG(s) MFW Isolation MOV:</p> <ul style="list-style-type: none"> • SG A, 1-FW-MOV-154A • SG B, 1-FW-MOV-154B • SG C, 1-FW-MOV-154C <p>RO/BOP will close 1-FW-MOV-154A.</p>
		End Attachment 9 of 1-E-0

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Event Description: Failure of the TD AFW Pump (1-FW-P-2) to automatically start.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	<p>ATTACHMENT 1 OF E-0</p> <p>1. VERIFY FW ISOLATION:</p> <ul style="list-style-type: none"> • Feed pump discharge MOVs – CLOSED <ul style="list-style-type: none"> • 1-FW-MOV-150A • 1-FW-MOV-150B • MFW pumps – TRIPPED • Feed REG valves – CLOSED • SG FW bypass flow valves – DEMAND AT ZERO • SG blowdown TVs – CLOSED
	BOP	<p>2. VERIFY CTMT ISOLATION PHASE I:</p> <ul style="list-style-type: none"> • Phase I TVs – CLOSED • 1-CH-MOV-1381 – CLOSED • 1-SV-TV-102A – CLOSED • PAM isolation valves – CLOSED <ul style="list-style-type: none"> • 1-DA-TV-103A • 1-DA-TV-103B

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Event Description: Failure of the TD AFW Pump (1-FW-P-2) to automatically start.

Cue: By Examiner.

	BOP	<p>3. VERIFY AFW PUMPS RUNNING:</p> <p>a) MD AFW pumps – RUNNING (Time Delayed)</p> <p>b) TD AFW pump - RUNNING IF NECESSARY</p> <p>BOP will start the TD AFW pump (1-FW-P-2) and recall that 1-FW-P-3A is tagged out.</p> <p>This component can also be started by Attachment 9 of 1-E-0; as such the RO may start 1-FW-P-2.</p>
	BOP	<p>4. VERIFY SI PUMPS RUNNING:</p> <ul style="list-style-type: none"> • CHG pumps – RUNNING • LHSI pumps - RUNNING
	BOP	<p>5. CHECK CHG PUMP AUXILIARIES:</p> <ul style="list-style-type: none"> • CHG pump CC pump – RUNNING • CHG pump SW pump - RUNNING
	BOP	<p>6. CHECK INTAKE CANAL:</p> <ul style="list-style-type: none"> • Level - GREATER THAN 24 FT • Level - BEING MAINTAINED BY CIRC WATER PUMPS

Event Description: Failure of the TD AFW Pump (1-FW-P-2) to automatically start.

Cue: By Examiner.

	<p>BOP</p>	<p>7. CHECK IF MAIN STEAMLINES SHOULD BE ISOLATED:</p> <p>a) Check if ANY of the following annunciators - HAVE BEEN LIT</p> <ul style="list-style-type: none"> • E-F-10 (High Steam Flow SI) • B-C-4 (Hi Hi CLS Train A) • B-C-5 (Hi Hi CLS Train B) <p>Recalls that the cause of the trip was a steam break. BOP will ask the team if a High Steam Flow SI was actuated. There are no control room indications for this if the annunciator was acknowledged. The team may ask the STA to look on the Hathaway to determine if a High Steam Flow SI occurred.</p> <p><i>If asked the STA will refer to the Hathaway System and report back that annunciator 1E-F10 has not actuated.</i></p> <p>The BOP will proceed to the RNO and identify that annunciator E-H-10 (hdr/line SI) is lit and GO TO Step 7d.</p> <p>d) Verify RWST crosstie valves - OPEN</p> <ul style="list-style-type: none"> • 1-SI-TV-102A • 1-SI-TV-102B • 2-SI-TV-202A • 2-SI-TV-202B <p><i>If asked Unit 2 will report that 2-SI-TV-202A and 2-SI-TV-202B are OPEN.</i></p> <p>e) Check RCS pressure – LESS THAN 185 PSIG</p> <p>RNO</p> <p>e) Put BOTH RMT mode transfer switches in REFUEL.</p>
	<p>BOP</p>	<p>*8. CHECK IF CS REQUIRED:</p> <p>a) CTMT pressure – HAS EXCEEDED 23 PSIA</p> <p>Identifies pressure has not exceeded 23 or 17.7 psia and goes to step 10.</p>

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Event Description: Failure of the TD AFW Pump (1-FW-P-2) to automatically start.

Cue: By Examiner.

	BOP	<p>*10. BLOCK LOW PRZR PRESS SI SIGNAL:</p> <ol style="list-style-type: none"> a) Check PRZR pressure – LESS THAN 2000 psig b) Turn both LO PRZR PRESS & STM HDR/LINE ΔP switches to block c) Verify Permissive Status light C-2 - LIT <p>BOP may block the low pressurizer pressure SI signal depending on current RCS pressure. This signal may reset later in the scenario.</p>
	BOP	<p>*11. BLOCK LOW TAVE SI SIGNAL:</p> <ol style="list-style-type: none"> a) Check RCS Tave - LESS THAN 543°F b) Turn both HI STM FLOW & LO TAVG OR LP switches to block c) Verify Permissive Status light F-1 - LIT
	BOP	<p>NOTE:</p> <ul style="list-style-type: none"> • CHG pumps should be run in the following order of priority: C, B, A. • Subsequent SI signals may be reset by re-performing Step 12. <p>12. VERIFY SI FLOW:</p> <ol style="list-style-type: none"> a) HHSI to cold legs - FLOW INDICATED <ul style="list-style-type: none"> • 1-SI-FI-1961 (NQ) • 1-SI-FI-1962 (NQ) • 1-SI-FI-1963 (NQ) • 1-SI-FI-1943 or 1-SI-FI-1943A b) Check CHG pumps - THREE RUNNING c) Reset SI. d) Stop one CHG pump and out in AUTO

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Event Description: Failure of the TD AFW Pump (1-FW-P-2) to automatically start.

Cue: By Examiner.

	BOP	<p>12. Continued</p> <p>e) RCS pressure - LESS THAN 185 PSIG</p> <p>RNO: e) IF two LHSI pumps are running, THEN do the following:</p> <ol style="list-style-type: none"> 1) Verify reset or reset SI. 2) Stop one LHSI pump and put in AUTO. 3) GO TO Step 13.
	BOP	13. VERIFY TOTAL AFW FLOW - GREATER THAN 350 GPM [450 GPM]
	BOP	<p>14. CHECK AFW MOVs - OPEN</p> <p>BOP will identify that all AFW MOVs are not open and will read the RNO portion of this step and manually align valves as necessary.</p>
	BOP	<p>15. INITIATE SI VALVE ALIGNMENT IAW ATTACHMENT 2</p> <p>See attached copy of Attachment 2.</p>
	BOP	<p>16. INITIATE VENTILATION ALIGNMENT AND AC POWER ALIGNMENT IAW ATTACHMENT 3</p> <p>See attached copy of Attachment 3:</p> <p><i>Unit 2 Operator will state that Unit 2 is at 100% power (if asked)</i></p> <p><i>Unit 2 will also accept responsibility to complete Attachment 3 if it is given to Unit 2 at the point where differential pressure indications are requested.</i></p>

END – Event Terminates upon completion of Attachment 2 and 3

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Event Description: E-2, SG Isolation and loss of AFW pumps leading to Loss of all Feed Water and entry into FR-H.1.

Cue: Transition to 1-E-2 (prior to intact SG levels being greater than 12%).

Time	Position	Applicant's Action or Behavior
	<p>TEAM</p> <p>SRO</p>	<p>Upon transition to 1-E-2 or PRIOR TO SG levels exceeding 12% narrow range, the AFW Pumps will sequentially trip due to the harsh environment of safeguards (for 1-FW-P-3B) and an over speed of 1-FW-P-2 (TD AFW pump).</p> <p>The trip of 1-FW-P-2 will be identified by a decrease in AFW flow and loss of steam flow indication on the backboards.</p> <p>The trip of 1-FW-P-3B will be identified by a decrease in AFW flow and an annunciator indicating that the pump has tripped.</p> <p>The SRO may ask Unit 2 to prepare for establishing AFW crosstie in accordance with AP-50.00 (Attachment 2).</p> <p><i>The Unit 2 SRO will acknowledge the request (no actions performed). If asked again, he will state he is experiencing difficulty with his Unit and is not able to provide AFW at this time, but he is working to resolve the problem.</i></p> <p>Depending on efficiency of procedure performance, the team will transition to FR-H.1 when the transition is made to E-2 or from Attachment 1 Step 13 RNO for low SG level with no AFW flow.</p> <p>FR-H.1 Actions are contained on pages 56 – 58.</p>
	SRO	Initiate E-2, Faulted Steam Generator Isolation.
	<p>SRO</p> <p>RO</p>	<p>CAUTION:</p> <ul style="list-style-type: none"> • At least one SG must be maintained available for RCS cooldown. • Any faulted SG or secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown. <p>1. CHECK MSTV AND BYPASS VALVE ON AFFECTED SG(s) - CLOSED</p> <p>The RO will report that the MSTV and Bypass Valves are closed.</p>

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Event Description: E-2, SG Isolation and loss of AFW pumps leading to Loss of all Feed Water and entry into FR-H.1.

Cue: Transition to 1-E-2 (prior to intact SG levels being greater than 12%).

	RO	<p>2. CHECK IF ANY SG SECONDARY SIDE IS INTACT:</p> <ul style="list-style-type: none"> • Check pressures in all SGs – ANY STABLE OR INCREASING <p>RO will report that the 'B' and 'C' SGs are stable for plant conditions. An RCS cooldown may be in progress at this time and a discussion that the SG pressures are stable for plant conditions may ensue.</p>
	BOP	<p>3. IDENTIFY FAULTED SG(S):</p> <p>a) Check pressures in all SGs:</p> <ul style="list-style-type: none"> • ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • ANY SG COMPLETELY DEPRESSURIZED <p>Reports the 'A' SG is faulted.</p>
	SRO	<p>CAUTION:</p> <ul style="list-style-type: none"> • If the TD AFW pump is the only available source of feed flow, steam supply to the TD AFW pump must be maintained from at least one SG. • TD AFW pump Low Flow Shutdown Criteria: <p>Maintain greater than or equal to 150-gpm total AFW flow when feeding two or less Steam Generators with the TD AFW Pump operating.</p> <p>Methods that may be used to comply with this restriction:</p> <ol style="list-style-type: none"> 1) Increasing total AFW flow to greater than 150 gpm 2) Feeding ALL Steam Generators 3) Securing the TD AFW Pump

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Event Description: E-2, SG Isolation and loss of AFW pumps leading to Loss of all Feed Water and entry into FR-H.1.

Cue: Transition to 1-E-2 (prior to intact SG levels being greater than 12%).

BOP	<p>4. ISOLATE FAULTED SG(s):</p> <ul style="list-style-type: none"> • Close AFW MOV(s) <p>BOP will close 1-FW-MOV-151E and 1-FW-MOV-151F.</p>
BOP	<ul style="list-style-type: none"> • Defeat the auto-open signal for the faulted SG AFW MOVs using the following switches: <ul style="list-style-type: none"> • 1-FW-43-3-AFW-S, H TRAIN DISABLE SELECTOR SWITCH • 1-FW-43-4-AFW-S, J TRAIN DISABLE SELECTOR SWITCH • Place both of the following key switches in the DISABLE SELECTED position: <ul style="list-style-type: none"> • 1-FW-43-1-AFW-E, H TRAIN AUTO OPEN ENABLE SWITCH • 1-FW-43-2-AFW-E, J TRAIN AUTO OPEN ENABLE SWITCH <p>BOP will select the switches to defeat the automatic open feature of the 'A' SG AFW MOVs.</p> <ul style="list-style-type: none"> • Isolate MFW line: <ol style="list-style-type: none"> a) Close SG FW isolation MOV(s) <p>Closes or verifies 1-FW-MOV-154A is closed.</p> <ol style="list-style-type: none"> b) Locally close feed REG bypass valve manual isolation valve(s): <ul style="list-style-type: none"> • 1-FW-26 for SG A • 1-FW-57 for SG B • 1-FW-88 for SG C <p>Directs a field operator to close 1-FW-26 in #1MER.</p> <p><i>If directed, the field operator will close 1-FW-26 and report the status of the valve back to the MCR.</i></p>

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Event Description: E-2, SG Isolation and loss of AFW pumps leading to Loss of all Feed Water and entry into FR-H.1.

Cue: Transition to 1-E-2 (prior to intact SG levels being greater than 12%).

	BOP	<p>4. ISOLATE FAULTED SG(s): (Continued)</p> <ul style="list-style-type: none"> • Locally close steam supply valve(s) to TD AFW pump: <ul style="list-style-type: none"> • 1-MS-87 for SG A • 1-MS-120 for SG B • 1-MS-158 for SG C <p>Directs a field operator to close 1-MS-87 in Unit 1 Safeguards.</p> <p><i>If directed, the field operator will close 1-MS-87 and report the status of the valve back to the MCR. This is not required for CT completion (SG will be blown dry).</i></p> <ul style="list-style-type: none"> • Close or verify closed SG PORV(s) • Close or verify closed SG blowdown TVs <p>Critical Task: [WOG E-2—A] Isolate feed flow to and steam flow from the faulted SG before RCS temperature is less than 400°F is completed during the performance of this step, if it was not completed in Attachment 9 of 1-E-0. Critical task (WOG E-2—A) is completed when the 'A' SG is isolated by closing 1-MS-TV-101A and 1-FW-MOV-151E/F.</p>
	BOP	<p>5. CHECK ECST LEVEL - GREATER THAN 20%</p> <p>Observes ECST indicator on vertical board is greater than 20%.</p>
	SRO	<p>6. CHECK SECONDARY RADIATION:</p> <p>a) Consult with TSC or SEM to determine if FAULTED SG should be aligned for sampling</p> <p><i>If contacted, the TSC will state that they do not desire to sample the Faulted SG.</i></p> <p>b) Initiate periodic activity sampling of INTACT SGs IAW Attachment 1</p>

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Event Description: E-2, SG Isolation and loss of AFW pumps leading to Loss of all Feed Water and entry into FR-H.1.

Cue: Transition to 1-E-2 (prior to intact SG levels being greater than 12%).

	BOP	<p>6. CHECK SECONDARY RADIATION: (Continued)</p> <p>c) Check unisolated secondary radiation monitors:</p> <ul style="list-style-type: none"> • Main steamline • TD AFW pump exhaust • Condenser air ejector <p>No indications of secondary radiation can be observed or are present.</p> <p>d) Secondary Radiation - NORMAL</p> <p>No indications of secondary radiation can be observed or are present.</p>
	BOP	<p>7. ADJUST INTACT SG PORVs TO LIMIT RCS HEATUP:</p> <p>a) Determine required PORV pressure setting using Attachment 2</p> <p>Will refer to Attachment 2 to determine desired intact SG PORV setpoint. If the PORVs were set utilizing Attachment 9 of 1-E-0, further adjustment may not be warranted.</p> <p>b) Adjust intact SG PORVs pressure setting</p> <p>BOP will slowly lower the setpoint of the SG PORV. This can either be done in Manual or Automatic.</p> <p>c) Stabilize RCS temperature by controlling SG PORV pressure setting</p>

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Event Description: E-2, SG Isolation and loss of AFW pumps leading to Loss of all Feed Water and entry into FR-H.1.

Cue: Transition to 1-E-2 (prior to intact SG levels being greater than 12%).

BOP	<p>8. CHECK IF SI FLOW SHOULD BE REDUCED:</p> <ul style="list-style-type: none">a) RCS subcooling based on CETCs - GREATER THAN 30°F [85°F]b) Secondary heat sink:<ul style="list-style-type: none">• Total feed flow to INTACT SGs - GREATER THAN 350 gpm [450 gpm]OR• Narrow range level in at least one intact SG - GREATER THAN 12% [18%]c) RCS pressure - STABLE OR INCREASINGd) PRZR level - GREATER THAN 22% [50%]e) GO TO 1-ES-1.1, SI TERMINATION
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Event Description: E-2, SG Isolation and loss of AFW pumps leading to Loss of all Feed Water and entry into FR-H.1.

Cue: Transition to 1-E-2 (prior to intact SG levels being greater than 12%).

Time	Position	Applicant's Action or Behavior
		Actions for FR-H.1
	SRO	<p>CAUTION:</p> <ul style="list-style-type: none"> • If total feed flow is less than 350 gpm [450 gpm] due to operator action, this procedure should NOT be performed. • Feed flow should NOT be reestablished to any faulted SG if a non-faulted SG is available.
	RO	<p>1. CHECK IF SECONDARY HEAT SINK IS REQUIRED:</p> <p>a) RCS pressure - GREATER THAN ANY NON-FAULTED SG PRESSURE</p> <p>RO will report that RCS pressure is greater than the intact SGs</p> <p>b) RCS hot leg temperature – GREATER THAN 350°F</p> <p>RO will report that RCS hot leg temperature is greater than 350 °F.</p>
	SRO	<p>CAUTION: If WIDE RANGE level in any 2 SGs is less than 7% [22%] OR PRZR pressure is greater than or equal to 2335 psig due to loss of secondary heat sink, RCPs should be tripped and Steps 11 through 18 should be immediately initiated for bleed and feed.</p>
	RO	<p>2. TRY TO ESTABLISH AFW FLOW TO AT LEAST ONE SG:</p> <p>a) Check SG blowdown TVs – CLOSED</p> <p>RO will report that all blowdown Trip Valves are closed.</p>
	BOP	<p>b) Verify AFW MOVs – OPEN</p> <p>BOP will report that AFW MOVs to the faulted SG are closed, but that the AFW MOVs to the intact SGs are open. The team will NOT reopen the AFW MOVs to the faulted SG.</p>

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Event Description: E-2, SG Isolation and loss of AFW pumps leading to Loss of all Feed Water and entry into FR-H.1.

Cue: Transition to 1-E-2 (prior to intact SG levels being greater than 12%).

		2. TRY TO ESTABLISH AFW FLOW TO AT LEAST ONE SG: (Continued)
	BOP	<p>c) Check ECST – AVAILABLE</p> <p>Reports the ECST is available for use.</p>
	BOP	<p>d) Check AFW - AVAILABLE</p> <p>Reports AFW is NOT available due to the failure of the AFW pumps.</p>
	RO	<p>d) RNO: IF minimum feed flow NOT established, THEN do the following:</p> <p>1) Stop ALL RCPs.</p> <p>Secures all of Unit 1's RCPs.</p>
	SRO	<p>2) IF desired to transfer EDG 3 to Bus 2J to restore power to 2-FW-P-3B, THEN GO TO Attachment 2.</p> <p>This is not desired as 2J is being supplied by off-site power.</p> <p><i>If asked, respond as Unit 2 that 2J is being supplied by off-site power.</i></p> <p>3) Have Unit 2 operator close Unit 2 AFW MOVs.</p> <p>Asks Unit 2 if they are able to supply AFW to Unit 1 and subsequently directs Unit 2 to close the Unit 2 AFW MOVs.</p> <p><i>If asked, respond as Unit 2 and state that issues on Unit 2 have been resolved and you can now supply AFW to Unit 1.</i></p> <p><i>If directed, report back as Unit 2 that Unit 2 AFW MOVs are closed.</i></p> <p>4) Have Unit 2 operator open the following valves:</p> <ul style="list-style-type: none"> • 1-FW-MOV-160A • 1-FW-MOV-160B <p>Directs Unit 2 to open the auxiliary feedwater crosstie valves.</p> <p><i>If directed, report back as Unit 2 that 1-FW-MOV-160A and B are open.</i></p>

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Event Description: E-2, SG Isolation and loss of AFW pumps leading to Loss of all Feed Water and entry into FR-H.1.

Cue: Transition to 1-E-2 (prior to intact SG levels being greater than 12%).

SRO	<p>2. TRY TO ESTABLISH AFW FLOW TO AT LEAST ONE SG: (Continued)</p> <p>5) Have Unit 2 operator start AFW pump(s).</p> <p>Directs Unit 2 to start AFW pumps.</p> <p><i>If directed, report back as Unit 2 the requested number of pumps has been started. If no direction was given on how many pumps to start, only start the motor driven AFW pumps.</i></p>
RO	<p>6) Control flow to restore narrow range level in at least one SG greater than 12% [18%].</p> <p>Adjusts AFW flow, if needed, to raise level in at least one SG to greater than 12%.</p> <p>7) <u>WHEN</u> narrow range level in at least one SG greater than 12% [18%], <u>THEN</u> RETURN TO procedure and step in effect.</p> <p>Critical Task: [WOG FR-H.1] Establish feed flow to ≥ 1 SG and trip RCPs before level in ≥ 2 SGs are $< 7\%$ WR (PSA).</p>

END – Event is terminated when > 350 gpm of flow is provided to Unit 1 SGs and SG levels are greater than 12% narrow range.

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Event Description: Spurious Trip of 1-CC-P-1B and a failure of 1-CC-P-1A to automatically start.

Cue: By examiner after transition out of 1-FR-H.1

Time	Position	Applicant's Action or Behavior
	Team	<p>Diagnoses the failure of 1-CC-P-1B with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • 1K-E7 CC PPS HDR LO PRESS <p>Indications:</p> <ul style="list-style-type: none"> • CC Flow decreases rapidly • CC Flow decreases rapidly • CC Flow to RCPs decrease. <p>Other annunciators may also alarm as the transient continues.</p> <p>Team may start 1-CC-P-1A based on the failure of a component to automatically start that should have started or the team may use ARP 1K-E7 to start the pump. The actions of 1K-E7 are listed here as a reference.</p>
	BOP	<p>1. VERIFY CC HEADER PRESSURE – LESS THAN 90 PSIG</p> <ul style="list-style-type: none"> • PI-CC-100, CC PP DISCH PRESS
	BOP	<p>2. CHECK CC – LEAK OR RUPTURE</p> <ul style="list-style-type: none"> • CC Surge Tank Level – DECREASING • CTMT or AUX BLDG Sumps – LEVEL INCREASING <p>2. RNO – GOTO STEP 10</p>
	BOP	<p>Caution: Three CC pumps are required for two unit operation. Two pumps are required for single unit operation. Tech Spec 3.13 should be reviewed if two pumps are inoperable.</p> <p>Note: The standby CC pump should start automatically if the discharge pressure of the operating pump drops below 55 psig.</p> <p>10. CHECK CC PRESSURE – LESS THAN OR EQUAL TO 55 PSIG</p>

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Event Description: Spurious Trip of 1-CC-P-1B and a failure of 1-CC-P-1A to automatically start.

Cue: By examiner after transition out of 1-FR-H.1

	BOP	11. START STANDBY CC PUMP Starts 1-CC-P-1A.
	BOP	12. VERIFY CC PRESSURE - NORMAL
	BOP	13. GO TO STEP 17
	BOP	17. PROVIDE NOTIFICATIONS <ul style="list-style-type: none">• OMO• STA• SHIFT SUPERVISION

END – Scenario 2

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SIMULATOR OPERATOR GUIDE

Simulator Setup

Initial Conditions:

Recall 100% IC and enter the following malfunctions or recall the IC 253 and implement **TRIGGER #16** to activate all passive malfunctions. **VERIFY Trigger #16 implemented.**

Open the monitor window and add the following points to it:

- ASP_AO_OFF = True
- CC_572
- FW_26
- MSGV1_STUK_FLAG
- MSGV2_STUK_FLAG
- MSGV3_STUK_FLAG
- MSGV4_STUK_FLAG
- Turb_Trip_Loc

Enter the following MALFUNCTIONS:

Malfunction	Delay	Ramp	Trigger	Value	Final	Trigger Type
CH4702 – CH-P-1B Breaker 15J5 Spurious Trip	15	N/A	1	False	True	Manual
CH4202 - CH-P-1B Discharge Check Valve Failure	10	N/A	1	False	True	Manual
RC4802 - Pressurizer Pressure Control Transmitter Failure	15	0	3	0	1	Manual
GL0101 – Isophase Bus Duct Cooling Fan Failure (A)	15	N/A	5	False	True	Manual
CN0102 - Loss of 1-CN-P-1B (over-current trip)	15	N/A	7	False	True	Manual
MS0401 - 'A' SG Steam Break in Unit 1 Safeguards	15	45	9	0	10	Manual
MS0401 - 'A' SG Steam Break in Unit 1 Safeguards	N/A	N/A	N/A	10	50	Manual update of final value

SIMULATOR OPERATOR GUIDE

Malfunction	Delay	Ramp	Trigger	Value	Final	Trigger Type
FW0702 - 1-FW-P-3B Trip	15	N/A	11	False	True	Manual
FW1101 - 1-FW-P-2	15	N/A	11	0	100	Manual
TU03 - Failure of Auto Turbine Trip	0	N/A	16	False	True	Passive
TU04 - Failure of Manual Turbine Trip	0	N/A	16	False	True	Passive
CC1102 - Spurious Trip of 1-CC-P-1B	5	N/A	30	False	True	Manual

Enter the following REMOTE FUNCTIONS:

Remote Function	Delay	Ramp	Trigger	Value	Final	Trigger Type (Auto or Manual)
DISA_CNP1A_ASTRT – Disable auto-start of 1-CN-P-1A	0	N/A	16	Enable	Disable	Passive
DISA_FWP2_ASTRT – Disable auto-start of 1-FW-P-2	0	N/A	16	Enable	Disable	Passive
DISA_CCPIA_ASTRT – Disable auto-start of 1-CC-P-1A	0	N/A	30	Enable	Disable	Manual

Enter the following OVERRIDES:

Override	Delay	Ramp	Trigger	Value	Final	Trigger Type (Auto or Manual)
OPEN_GV4_RED Governor Valve 4 Red Light	0	N/A	15	On	Off	Auto on Rx Trip
OPEN_GV4_GREEN Governor Valve 4 Green Light	0	N/A	15	On	Off	Auto on Rx Trip
OPEN_GV4_WHITE Governor Valve 4 White Light	0	N/A	15	On	Off	Auto on Rx Trip

SIMULATOR OPERATOR GUIDE

TRIGGER	TYPE	DESCRIPTION
1	Manual	Loss of 'B' Charging pump and failure of its check valve in the open direction.
3	Manual	1-RC-PT-1445 Fails high (PORV opens).
5	Manual	Loss of IBDC Fan A.
7	Manual	Loss of 1-CN-P-1B and failure of 1-CN-P-1A to auto-start.
9	Manual	Commence Steam Break in 'A' SG.
11	Manual	Loss of all AFW.
15	Automatic	Provide indication of Failed Governor Valve.
MANUAL UPDATE	MANUAL UPDATE	Increase the size of the Steam Break in 'A' SG.
16	Passive	Disable Auto Start of 1-CN-P-1A and 1-FW-P-2. Failure of Auto or Manual Turbine Trip.
30	Manual	Trip 1-CC-P-1B and disable the automatic start of 1-CC-P-1A.

SIMULATOR OPERATOR GUIDE

Verify the following control room setup:

- Place the simulator in RUN and verify normal 100% power operation indications.
- Verify Red Magnets on the following components:

<input type="checkbox"/> 1-FW-P-3A	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Verify 1-RM-RI-112 aligned to A/C SG and 1-RM-RI-113 aligned to B SG (magnets).
- Verify Ovation System operating.
- Reset ICCMs.
- Verify Component Switch Flags.
- Verify Brass Caps properly placed.
- Verify SG PORVs set for 1035 psig.
- Verify Rod Control Group Step Counters indicate properly.
- Verify Ovation CRT display
- Advance Charts the following charts:

Master chart advance switch

- Verify Turbine Thumb Wheel Settings @120 rpm/min and Position 6
- Verify Containment Instrument Air Compressors are on Inside Suction (all RMs reset)
- Verify all ARPs have been cleaned
- Verify CLEAN copies of the following procedures are in place:

<input type="checkbox"/> AP-53.00	<input type="checkbox"/> AP-31.00	<input type="checkbox"/> AP-21.00	<input type="checkbox"/> AP-23.00
<input type="checkbox"/> E-0	<input type="checkbox"/> E-2	<input type="checkbox"/> FR-H.1	<input type="checkbox"/> AP-38.00
<input type="checkbox"/> OP-CH-007		<input type="checkbox"/> OP-CH-020	
<input type="checkbox"/> OP-ZZ-002		<input type="checkbox"/> Reactivity Sheet	

- Verify Reactivity Placard is current.

SIMULATOR OPERATOR GUIDE**Brief**

This simulator performance scenario is performed in the EVALUATION MODE. You should not direct questions to the evaluators. Otherwise, you should perform as if you were in the MCR.

Your ability to maintain a log is not being graded, but maintaining a rough log is recommended to help during briefs.

If you need to communicate with the Unit 2 operator, verbally state, "Unit 2" and an instructor will locate to the Unit 2 area and respond to you as quickly as possible.

In the unlikely event that the simulator fails such that illogical indications result, the session will be terminated. In other words, respond to what you see. If there is a problem with the simulation, the session will be terminated or adjusted as appropriate based on the specific problem.

Assign operating positions.

Ask for and answer questions.

Op-Test No.: Surry 2008-301**Scenario No.: 2****Page 66 of 78****SIMULATOR OPERATOR GUIDE**Conduct shift turnover:

Provide normal shift turnover materials reflecting the below initial conditions:

The initial conditions have Unit #1 operating steady state at 100% power with a current boron concentration of 750 ppm. All Unit #1 systems and crossties are operable with the following exception:

- 1-FW-P-3A ('A' Motor Driven Auxiliary Feed Water Pump) is tagged out for bearing replacement. 1-FW-P-3A is expected to be returned to service on dayshift tomorrow. 60 hours remain in the 72-hour Technical Specification 3.6 Clock.

Unit #2 is at 100% power with all systems and crossties operable.

Shift orders are to maintain 100% power on Unit #1.

The last shift performed two 50-gallon dilutions.

When the team has accepted the shift, proceed to the Session Conduct Section.

SIMULATOR OPERATOR GUIDE**Session Conduct:**

Ensure conditions in Simulator Set-up are established.

Ensure Trigger 16 is active prior to team entering the simulator.

Verify Exam Security has been established and ASP_AO_OFF = True.

EVENT 1 1-CH-P-1B Failure (Pump Trip and Valve Failure)

When cued by examiner, implement Trigger #1.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of the charging pump and associated check valve. The individual(s) contacted will also acknowledge any TS LCOs.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If contacted**, will acknowledge entry into AP-8.00.
- **If contacted:** The OPS Supervisor/manager will take responsibility for getting a team together, briefing them and then arranging a time with the Unit Supervisor to place 1-CH-P-1C on its alternate source. The team may not make this request (may quarantine).

Maintenance:

- **If contacted**, will acknowledge the failure of the charging pump and associated check valve and commence investigations.

SIMULATOR OPERATOR GUIDE

STA:

- **If contacted**, will acknowledge the failure of the charging pump and associated check valve. The individual(s) contacted will also acknowledge any TS LCOs. The STA will not confirm or deny any TS decisions.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

Field Operators:

- **If contacted**, field operators will report the dampers for 1-CH-P-1A and 1C (if both are still running when contacted) are open and the damper for 1-CH-P-1B is closed. The operator will also report that the lube oil flow and temperatures for the running and secured pumps is normal.
- **If contacted**, the operator will report charging and letdown appear intact and he can hear/feel flow at the discharge of 1-CH-P-1B while it is secured.
- **If contacted**, the operator will report no issues at the breaker for 1-CH-P-1B.

Role play as other individuals as needed.

EVENT 2 Place Normal Letdown In-service

Operations Supervisor/Management:

- **If contacted**, will acknowledge the need to place normal letdown in-service.

Role play as other individuals as needed.

SIMULATOR OPERATOR GUIDE**EVENT 3 1-RC-PT-1445 Fails High**

When cued by examiner, implement Trigger #3.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of 1-RC-PT-1455. The individual(s) contacted will also acknowledge any TS LCOs (i.e., close associated block valve).
- **If contacted**, will take responsibility for writing the WR and CR.
- **If contacted**, will acknowledge entry into AP-53.00 and AP-31.00.

STA:

- **If contacted**, will acknowledge the failure of 1-RC-PT-1455. The individual(s) contacted will also acknowledge any TS LCOs (i.e., close associated block valve). The STA will not confirm or deny any TS decisions.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

Maintenance:

- **If contacted**, will acknowledge the failure of 1-RC-PT-1455 and commence investigations.

Role play as other individuals as needed.

SIMULATOR OPERATOR GUIDE**EVENT 4 Loss of Isophase Bus Duct Cooling Fan 'A'**

When cued by examiner, implement Trigger #5.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of the 'A' Isophase Bus Duct Cooling Fan and the need to ramp at 1%/minute to 78% power and then at the normal ramp rate until generator amps are less than 14250 amps.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If contacted**, will acknowledge entry into AP-23.00.

STA:

- **If contacted**, will acknowledge the failure of the 'A' Isophase Bus Duct Cooling Fan and the need to ramp at 1%/minute to 78% power and then at the normal ramp rate until generator amps are less than 14250 amps.
- **If asked**, the STA will acknowledge the need to borate and use rods (will acknowledge the team review of OP-RX-010, if performed). If asked to perform the OP-RX-010 review, the STA will state that he is not able to at this time.
- **After directed**, the STA will report that he has reviewed VPAP-2802 and no notifications were required.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief**: The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

SIMULATOR OPERATOR GUIDE

Field Operators:

- **If contacted**, field operators will report that the low air flow is indicated for the 'A' iso-phase bus duct cooling fan.
- **If contacted**, the operator will report no amps are indicated on breaker 1A2-2-1B for 1-EP-F-1A ('A' Iso-phase Bus Duct Cooling Fans) and the thermal overload for the 'A' Fan has actuated.
- **If contacted**, the operator will acknowledge and reset the local alarm panel for the IBDC fan and clear the alarm in the MCR. This can be done with V2GE5_RESET under the simulator remote function tab.
- **If requested** to re-start the 'A' IBDC fan. Acknowledge the request and report back that the fan cannot be reset.

Maintenance:

- **If contacted**, will acknowledge the failure and commence investigations.
- **If contacted**, will acknowledge the requirements to sample the RCS.

Role play as other individuals as needed.

SIMULATOR OPERATOR GUIDE**EVENT 5 Loss of CN Pump and Failure of Stand-by Pump to Auto-Start**

When cued by examiner, implement Trigger #7.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failures.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If contacted**, will request that 1-CN-P-1B remain as is (i.e., quarantined).

STA:

- **If contacted**, will acknowledge the failure of 1-CN-P-1B and the failure of 1-CN-P-1A to automatically start.
- **If contacted**, will take responsibility for writing the WR and CR.

Field Operators:

- **If contacted**, field operators will report that the breaker for 1-CN-P-1B has a ground over-current trip.
- **If contacted**, the operator will the condensate recirc valve is closed and correctly set. The operator may also report that the suction strainers for the CN pumps are normal (like he saw them during operator rounds).
- **If contacted**, the CP building operator will report that the CP building differential pressure is normal (ΔP is zero if CP building is bypassed).

Maintenance:

- **If contacted**, will acknowledge the failure and commence investigations.

Role play as other individuals as needed.

SIMULATOR OPERATOR GUIDE

EVENT 6 **Steam Break on 'A' SG**

When cued by examiner:

1. Set one of the following flags to "TRUE" – GV Closest to 10 - 20%.
 - MSGV1_STUK_FLAG
 - MSGV2_STUK_FLAG
 - MSGV3_STUK_FLAG
 - MSGV4_STUK_FLAG
2. Implement Trigger #9 (Steam Break).

Operations Supervisor/Management:

- **If contacted**, will acknowledge the Steam Break and failure of the Turbine to Trip and entry into 1-E-0 (and SI, depending on power level at time of failure).

STA:

- **If contacted**, will enter the control room and commence reviewing status trees and prepare for the transient brief.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.
- **If contacted**, the STA will simulate walking to the Unit 1 Computer Room and then report back that Annunciator 1E-F10 has not actuated.

SIMULATOR OPERATOR GUIDE

Field Operators:

- **If contacted**, field operators will locally trip the main turbine.
- **If directed**, field operators will perform local manipulations.
- **If contacted**, field operators will report that they are unable to gain access to Unit 1 Safeguards.
- **If directed**, to locally trip the turbine. Acknowledge the request, wait 2 minutes, set TURB_TRIP_LOC to True, and then report back that the local trip of the turbine was completed.

Unit 2 Operator:

- **If asked** during the performance of 1-E-0, report that 2-SI-TV-202A and 2-SI-TV-202B are open.

Role play as other individuals as needed.

SIMULATOR OPERATOR GUIDE**EVENT 7 Failure of 1-FW-P-2 to Automatically Start**

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of 1-FW-P-2 to start and the subsequent starting of that pump.

STA:

- **If contacted**, will acknowledge the failure of 1-FW-P-2 to start and the subsequent starting of that pump.
- **If contacted**, the STA will simulate walking to the Unit 1 Computer Room and then report back that Annunciator 1E-F10 has not actuated.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

Field Operators:

- **If contacted**, field operators will report that they are unable to gain access to Unit 1 Safeguards.

Unit 2:

- **If asked**, state Unit 2 is at 100 % power.
- State that the Attachment 3 pressure indication readings outside the operator at the controls boundary area all indicate positive pressure.
- Unit 2 will also accept responsibility to complete Attachment 3 **if it is given to Unit 2** at the point where differential pressure indications are requested.
- If asked, 0-AP-50.00, Opposite Unit Emergency, has been initiated.

SIMULATOR OPERATOR GUIDE**EVENT 8 Loss of All AFW Pumps and Degradation of the Steam Break**

Implement Trigger #11 when the highest SG narrow range level is 5%.

Trigger #11 must be initiated prior to 12% SG NR level.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of all Unit 1 AFW pumps.
- **If contacted**, will acknowledge entry into FR-H.1 (E-2).

STA:

- **If contacted**, will acknowledge the loss of all Unit 1 AFW pumps.
- The STA will walkdown the Unit 1 MCR and determine that a Red Path exists on Heat Sink and state that the Unit is in a red path on FR-H.1 to the Unit Supervisor.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

SIMULATOR OPERATOR GUIDE

Unit 2 Operator:

- **If asked prior to Unit 1 Securing Unit 1 RCPs**, then acknowledge the request to establish AFW crosstie. If asked a second time, state that Unit 2 is experiencing difficulty and cannot provide AFW at this time, but we are working to resolve the issues.
- **After Unit 1 RCPs are secured, state (as Unit 2) that the difficulties Unit 2 was experiencing no longer exist.**
- **If asked after securing Unit 1 RCPs:** Commence the process for AFW Crosstie.
- **When asked** state that Bus 2J is powered from off-site power and Unit 2 does not need #3 EDG to power the bus.
- **When asked** to close Unit 2 AFW MOVs, acknowledge the request, wait one minute, set U2 Target Flow Rate on the Unit 2 AFW Simulator Screen = 0 and then report that Unit 2 AFW MOVs are closed.
- **When asked** to close 1-FW-MOV-160A and 1-FW-MOV-160B, acknowledge the request, take the switches on the Unit 2 AFW screen to open, and report that the valves are open when the red lights are out and green lights lit.
- **When asked** to start Unit 2 AFW Pumps, acknowledge the request and ANNOUNCE and start 2-FW-P-3A and 2-FW-P-3B by taking the clicking on the 2-FW-P-3A and 2-FW-P-3B pump buttons and selecting “Start”. After both pumps are started, report this back to the SRO.
- **If asked** state that Unit 2 AFW pump amps are at approximately 50 amps.

Field Operators:

- **If directed**, field operators will perform local manipulations (1-FW-26).
- **If contacted**, field operators will report that they are unable to gain access to Unit 1 Safeguards.

SIMULATOR OPERATOR GUIDE**EVENT 9 Loss of 1-CC-P-1B and Failure of 1-CC-P-1A to Automatically Start**

When cued by examiner, set **CC_572 = 0** and implement Trigger #30.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of 1-CC-P-1B and the failure of 1-CC-P-1A to automatically start.

Unit 2:

- **If asked**, state that 1-CC-P-1D did not automatically start and could not be started.
- **If the team does not identify the loss of 1-CC-P-1B** due to the pressurizer PORVs alarms that are occurring at the same time. Unit 2 will state that they have a CC low discharge pressure alarm and that 1-CC-P-1D did not automatically start 60 seconds after the event was initiated.

Facility:	Surry	Scenario No.:	3	Op-Test No.:	2008-301
Examiners:	_____	Operators:	_____	SRO	
	_____		_____	RO	
	_____		_____	BOP	
Initial Conditions:	Unit 1 is at 100% power and has been since last refueling outage. The control room instrumentation channels are selected to channel III. All systems and crossties are operable with the following exception:				
	<ul style="list-style-type: none"> #3 EDG is tagged out for major overhaul. Four days remain in the seven-day clock for both Units. 				
Turnover:	1-OP-RP-001, Aligning Control System for Performance of Channel I, II, III, and IV Process and Protection Testing is required to be performed upon relieving the shift. It has been PSA analyzed for current plant conditions.				
Event No.	Malf. No.	Event Type*	Event Description		
1	N/A	N - All	Swap controlling channels for I&C PT IAW 1-OP-RP-001.		
2	MS0806	I - BOP/SRO TS - SRO	Controlling steam flow channel fails high.		
3	RC0801	I - RO/SRO	Median Tave fails low.		
4	SW0401 DISA_SW P10_ASTR T(2)	C - RO/SRO TS-SRO	SW-P-10A trips/SW-P-10B does not auto start		
5	N/A	R - RO/SRO	Ramp unit offline due to TS clock from previous failure		
6	TU0901 TU0902 TU0903 TU0904	M - All	Turbine limiter/governor valves fail closed		
7	RC04 DISA_IA1 01A(B)_A CL	C - RO/SRO C- BOP/SRO	70 gpm RCS leak with a failure of the containment RM to automatically swap.		
8	RC04 DISA_CH2 04A_ACL DISA_CH1 381_ACL	M - All C - BOP/SRO	SBLOCA SI will be complicated due to various Phase I isolation valves failing to close on SI.		

9	RS1401 RS1402 RC0101 DISA_CS1 01A/B/C/D _AOPEN DISA_CSP 1A/B_AST RT	M – All C- RO/SRO	LBLOCA with Hi-Hi CLS failing to actuate requiring FR-Z.1.
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(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Surry 2008-301 Scenario #3Event 1

1-OP-RP-001 (Aligning Control System for Performance of Channel I, II, III, and IV Process and Protection Testing) is required to be performed upon shift turnover to support I&C testing of Channel III instrumentation. Team will brief on the evolution prior to turnover. The RO and BOP will both be involved with multiple actions to support this evolution (e.g., MFRVs in manual, rod control in manual, etc...)

Verifiable Actions: (RO/BOP) 1-OP-RP-001 Actions

Event 2

1-MS-FT-MS-1495 fails high causing 'C' MFRV to open and 'C' SG level to go up. The BOP should take manual control of 'C' MFRV. The SRO should enter 0-AP-53.00 (Loss of Vital Instrumentation / Controls) and direct the BOP to select redundant steam flow channel and return 'C' MFRV to automatic.

Verifiable Action: (BOP) Takes manual control of 'C' MFRV.

Technical Specifications: Table 3.7.1 item 17, Table 3.7.2 item 1.e.1 (Table 3.7.3 item 2.a)

Event 3

Median Tave fails low, causing multiple alarms, demand for outward control rod motion, and a decrease in programmed pressurizer level (charging flow will decrease). RO should take manual control of control rods and charging flow. SRO should enter 0-AP-53.00, Loss of Vital Instrumentation / Controls and may enter 0-AP-1.00, Rod Control System Malfunction.

Verifiable Actions: (RO) Take manual control of control rods and charging flow.

Event 4

The running charging pump service water pump (1-SW-P-10A) will trip and the redundant charging pump service water pump will not automatically start. The RO will manually start 1-SW-P-10B.

Verifiable Action: (RO) Starts 'B' charging pump service water pump.

Technical Specification: TS 3.2 and 3.3.

Event 5

Upon review of the technical specifications associated with the failure of 1-SW-P-10A and failure of 1-SW-P-10B to automatically start, the SRO will identify a 6-hour clock to hot shutdown. The SRO will be informed from maintenance/the shift manager that the repairs of 1-SW-P-10A or 10B will not occur for approximately 8 hours. The SRO will direct a unit shutdown in accordance with 0-AP-23.00 (Rapid Load Reduction)

Verifiable Actions: (RO) Utilizes the control rods and boric acid during the ramp.
 (BOP) will operate the turbine during the load decrease.

Event 6

During the ramp a turbine limiter/governor failure occurs causing the governor valves to fail closed. The BOP will report this failure to the team and the SRO will direct a reactor trip. Upon completion of the 1-E-0 immediate actions, the SRO will transition to 1-ES-0.1.

Verifiable Actions: (All) Manual reactor trip

Event 7

An RCS leak to containment will be ramped in to approximately 70 gpm over several minutes. The team will initiate AP-16.00 (Excessive RCS Leakage) and the RO will perform the immediate actions of AP-16.00 (i.e., take manual control of charging, isolate letdown and stabilize pressurizer level). Safety injection will not be required at this time. This event will be complicated by a failure of automatic actions from a containment radiation alarm.

Verifiable Actions: (RO) Perform the immediate actions of AP-16.00.
 (BOP) – Close 1-IA-TV-101A and 1-IA-TV-101B.

Event 8

The RCS leak in containment will degrade to a LOCA requiring the manual initiation of safety injection. The team will return to 1-E-0 and manually initiate safety injection. During the performance of 1-E-0, the BOP will identify that several containment isolation valves failed to close. The BOP will close the valves in accordance with 1-E-0. As RCS pressure decreases, RCP trip criteria will be met, thus requiring the RCPs to be tripped.

Verifiable Actions: (RO) Manually initiate safety injection and trip the RCPs
 (BOP) Close containment isolation valves

Critical Task: [WOG E-1—C] Trip all RCPs within 5 minutes of reaching RCP Trip and Miniflow recirc criteria (KOA).

Actions required to accomplish:	Trip 1-RC-P-1A
	Trip 1-RC-P-1B
	Trip 1-RC-P-1C

Event 9

The LOCA will continue to degrade until it becomes a large break LOCA. When containment pressure exceeds 23 psia, HI HI CLS will be required. HI HI CLS will not automatically initiate. The team will manually initiate HI HI CLS; however, the containment spray system will not automatically re-align. The team should enter FR-Z.1 and re-align the CS system.

Verifiable Actions: (RO) Initiate HI HI CLS and re-align CS pumps and valves

Critical Task: Align CS for operation prior to the start of the OSRS pumps.
 CS provides water to the suction of the OSRS pumps to ensure adequate NPSH.

Actions required to accomplish:	Manually initiate HI HI CLS
	Start 1-CS-P-1A
	Start 1-CS-P-1B
	Open 1-CS-MOV-101A/B/C/D

SIMULATOR OPERATOR GUIDE
NRC EXAM - SCENARIO 3

Initial Conditions: IC #1 100%, MOL – Cycle 21. The unit has been at 100% power since the last refueling outage.

Pre-load malfunctions:

- **Charging pump Service Water Pump fails to automatically start.**
- **Containment radiation monitors fail to provide automatic functions.**
- **Phase I trip valves fail to close.**
-

Equipment Status/ Procedures/ Alignments/ Data Sheets/ etc.:

- **#3 EDG is tagged out for major overhaul. Four days remain in seven day TS clock for both Units.**
- **Control Room instrumentation channels are selected to Channel III.**

Turnover: Maintain full power operation.

1-OP-RP-001, Aligning Control System for Performance of Channel I, II, III, and IV Process and Protection Testing is required to be performed upon relieving the shift. It has been PSA analyzed for current plant conditions.

Event	Malf. #'s	Severity	Instructor Notes and Required Feedback
1	N/A	NA	Swap controlling channels for I&C PT IAW 1-OP-RP-001.
2	MS0806	NA	Controlling steam flow channel fails high.
3	RC0801	NA	Median Tave fails low.
4	SW0401 DISA_SW P10_ASTR T(2)	NA	SW-P-10A trips/SW-P-10B does not auto start
5	N/A	NA	Ramp unit offline due to TS clock from previous failure
6	TU0901 TU0902 TU0903 TU0904	NA	Turbine limiter/governor valves fail closed
7	RC04 DISA_IA1 01A(B)_A CL	NA	70 gpm RCS leak with a failure of the containment RM to automatically swap.
8	RC04 DISA_CH2 04A_ACL DISA_CH1 381_ACL	NA	SBLOCA SI will be complicated due to various Phase I isolation vales failing to close on SI.

SIMULATOR OPERATOR GUIDE
NRC EXAM - SCENARIO 3

9	RS1401 RS1402 RC0101 DISA_CS1 01A/B/C/D _AOPEN DISA_CSP 1A/B_AST RT		LBLOCA with Hi-Hi CLS failing to actuate requiring FR-Z.1.
END			After crew Containment Spray Flow IAW FR-Z.1.

SHIFT TURNOVER INFORMATION

OPERATING PLAN:

- The Unit has been at 100% power since last refueling outage.
- #3 EDG is tagged out for major overhaul. Four days remain in the seven day clock
- 1-OP-RP-001, Aligning Control System for Performance of Channel I, II, III, and IV Process and Protection Testing, is required to be performed upon relieving the shift. It has been PSA analyzed for current plant conditions.
- Unit 2 is at 100% Power with all systems and crossties operable.
- Maintain full power operation.

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 1

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Event Description: Swap controlling channels for I & C PT IAW 1-OP-RP-001, Aligning Control System for Performance of Channel I, II, III, and IV Process and Protection Testing.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		<p>Team will pre-brief Initial Conditions, Precautions and Limitations, and procedure prior to entering simulator.</p> <p>Prior to entering the simulator the team will be provided with the following information to aide in completion of the initial conditions prior to entering the simulator:</p> <p>3.1 All spurious or locked-in alarms have been evaluated for the channel or system <u>not</u> being tested.</p> <p>3.2 None of the following conditions exist:</p> <ul style="list-style-type: none"> • NO electrical maintenance affecting the steady conditions of the fluid process are in progress. • NO operational changes affecting the steady state conditions of the fluid process are in progress. • NO other I&C activities affecting other Vital Bus supplied instrumentation are in progress. • NO design change activities affecting Vital Buses are in progress. <p>The Precautions and Limitations are included for reference only:</p> <p>4.1 Control System may be left in aligned condition upon completion of this procedure. No Control System inputs or functions are left disabled by the performance of this procedure.</p> <p>4.2 Verification of expected plant response must be made when a Control System is swapped from AUTO to MANUAL. Verification must also be made after the controlling channel has been swapped back to AUTO.</p> <p>4.3 Control Systems for Steam Flow, Feedwater Flow, and Impulse Pressure should be aligned such that the switches are all selected to the same channel (Channel III or Channel IV).</p>
		<p>Team will be performing Section 5.3, Preparation for Channel III Testing</p>

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 1

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Event Description: Swap controlling channels for I & C PT IAW 1-OP-RP-001, Aligning Control System for Performance of Channel I, II, III, and IV Process and Protection Testing.

Cue: By Examiner.

	BOP	<p>NOTE: If this section is being used to verify correct switch alignment prior to testing, the appropriate steps may be marked N/A.</p> <p>5.3.1 Verify or place 1/TR-1-412, ΔT PROTECTION SELECTOR switch to CH 1 or CH 2 position.</p> <p>BOP will manipulate the level recorder switch on the vertical board, if required.</p>
	BOP/RO	<p>5.3.2 <u>IF</u> PZR LVL-CH SEL switch (Benchboard) is <u>NOT</u> in POSTN 1 for Channels 1 and 2, <u>THEN</u> perform Steps 5.3.3 through 5.3.6. Otherwise, enter N/A for Steps 5.3.3 through 5.3.6.</p> <p>BOP will identify that the pressurizer level channel selector switch on the benchboard is in position number 2.</p>
	RO	<p>5.3.3 Place 1-CH-FCV-1122, CHG FLOW CNTRL (1-CH-FC-1122C) or 1-CH-FCV-1122, PRZR LEVEL CNTRL (1-CH-LC-1459G), in MANUAL position.</p> <p>BOP directs: RO will place the charging flow controller in manual so that Channel III of pressurizer level control can be defeated.</p>
	BOP/RO	<p>5.3.4 Place PRZR LVL - CH SEL switch (Benchboard) to POSTN 1 for Channels 1 and 2.</p> <p>BOP will move the selector switch to position #1.</p>
	RO	<p>5.3.5 Verify or place 1-CH-FCV-1122, CHG FLOW CNTRL (1-CH-FC-1122C), in AUTO position.</p> <p>RO will place the charging flow controller back in automatic, if required.</p>
	RO	<p>5.3.6 Verify or place 1-CH-FCV-1122, PRZR LEVEL CNTRL (1-CH-LC-1459G), in AUTO position.</p> <p>RO will place the charging flow controller back in automatic, if required.</p>

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 1

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Event Description: Swap controlling channels for I & C PT IAW 1-OP-RP-001, Aligning Control System for Performance of Channel I, II, III, and IV Process and Protection Testing.

Cue: By Examiner.

	RO/BOP	<p>5.3.7 Place ROD CONT MODE SEL switch in MAN position.</p> <p>The BOP directs the RO to place Rod Control in manual.</p>
	BOP/RO	<p>5.3.8 Place STM DUMP CNTRL switch in OFF-RESET position.</p> <p>The BOP places the Steam Dump Control Switch (on benchboard) in OFF-RESET.</p>
	BOP/RO	<p>5.3.9 Place Sudden Loss Load Defeat Switch 1-CP-43-1CP101 in the DEFEAT position (Condensate Polisher NORMAL/DEFEAT switch).</p> <p>The BOP places the Condensate Polisher NORMAL/DEFEAT Switch (on benchboard) in DEFEAT.</p>
	BOP/RO	<p>CAUTION: The Feedwater Regulator valve(s) should not be placed in MANUAL unless maintenance or testing will be performed on Channel III of the particular valve.</p> <p>NOTE: With Shift Supervision permission, steps within a subsection may be performed concurrently to limit the time a Feed Regulator valve is placed in MANUAL (i.e.; all three FRVs placed in MANUAL to allow swapping of SF/FF and Turbine First Stage Impulse Channels).</p> <p>5.3.10 Verify the following switch positions. Do not manipulate switches.</p> <ul style="list-style-type: none"> • STM GEN A - FW FLOW CH SEL SWITCH in CH 476 position • STM GEN A - STM FLOW CH SEL SWITCH in CH 475 position

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 1

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Event Description: Swap controlling channels for I & C PT IAW 1-OP-RP-001, Aligning Control System for Performance of Channel I, II, III, and IV Process and Protection Testing.

Cue: By Examiner.

	BOP RO BOP/RO BOP/RO RO	<p>5.3.11 <u>IF</u> both switches are in the correct position, <u>THEN</u> enter N/A. <u>IF</u> either switch is <u>NOT</u> in the correct position, <u>THEN</u> perform the following:</p> <ol style="list-style-type: none"> Place 1-FW-FCV-1478, SG A FEED REG, in MAN position. Verify or place STM GEN A - FW FLOW CH SEL SWITCH to CH-476 position. Verify or place STM GEN A - STM FLOW CH SEL SWITCH to CH-475 position. Place 1-FW-FCV-1478, SG A FEED REG, in AUTO position. <p>With the SRO's permission the team may perform all manipulations associated with placing the MFRVs in manual at this time. As a result the MFRV may or may not be returned to automatic at this time.</p>
	BOP/RO	<p>5.3.12 Verify the following switch positions. Do not manipulate switches.</p> <ul style="list-style-type: none"> STM GEN B - FW FLOW CH SEL SWITCH in CH 486 position STM GEN B - STM FLOW CH SEL SWITCH in CH 485 position
	BOP RO BOP/RO BOP/RO RO	<p>5.3.13 <u>IF</u> both switches are in the correct position, <u>THEN</u> enter N/A. <u>IF</u> either switch is <u>NOT</u> in the correct position, <u>THEN</u> perform the following:</p> <ol style="list-style-type: none"> Place 1-FW-FCV-1488, SG B FEED REG, in MAN position. Verify or place STM GEN B - FW FLOW CH SEL SWITCH to CH-486 position. Verify or place STM GEN B - STM FLOW CH SEL SWITCH to CH-485 position. Place 1-FW-FCV-1488, SG B FEED REG, in AUTO position. <p>With the SRO's permission the team may perform all manipulations associated with placing the MFRVs in manual at this time. As a result the MFRV may or may not be returned to automatic at this time.</p>

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 1

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Event Description: Swap controlling channels for I & C PT IAW 1-OP-RP-001, Aligning Control System for Performance of Channel I, II, III, and IV Process and Protection Testing.

Cue: By Examiner.

	BOP/RO	<p>5.3.14 Verify the following switch positions. Do not manipulate switches.</p> <ul style="list-style-type: none"> • STM GEN C - FW FLOW CH SEL SWITCH in CH 496 position • STM GEN C - STM FLOW CH SEL SWITCH in CH 495 position
	<p>BOP</p> <p>RO</p> <p>BOP/RO</p> <p>BOP/RO</p> <p>RO</p>	<p>5.3.15 <u>IF</u> both switches are in the correct position, <u>THEN</u> enter N/A. <u>IF</u> either switch is <u>NOT</u> in the correct position, <u>THEN</u> perform the following:</p> <ol style="list-style-type: none"> a. Place 1-FW-FCV-1498, SG C FEED REG, in MAN position. b. Verify or place STM GEN C - FW FLOW CH SEL SWITCH to CH-496 position. c. Verify or place STM GEN C - STM FLOW CH SEL SWITCH to CH-495 position. d. Place 1-FW-FCV-1498, SG C FEED REG, in AUTO position. <p>With the SRO's permission the team may perform all manipulations associated with placing the MFRVs in manual at this time. As a result the MFRV may or may not be returned to automatic at this time.</p>
	BOP/RO	<p>5.3.16 Verify the following switch position. Do not manipulate switch.</p> <ul style="list-style-type: none"> • TURB FIRST STAGE PRESS CH SEL SWITCH in CH 4 position
	<p>BOP</p> <p>RO</p> <p>RO</p> <p>RO</p>	<p>5.3.17 <u>IF</u> switch is in the correct position, <u>THEN</u> enter N/A for this step and Steps 5.3.18 through 5.3.21. <u>IF</u> switch is <u>NOT</u> in the correct position, <u>THEN</u> perform the following:</p> <ol style="list-style-type: none"> a. Place 1-FW-FCV-1478, SG A FEED REG, in MAN position. b. Place 1-FW-FCV-1488, SG B FEED REG, in MAN position. c. Place 1-FW-FCV-1498, SG C FEED REG, in MAN position. <p>Based on the SRO's direction, the MFRVs may or may not be placed in manual at this time (as they may already be in manual).</p>

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 1

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Event Description: Swap controlling channels for I & C PT IAW 1-OP-RP-001, Aligning Control System for Performance of Channel I, II, III, and IV Process and Protection Testing.

Cue: By Examiner.

	BOP/RO	<p>5.3.18 Place TURB FIRST STAGE PRESS CH SEL SWITCH to CH 4 position.</p> <p>BOP places the First Stage Pressure Channel Selector Switch (on vertical board) in the Channel 4 position.</p>
	RO	5.3.19 Place 1-FW-FCV-1478, SG A FEED REG, in AUTO position.
	RO	5.3.20 Place 1-FW-FCV-1488, SG B FEED REG, in AUTO position.
	RO	5.3.21 Place 1-FW-FCV-1498, SG C FEED REG, in AUTO position.
	BOP	<p>NOTE: Prior to manipulating the Steam Dump Control switch, the STM DUMP MODE SEL switch must be momentarily taken to the RESET position.</p> <p>5.3.22 At the direction of Shift Supervision, place the following switches in the desired position:</p> <ul style="list-style-type: none"> a. ROD CONT MODE SEL switch b. STM DUMP CNTRL switch <p>BOP will momentarily take the Steam Dump Mode Selector Switch (on benchboard) to RESET prior to manipulating the Steam Dump Controller Switch.</p> <ul style="list-style-type: none"> c. Sudden Loss Load Defeat Switch 1-CP-43-1CP101. (Condensate Polisher NORMAL/DEFEAT switch)

End Event #1

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 2

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Event Description: Controlling Steam Flow Channel fails high ('C' SG).

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	Diagnoses failure 1-MS-FT-1495 with the following indications/alarms: Alarms: <ul style="list-style-type: none"> • 1H-E7 STM GEN 1C FW >< STM FLOW • 1F-D9 STM GEN 1C CH 4 FW < STM FLOW • 1H-G7 STM GEN 1C LVL ERROR. • 1F-G6 STM GEN 1C CH4 HI STM LINE FLOW Indications: <ul style="list-style-type: none"> • Step increase in 1C SG Steam Flow indication CH-IV • Increasing level on 'C' SG.
	SRO	Enters 0-AP-53.00 LOSS OF VITAL INSTRUMENTATION / CONTROLS
	BOP	[1] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL BOP identifies Channel III indication for steam flow is NORMAL.
	BOP	[2] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION BOP takes manual control of 'C' SG feed reg valve and decreases demand (FF < SF) to restore level to program.
	SRO	NOTE: When the affected instrument/controller malfunction has been addressed by this procedure, recovery actions may continue at Step 12.
	RO	3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS – AFFECTED <ul style="list-style-type: none"> • Nuclear Instrumentation • Pressurizer Pressure control RNO: GO TO Step 6.

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 2

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Event Description: Controlling Steam Flow Channel fails high ('C' SG).

Cue: By Examiner.

	BOP	<p>6. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS – NORMAL</p> <ul style="list-style-type: none"> • Steam Pressure • Steam Flow • Feed Flow • Steam Generator Level
	BOP	<p>Determines CH IV Steam flow instrumentation for 'C' SG is NOT normal.</p> <p>Step 6. RNO</p> <p>IF the selected steam flow, steam pressure, or feed flow input to the SG Water Level Control system has failed, THEN do the following:</p>
	BOP	<p>a) Place the associated Feed Reg Valve in MANUAL.</p> <p>Verifies 'C' SG MFRV controller, 1-FW-FCV-1498, in manual</p>
	BOP	<p>b) Control SG level at program level (44%, a band may be given).</p> <p>Verifies 'C' SG NR level is returning to program level.</p>
	RO	<p>c) Select the redundant channel for affected SG(s)</p> <p>Selects Channel III Steam Flow for 'C' SG using two-position selector switch on Vertical Board 1-2 (applicant may also place the associated Steam Flow channel in Channel III).</p>
	BOP	<p>d) WHEN SG level returned to normal, THEN place the Feed Reg Valve in AUTOMATIC.</p> <p>Places 'C' SG FRV controller, 1-FW-FCV-1498, in automatic control.</p>

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 2

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Event Description: Controlling Steam Flow Channel fails high ('C' SG).

Cue: By Examiner.

	SRO	<p>Step 6. RNO (Continued)</p> <p>Perform follow-up actions:</p> <ol style="list-style-type: none"> a) Consult with Shift Manager on need to initiate ()-OP-RP-001, ALIGNING CONTROL SYSTEM FOR PERFORMANCE OF CHANNEL I, II, III, AND IV PROCESS AND PROTECTION TESTING. b) Refer to the following Tech Spec 3.7 items: <ul style="list-style-type: none"> • Table 3.7-1, 12 and 17 • Table 3.7-2, 1.c, 1.e, and 3.a • Table 3.7-3, 2.a, and 3.a <p>Determines Table 3.7-1 item 17, 3.7-2 item 1e, and 3.7.3 item 2a are applicable (place channel in trip w/in 72 hours).</p> <ol style="list-style-type: none"> c) Refer to Attachment 1. d) IF no other instrumentation failure exists, THEN GO TO Step 12.
	SRO	<p>12. Review OPT-RX-001, Rx Power Calorimetric using PCS computer program, to determine operability of calorimetric and need to perform OPT-RX-007, Shift Average Power Calculation.</p> <p>SRO/RO determines that OPT-RX-001 is impacted and OPT-RX-007 will need to be performed.</p> <p><i>If it appears that the SRO/RO will take action to perform 1-OPT-RX-007, the Unit 2 Operator will state that he will have the fourth RO perform 1-OPT-RX-007.</i></p>
	SRO	<p>13. CHECK FAILED INSTRUMENT - IS A REGULATORY GUIDE 1.97 VARIABLE (Go to Step 14 if not Reg. Guide 1.97)</p> <p><i>SRO directs STA to review Reg. Guide 1.97. The STA will report that 1-MS-FT-1495 is a Reg. Guide 1.97 component.</i></p>

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Event Description: Controlling Steam Flow Channel fails high ('C' SG).

Cue: By Examiner.

	SRO	<p>14. REVIEW CEP 99-0029, REG GUIDE 1.97 OPERABILITY, REPORTABILITY, AND ALTERNATE INDICATIONS</p> <p><i>SRO directs STA to review CEP 99-0029. The STA will report that the Reg. Guide 1.97 only requires one channel of Steam Flow indication per steam generator and no actions are required.</i></p>
	SRO	<p>15. Review the following:</p> <ul style="list-style-type: none"> • TS 3.7 <p>Determines Table 3.7-1 item 17, 3.7-2 item 1e, and 3.7.3 item 2a are applicable (place channel in trip w/in 72 hours).</p> <ul style="list-style-type: none"> • VPAP-2802 • TRM Section 3.3, Instrumentation <p><i>SRO directs STA to review VPAP-2802 and TRM Section 3.3. The STA reports he has completed these reviews and there is no impact.</i></p>
	SRO	<p>16. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"> • Shift Supervision • OMO • STA (PRA determination) • I&C <p>- END -</p>

END – Event 2

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 3

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Event Description: Median Tave Fails Low.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	Team	<p>Diagnoses failure of median Tave with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • 1H-C4, LOW TAVE FW CONTROL • 1G-F8, ROD BANK 'D' WITHDRAW • 1C-C8, PRZR HIGH LEVEL HEATERS ON <p>Indications:</p> <ul style="list-style-type: none"> • Median Tave (recorder and indicator) off-scale low • Individual Loop Taves indicating NORMAL • Control Rods stepping 'OUT' and reactor power decreasing
	SRO	Enters 0-AP-53.00 LOSS OF VITAL INSTRUMENTATION / CONTROLS
	RO	<p>[1] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL</p> <p>RO identifies individual loop Tave indications are normal</p>
	RO	<p>[2] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION</p> <p>RO takes manual control of the control rods to stop the outward rod motion and also takes manual control pressurizer level control (1-CH-FCV-1122) to maintain pressurizer level at program.</p> <p>It should be noted that charging may not be placed in manual until procedurally directed.</p>

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Event Description: Median Tave Fails Low.

Cue: By Examiner.

	SRO	NOTE: When the affected instrument/controller malfunction has been addressed by this procedure, recovery actions may continue at Step 12.
	RO	<p>3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS - AFFECTED</p> <ul style="list-style-type: none"> • Nuclear Instrumentation • Pressurizer Pressure control <p>RNO: GO TO Step 6.</p>
	BOP	<p>6. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS – NORMAL</p> <ul style="list-style-type: none"> • Steam Pressure • Steam Flow • Feed Flow • Steam Generator Level <p>Determines all SG parameters are normal for this event. Discussions may occur concerning the fact that a SG Steam Flow Channel Failure has previously occurred.</p>
	BOP	7. CHECK TURBINE FIRST STAGE PRESSURE CHANNELS – NORMAL

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Event Description: Median Tave Fails Low.

Cue: By Examiner.

	SRO	NOTE: Depending on the instrumentation failure, the Tave input to the Steam Dumps may be invalid, causing the Steam Dumps to stay open longer or never open at all.
	RO	<p>8. CHECK LOOP/MEDIAN ΔT/Tave - NORMAL</p> <p>a) Median Tave - NORMAL</p> <p>a) RNO - Do the following:</p> <p>1) Place ROD CONT MODE SEL switch in MANUAL, as required.</p> <p>RO will report that Rod Control is already in manual.</p> <p>2) Take manual control of charging, as necessary to maintain pressurizer level at program.</p> <p>RO will report that charging flow is in manual or will place charging flow in manual.</p> <p>3) Refer to Attachment 4 (Describes Tave control system)</p> <p>4) If no other instrumentation failure exists, then go to step 13.</p> <p>Goes to Step 13</p>
	SRO	<p>13. CHECK FAILED INSTRUMENT - IS A REGULATORY GUIDE 1.97 VARIABLE</p> <p><i>SRO directs STA to review Reg. Guide 1.97. The STA will report that Median Tave is not a Reg. Guide 1.97 component.</i></p> <p>13. RNO – GO TO Step 15,</p>

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 3

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Event Description: Median Tave Fails Low.

Cue: By Examiner.

	SRO	<p>15. Review the following:</p> <ul style="list-style-type: none"> • TS 3.7 • VPAP-2802 • TRM Section 3.3, Instrumentation <p><i>SRO directs STA to review VPAP-2802 and TRM Section 3.3. The STA reports that he has completed his reviews; Neither VPAP-2802 or the TRM is impacted by this failure.</i></p>
	SRO	<p>16. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"> • Shift Supervision • OMOG • STA (PRA determination) • I&C <p>- END – If Control Rods stepped out greater than 230 steps, the team will perform ARP 1G-F8. 1G-F8 Actions are contained on the next two pages.</p>

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Event Description: Median Tave Fails Low.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	RO	<p>1G-F8 (Rod Bank D Withdraw)</p> <p>1. VERIFY ALARM – ROD DEMAND POSITION GREATER THAN OR EQUAL TO 228 STEPS ON CONTROL BANK D – GP 1 DEMAND POSITION.</p> <p>Identifies that Bank D is greater than 228 steps (could be greater than 230 steps).</p>
		<p>1G-F8 (Rod Bank D Withdraw)</p> <p>2. PUT ROD CONTROL MODE SEL SWITCH IN MANUAL.</p> <p>Verifies that Rod Control is in Manual.</p>
		<p>1G-F8 (Rod Bank D Withdraw)</p> <p>3. VERIFY ROD MOTION - STOPPED</p>
		<p>1G-F8 (Rod Bank D Withdraw)</p> <p>4. CHECK BOTH CONTROL BANK D STEP COUNTERS – LESS THAN OR EQUAL TO 230 STEPS.</p> <p>If less than 230 steps proceed to Step 5.</p> <p>RNO –</p> <p>a) Step rods <u>out</u> to make both Bank D Step Counters equal. (Group step counters must be equalized by stepping out only, to prevent Rod Group Sequence Error).</p> <p>Steps Rods out as needed to equalize group step counters.</p> <p>b) Reset Bank D Step Counters to 230 steps.</p> <p>Uses a pen/pencil to reset the Bank D Step Counters to 230 steps.</p>

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Event Description: Median Tave Fails Low.

Cue: By Examiner.

		<p>1G-F8 (Rod Bank D Withdraw)</p> <p>NOTE: Rods may have to be stepped in as many as two steps below the fully withdrawn position to clear Annunciator 1G-F8.</p> <p>5. STEP CONTROL BANK D RODS IN AS NECESSARY TO CLEAR 1G-F8, ROD BANK D WITHDRAW.</p>
		<p>1G-F8 (Rod Bank D Withdraw)</p> <p>6. POSITION CONTROL BANK D RODS AS DETERMINED BY SHIFT SUPERVISION.</p>
		<p>1G-F8 (Rod Bank D Withdraw)</p> <p>NOTE: Both group step counters for Control Bank D should be the same before performing Step 7.</p> <p>7. LOCALLY CHECK THE BANK OVERLAP COUNTER – AT 384 PLUS CURRENT CONTROL BANK D DEMAND POSITION.</p> <p>Contacts a field operator to determine the bank overlap counter. $384 + 225 = 609$ $384 + 226 = 610$</p> <p><i>Field operator will report bank overlap position as indicated on the simulator.</i></p>
		<p>1G-F8 (Rod Bank D Withdraw)</p> <p>8. NOTIFY SHIFT SUPERVISION</p>

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 4

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Event Description: Charging Pump SW pump trips (1-SW-P-10A) and 1-SW-P-10B fails to automatically start.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	Team	Diagnoses failure of 1-SW-P-10A with the following indications/alarms: Alarms: <ul style="list-style-type: none"> • 1D-G5, SW or CC PPS DISCH TO CHG PPS LO PRESS Indications: <ul style="list-style-type: none"> • Neither 1-SW-P-10A or 1-SW-P-10B red running lights lit • No CH Pump SW pump flow on PCS • Running charging pump bearing temperatures increasing
	Team	Team may discuss and then manually start 1-SW-P-10B or they may initiate ARP 1D-G5, SW or CC PPS DISCH TO CH PPS LO PRESS or AP-12.00, Service Water System Abnormal Conditions.
	SRO RO	ARP 1D-G5 Actions follow (AP-12.00 Actions are contained on pages 28 –29). 1. CHECK CHG PUMP CC <u>OR</u> SW PP(S) TESTING IN PROGRESS Testing was not in progress. 1. RNO – GO TO Step 3.
		NOTE: The standby CHG Pump SW Pump will auto-start at 8 psig. 3. CHECK STANDBY CHG PUMP CC PP <u>OR</u> SW PP – AUTO STARTED 1-SW-P-10B did NOT automatically start.

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 4

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Event Description: Charging Pump SW pump trips (1-SW-P-10A) and 1-SW-P-10B fails to automatically start.

Cue: By Examiner.

		3. RNO – Do the following:
	BOP	<p>a) Locally check the CHG pump CC and SW PPs.</p> <p><i>If dispatched a field operator will report that a strong odor is coming from the motor of 1-SW-P-10A, but there is no fire. The operator will also report that 1-SW-P-10B is not running (unless the team has already started the pump), but does not see any problems with it.</i></p>
	BOP	<p>b) Monitor CHG Pump CC and SW flows on PCS (ERFCS if not removed):</p> <ul style="list-style-type: none"> • 1-CC-P-2A, F1CC003A • 1-CC-P-2B, F1CC004A • 1-SW-P-10A, F1SW007A • 1-SW-P-10B, F1SW008A <p>BOP may place the SW points on trend or may refer to the associated PCS drawing.</p>
	RO	<p>c) <u>IF</u> CHG Pump CC and SW PPs are operating normally, <u>THEN</u> do the following:</p> <p>The CHG Pump SW pumps are NOT operating normally.</p>
	RO	<p>d) <u>IF</u> CHG Pump CC and SW PPs are NOT operating normally, <u>THEN</u> do the following:</p> <p>1) Swap CHG CC or SW PPs</p> <p>RO will start 1-SW-P-10B if not previously started.</p> <p>2) <u>IF</u> standby CHG Pump CC or SW PP unavailable, <u>THEN</u> return lead pump to service.</p>
	SRO	<p>3) Submit Plant Issue and Work Request.</p> <p><i>If SM or STA is contacted, they will accept the responsibility of writing a Plant Issue and Work Request on the failed CHG Pump SW Pump.</i></p> <p>4) GO TO Step 13</p>

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 4

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Event Description: Charging Pump SW pump trips (1-SW-P-10A) and 1-SW-P-10B fails to automatically start.

Cue: By Examiner.

	SRO	<p>13. PROVIDE NOTIFICATIONS:</p> <ul style="list-style-type: none"> • OMOG • STA • SYSTEM ENGINEERING
	SRO	<p>SRO will review Technical Specifications and identify a Tech Spec 6 hour clock to HSD based TS 3.0.2, 3.2 and 3.3.</p> <p><i>If SM is contacted, he will state that the electricians have looked at both the pump motor and breaker for 1-SW-P-10A and report that it will take them about 12-16 hours to repair the motor.</i></p> <p><i>If the SM is asked, the electricians reported that the earliest #3 EDG will be ready to be returned to service is 48 hours.</i></p> <p><i>If the SM is asked for a recommended ramp rate, ask what the Unit Supervisor recommends. When authorized by the NRC, the Shift Manager will direct a 1%/minute ramp rate.</i></p>

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 4

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Event Description: Charging Pump SW pump trips (1-SW-P-10A) and 1-SW-P-10B fails to automatically start.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	Team	Team may discuss and then manually start 1-SW-P-10B or they may initiate ARP 1D-G5, SW or CC PPS DISCH TO CH PPS LO PRESS or AP-12.00, Service Water System Abnormal Conditions.
	SRO	Initiate AP-12.00, Service Water System Abnormal Conditions
	SRO	<p>NOTE:</p> <ul style="list-style-type: none"> • The maximum ΔP across MER 3 SW strainers is 5 PSID. • SW system low pressure alarms may be caused by obstructed sensing lines to pressure switches. • ΔP gage sensing lines must be able to vent water for the associated gage to be accurate.
	RO	<p>1. LOCALLY CHECK SW STRAINER ΔP - NORMAL</p> <p>a) Motorized strainers:</p> <ul style="list-style-type: none"> • 1-VS-S-1A • 1-VS-S-1B <p><i>If dispatched a field operator will report the ΔP across the strainer is 0 psid. If 1-SW-P-10B is running, the operator will report that the ΔP is 1 psid.</i></p> <p>b) CHG pump SW pump suction strainers:</p> <ul style="list-style-type: none"> • ()-SW-S-2A, ()-SW-P-10A • ()-SW-S-2B, ()-SW-P-10B <p><i>If dispatched a field operator will report the ΔP across the strainer is 0 psid.</i></p> <p><i>If dispatched a field operator will report that a strong odor is coming from the motor of 1-SW-P-10A, but there is no fire. The operator will also report that 1-SW-P-10B is not running (unless the team has already started the pump), but does not see any problems with it.</i></p>

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 4

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Event Description: Charging Pump SW pump trips (1-SW-P-10A) and 1-SW-P-10B fails to automatically start.

Cue: By Examiner.

	RO	<p>NOTE: The maximum ΔP across MER 5 SW strainers is 10 PSID.</p> <p>2. LOCALLY CHECK MER 5 SW STRAINER ΔP - NORMAL</p> <ul style="list-style-type: none"> • 1-SW-S-11 <p><i>If dispatched a field operator will report the ΔP across the strainer is 1psid, just like it was on logs.</i></p>
	RO	<p>3. CHECK CHG PUMP SERVICE WATER SYSTEM – ABNORMAL CONDITION EXISTS</p>
	RO	<p>4. VERIFY CHG PUMP SW PUMPS - AT LEAST ONE RUNNING</p> <ul style="list-style-type: none"> • (-)SW-P-10A • (-)SW-P-10B <p>4. RNO - Manually start pump.</p> <p>RO will manually start the pump if not previously started.</p>
	SRO	<p>SRO will review Technical Specifications and identify a Tech Spec 6 hour clock to HSD based TS 3.0.2, 3.2 and 3.3.</p> <p><i>If SM is contacted, he will state that the electricians have looked at both the pump motor and breaker for 1-SW-P-10A and report that it will take them about 12-16 hours to repair the motor.</i></p> <p><i>If the SM is asked, the electricians reported that the earliest #3 EDG will be ready to be returned to service is 48 hours.</i></p> <p><i>If the SM is asked for a recommended ramp rate, ask what the Unit Supervisor recommends. When authorized by the NRC, the Shift Manager will direct a 1%/minute ramp rate.</i></p>

End of Event #4

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 5

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Event Description: AP-23.00 Ramp due to Tech Spec clock for SW-P-10A & B inoperable

Cue: Following brief concerning six-hour clock to hot shutdown.

Time	Position	Applicant's Action or Behavior
		<p>0-AP-23.00, RAPID LOAD REDUCTION</p> <p>CAUTION: Conservative decision-making must be maintained during rapid load reductions. If uncertain or degrading conditions arise which could adversely affect the safety of the plant, or if any criteria in Attachment 1 is exceeded, the load reduction should be terminated by tripping the Reactor or the turbine, or both, depending on power level.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • Actions that can be completed independently of preceding steps may be performed out of sequence as directed by the SRO. • If at any time plant conditions no longer require rapid load reduction, actions should continue at Step 35. • RCS Tave must be maintained less than or equal to 577°F and RCS pressure must be maintained greater than or equal to 2205 psig. • Tech Spec 3.12.F.1 should be reviewed if either parameter is exceeded. • I & C should be contacted to provide assistance with adjusting IRPIs. • When the turbine is not being actively ramped, the REFERENCE and SETTER values must remain matched to prevent inadvertent ramp. <p>1. INITIATE PLANT LOAD REDUCTION AT 5%/MINUTE OR LESS:</p> <p>BOP a) Verify turbine valve position - NOT ON LIMITER</p> <p>The turbine is on the limiter.</p> <p>BOP a) RNO Take the turbine off the limiter.</p> <p>The SRO and BOP will ramp the turbine off the limiter. The rate of ramping off the limiter is determined by the crew.</p> <p>RO b) Insert control rods in AUTO or MANUAL as necessary to maintain Tave and Tref matched</p> <p>BOP c) Verify or place turbine in IMP IN or IMP OUT as determined by Shift Supervision</p> <p>BOP d) Adjust SETTER to desired power level</p>

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 5

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Event Description: AP-23.00 Ramp due to Tech Spec clock for SW-P-10A & B inoperable

Cue: Following brief concerning six-hour clock to hot shutdown.

	BOP	e) Adjust LOAD RATE %/MIN thumbwheel to desired ramp rate (1%/minute)
	BOP	f) Initiate Turbine load reduction using OPERATOR AUTO (pushes the white GO button)
	BOP	g) Reduce Turbine Valve Position Limiter as load decreases
		The BOP will periodically reduce the limiter setpoint during the ramp.
	SRO	2. CHECK EMERGENCY BORATION – REQUIRED TO REDUCE TAVE-TREF MISMATCH
		The team will decide to emergency borate based on the Tave – Tref difference.
	SRO	NOTE: Step 3 or Step 4 may be performed repeatedly to maintain Tref and Tave matched Δ Flux in band, and control rod position above the LO-LO insertion limit.
	RO	3. PERFORM AN EMERGENCY BORATION IAW THE FOLLOWING:
		a) Verify or raise CHG flow to greater than 75 gpm
		b) Transfer the in-service BATP to FAST
		c) Open ()-CH-MOV-()350
		d) Monitor EMRG BORATE FLOW
		• ()-CH-FI-()110
		e) After required emergency boration, perform the following:
		1) Close ()-CH-MOV-()350
		2) Transfer the in-service BATP to AUTO
		3) Restore Charging flow control to normal

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Event Description: AP-23.00 Ramp due to Tech Spec clock for SW-P-10A & B inoperable

Cue: Following brief concerning six-hour clock to hot shutdown.

	RO	<p>4. ESTABLISH A NORMAL BORATION TO MAINTAIN CONTROL ROD POSITION ABOVE THE LO-LO INSERTION LIMITS IAW ()-OP-CH-007, BLENDER OPERATIONS</p> <p>1-OP-CH-007 Boration instructions on pages 34, 35, and 36.</p>
	RO	<p>5. INCREASE SURVEILLANCE OF RCS PRESSURE</p> <p>a) Turn all PRZR heaters ON</p> <p>b) Control ramp rate to maintain RCS pressure greater than 2205 psig</p>
	BOP	6. MONITOR STEAM DUMPS FOR PROPER OPERATION
	SRO	<p>7. NOTIFY THE FOLLOWING:</p> <ul style="list-style-type: none"> • Energy Supply (MOC) • Polishing Building • Chemistry • OMOG
	SRO	<p>8. EVALUATE THE FOLLOWING:</p> <ul style="list-style-type: none"> • EPIP applicability <p><i>The Shift Manager will review EPIPs for applicability. They are not applicable.</i></p> <ul style="list-style-type: none"> • VPAP-2802, NOTIFICATIONS AND REPORTS, applicability <p><i>SRO directs STA to review VPAP-2802. The STA reports that he has completed his review of VPAP-2802 and no notifications are required.</i></p>

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Event Description: AP-23.00 Ramp due to Tech Spec clock for SW-P-10A & B inoperable

Cue: Following brief concerning six-hour clock to hot shutdown.

	SRO	*9. CHECK ISOTOPIC ANALYSIS OF RCS – REQUIRED <ul style="list-style-type: none">• Reactor power has decreased more than 15% in one hour
	SRO	10. HAVE CHEMISTRY PERFORM ISOTOPIC ANALYSIS OF RCS FOR IODINE WITHIN 2 TO 6 HOURS <i>SRO directs Chemistry to perform an isotopic analysis of the RCS in 2 to 6 hours. Chemistry will acknowledge the requirement to sample the RCS.</i>

Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 5

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Event Description: AP-23.00 Ramp due to Tech Spec clock for SW-P-10A & B inoperable

Cue: Following brief concerning six-hour clock to hot shutdown.

Time	Position	Applicant's Action or Behavior
	RO	<p>1-OP-CH-007 Actions</p> <p>RO retrieves a copy of 1-OP-CH-007.</p> <p>RO reviews the initial conditions.</p> <p>3.1 Verify Primary Grade water is available to the Blender.</p> <p>Observes PG pump is running.</p> <p>3.2 Verify at least one Boric Acid Transfer Pump is in Automatic and aligned to the Blender. <u>If</u> the boric acid flow path to the blender is unavailable, <u>THEN</u> enter N/A.</p> <p>Observes a Boric Acid Pump is in automatic and aligned to the Blender</p> <p>RO reviews the Precautions and Limitations</p> <p>4.1 Control rod position, Tave, and/or power level should be observed when making up to the RCS.</p> <p>4.2 Operation of the pressurizer heaters and spray valves should be used to equalize Boron concentration (Cb) when changing Cb.</p> <p>4.3 The blender must be frequently monitored for proper operation during the entire duration of the makeup.</p> <p>4.4 The Reactor Operator shall notify Shift Supervisor before performing any Blender evolution.</p> <p>4.5 Rapidly changing VCT level and pressure may affect RCP Seal leakoff, which should be monitored for normal response.</p> <p>4.6 Calculations involving reactivity must be independently verified.</p> <p>RO goes to Section 5.3 of the procedure.</p>

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Event Description: AP-23.00 Ramp due to Tech Spec clock for SW-P-10A & B inoperable

Cue: Following brief concerning six-hour clock to hot shutdown.

		5.3 Boration
RO		<p>CAUTION: The blender must be frequently monitored for proper operation during the entire duration of the make up.</p> <p>NOTE: This subsection will be used for the first boration of the shift. Attachment 2 will be used as a guide for further borations for the remainder of the shift.</p>
RO	5.3.1	Notify Shift Supervision of impending Boration.
	5.3.2	Place the MAKE-UP MODE CNTRL switch in the STOP position.
	5.3.3	<p>Adjust both of the following controllers for the flow rate and total gallons of Boric Acid for the boration. IF the BA FLOW CNTRL controller setpoint has previously been set, THEN enter N/A for that substep.</p> <p>a. 1-CH-FC-1113A, BA FLOW CNTRL (N/A) _____ GPM (IAW Attachment 5)</p> <p>b. 1-CH-YIC-1113, BA SUPPLY BATCH INTEGRATOR (GAL) _____ GAL</p> <ol style="list-style-type: none"> 1. Depress PRESET A Button (Controller will read the last value entered into the controller; reads in tenths of gallons.) 2. To clear PRESET A, depress the CLR Button. Enter N/A if not required. 3. Enter desired PRESET A value. Enter N/A if not required. 4. Depress ENT Button.
RO	5.3.4	Place the MAKE-UP MODE SEL switch in the BORATE position.
RO	5.3.5	Place the MAKE-UP MODE CNTRL switch in the START position.
RO	5.3.6	<p>Verify all of the following conditions.</p> <p>a. 1-CH-FCV-1113A, BORIC ACID TO BLENDER, is controlling in AUTO.</p> <p>b. 1-CH-FCV-1113B, BLENDER TO CHG PUMP, is open.</p> <p>c. 1-CH-FCV-1114A, PGW TO BLENDER, is closed.</p>

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Event Description: AP-23.00 Ramp due to Tech Spec clock for SW-P-10A & B inoperable

Cue: Following brief concerning six-hour clock to hot shutdown.

		d. 1-CH-FCV-1114B, BLENDER TO VCT, is closed.
RO		<p>CAUTION: There is potential for the Blender Integrator to lock up if the RATE function is in use at the end of make up. (Integrator lock up does not affect the Blender AUTO function.)</p> <p>NOTE: The rate of Boric Acid addition may be seen by depressing the C RATE/TOTAL Button on the Boric Acid Integrator. The total amount of Boric Acid added may be seen by depressing the C RATE/TOTAL Button again.</p>
RO	5.3.7	IF performing a unit ramp, THEN adjust Boric Acid flow on 1-CH-FC-1113A as required. Otherwise, enter N/A.
RO	5.3.8	IF it is desired to stop the Boration before the selected amount, THEN place the MAKE-UP MODE CNTRL switch in the STOP position. IF the BA SUPPLY BATCH INTEGRATOR (GAL) is used to stop the flow, THEN enter N/A for this step.
RO	5.3.9	WHEN the desired amount of makeup has been reached, THEN verify 1-CH-FCV-1113B closes.
RO	5.3.10	WHEN boration is complete, THEN do the following. IF boric acid is to remain in the Blender to support ramping the Unit, THEN enter N/A. <ul style="list-style-type: none"> a. Manually blend approximately 20 gallons to flush the boration path IAW Subsection 5.5. b. Enter N/A for Steps 5.3.11 through 5.3.14.
RO	5.3.11	Place the MAKE-UP MODE CNTRL switch in the STOP position.
RO	5.3.12	Place the MAKE-UP MODE SEL switch in the AUTO position.
RO	5.3.13	Place the MAKE-UP MODE CNTRL switch in the START position.
RO	5.3.14	Notify Shift Supervision of Blender status.

END – Event 5

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Event Description: Turbine governor valves fail closed resulting in team performing a manual reactor trip.

Cue: By Examiner (Governor Valve #4 should be at or below 20%)

Time	Position	Applicant's Action or Behavior
	Team	<p>Diagnoses failure of turbine governor valves with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • 1H-D7, STM DUMP PERM • 1H-H7, STM DUMP VV TRIP OPEN • Various steam flow annunciators <p>Indications:</p> <ul style="list-style-type: none"> • Turbine Megawatts rapidly decreasing • Loop Tave increasing • Reactor Power decreasing • Pressurizer level increasing • Steam flow rapidly decreasing
	SRO	Direct RO to perform the Immediate Actions of E-0, REACTOR TRIP OR SAFETY INJECTION
	RO	<p>[1] VERIFY REACTOR TRIP:</p> <p>a) Manually trip reactor</p> <p>Pushes the reactor trip push buttons.</p> <p>b) Check the following:</p> <ul style="list-style-type: none"> • All Rods On Bottom light – LIT • Reactor trip and bypass breakers – OPEN • Neutron flux - DECREASING

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Event Description: Turbine governor valves fail closed resulting in team performing a manual reactor trip.

Cue: By Examiner (Governor Valve #4 should be at or below 20%)

RO	<p>[2] VERIFY TURBINE TRIP:</p> <p>a) Manually trip the turbine</p> <p>Pushes the turbine trip push buttons.</p> <p>b) Verify all turbine stop valves - CLOSED</p> <p>c) Isolate reheaters by closing MSR steam supply SOV</p> <ul style="list-style-type: none"> • 1-MS-SOV-104 <p>d) Verify generator output breakers – OPEN (Time Delayed)</p>
RO	<p>[3] VERIFY BOTH AC EMERGENCY BUSES - ENERGIZED</p>
RO	<p>[4] CHECK IF SI INITIATED:</p> <p>a) Check if SI is actuated:</p> <ul style="list-style-type: none"> • LHSI pumps – RUNNING • SI annunciators – LIT <ul style="list-style-type: none"> • A-F-3 SI INITIATED – TRAIN A • A-F-4 SI INITIATED – TRAIN B <p>a) RNO - Check is SI is required or imminent as indicated by any of the following:</p> <ul style="list-style-type: none"> • Low PRZR Pressure <p>Identifies that pressurizer pressure is slowly recovering (or stable).</p> <ul style="list-style-type: none"> • High CTMT Pressure <p>Identifies that containment pressure is stable at about 10.5 psia</p> <ul style="list-style-type: none"> • High Steamline Differential Pressure <p>Identifies that there is no steam line differential pressure.</p>

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Event Description: Turbine governor valves fail closed resulting in team performing a manual reactor trip.

Cue: By Examiner (Governor Valve #4 should be at or below 20%)

	SRO	<ul style="list-style-type: none"> • High Steam Line Flow with Low Tave or Low Line Pressure <p>Identifies no steam flow indicated and determines that SI is not required.</p> <p><u>IF</u> SI is <u>NOT</u> required, <u>THEN</u> GO TO 1-ES-0.1, REACTOR TRIP RESPONSE</p>
	SRO	<p>The team will hold a transition brief. During the brief it will be identified that all the governor valves failed closed for an unknown reason.</p> <p><i>The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.</i></p> <p>Following the brief the team will transition to 1-ES-0.1. The team may dispatch personnel to investigate the cause of the governor valve failures.</p>
	SRO	SRO initiates 1-ES-0.1

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Event Description: Turbine governor valves fail closed resulting in team performing a manual reactor trip.

Cue: By Examiner (Governor Valve #4 should be at or below 20%)

	RO	<p>1-ES-0.1</p> <p>1. MONITOR RCS AVERAGE TEMPERATURE</p> <ul style="list-style-type: none"> • STABLE AT 547°F <p style="text-align: center;"><u>OR</u></p> <ul style="list-style-type: none"> • TRENDING TO 547°F <p>RCS temperature is trending to 547 °F</p>
	BOP	<p>1-ES-0.1</p> <p>SRO may provide the BOP with Attachment 5 of 1-ES-0.1 for guidance on AFW control.</p> <p>Actions are summarized below:</p> <ol style="list-style-type: none"> 1. Maintain minimum AFW flow of 540 gpm with RCP(s) in service until one SG Narrow Range level is greater than 12% 2. Maintain minimum AFW flow of 350 gpm with NO RCPs running until one SG Narrow Range level is greater than 12% 3. When minimum heat sink has been verified, AFW MOVs should be controlled to maintain intact SG Narrow Range levels between 22% and 50% by throttling AFW Isolation MOVs.

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Event Description: Turbine governor valves fail closed resulting in team performing a manual reactor trip.

Cue: By Examiner (Governor Valve #4 should be at or below 20%)

	BOP	<p>1-ES-0.1</p> <p>2. CHECK FW STATUS</p> <p>a) Check RCS Average temperatures – LESS THAN 554°F</p> <p>b) Verify Feed Reg valves - CLOSED</p> <p>c) Close SG FW isolation MOVs</p> <ul style="list-style-type: none"> • 1-FW-MOV-154A • 1-FW-MOV-154B • 1-FW-MOV-154C <p>BOP closed 1-FW-MOV-154A, B, C</p> <p>d) Check AFW pumps - RUNNING</p> <ul style="list-style-type: none"> • Motor Driven AFW pumps • TD AFW pump <p>e) Verify total AFW flow – GREATER THAN 540 GPM (350 W/O RCPs)</p> <p>f) Check emergency buses – BOTH ENERGIZED</p> <p>g) Control feed flow to maintain narrow range level between 22% and 50%.</p>
	RO	<p>3. VERIFY CHARGING IN SERVICE</p>
	BOP	<p>4. CHECK CC SYSTEM STATUS:</p> <p>a) Check SW to CC HXs – IN SERVICE</p> <p>b) Check CC pumps – AT LEAST ONE RUNNING</p>

Event 6 ends upon initiation of Step 2 of 1-ES-0.1.

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Event Description: 70 gpm RCS leak with failure of containment radiation monitors to initiate automatic functions. Leak rate can be increased incrementally to 100 gpm to expedite reaching the containment radiation monitor high setpoint.

Cue: Initiation of Step 2 of 1-ES-0.1.

Time	Position	Applicant's Action or Behavior
	Team	<p>Diagnoses RCS leak with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • 1D-E5 Charging PP to Regen HX High/Low Flow • 1B-A3 Containment Sump High Level <p>Indications:</p> <ul style="list-style-type: none"> • Charging Flow increasing • Pressurizer level decreasing • Pressurizer pressure decreasing <p><i>When received the Unit 2 Operator will report and silence the radiation monitor alarms associated with this event.</i></p>
	SRO	Direct initiation of AP-16.00, EXCESSIVE RCS LEAKAGE
	SRO RO	<p>Note: If SI Accumulators are isolated, 1-AP-16.01, SHUTDOWN LOCA, should be used for guidance.</p> <p>Note: RCS average temperature has a direct impact on pressurizer level.</p> <p>[1] INCREASE CHG FLOW USING 1-CH-FCV-1122 IN MANUAL TO MAINTAIN PRZR LEVEL AT PROGRAM SETPOINT, AS NECESSARY</p> <p>RO places charging in manual and maintains level at approximately 22% (immediate action).</p>

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Event Description: 70 gpm RCS leak with failure of containment radiation monitors to initiate automatic functions. Leak rate can be increased incrementally to 100 gpm to expedite reaching the containment radiation monitor high setpoint.

Cue: Initiation of Step 2 of 1-ES-0.1.

	RO	<p>[2] CHECK RCS LEAK RATE</p> <ul style="list-style-type: none"> • Pressurizer level – Decreasing (or) • Charging Flow – 25 gpm above pre-event value <p>RO estimates RCS leak rate is > 25 gpm (immediate action).</p>
	RO	<p>[3] VERIFY CLOSED OR CLOSE NORMAL AND EXCESS LETDOWN ISOLATIONS:</p> <ul style="list-style-type: none"> • 1-CH-LCV-1460A • 1-CH-LCV-1460B • 1-RC-HCV-1557A • 1-RC-HCV-1557B • 1-RC-HCV-1557C • 1-RH-HCV-1142 <p>Closes 1-CH-LCV-1460A and 1-CH-LCV-1460B (immediate action).</p>
	RO	<p>[4] VERIFY THE FOLLOWING PARAMETERS – STABLE OR INCREASING:</p> <ul style="list-style-type: none"> • PRZR Level • PRZR Pressure • RCS Subcooling <p>Identifies all parameters are stable or increasing</p>
	BOOTH	<p><i>Increase leak rate incrementally, as needed, to expedite the receipt of the containment radiation monitor high setpoint. The leak rate shall not be increased to greater than 100 gpm.</i></p>
	RO	<p>5. EVALUATE STOPPING COMPONENTS:</p> <ul style="list-style-type: none"> • CTMT Sump Pumps • CTMT Vacuum Pumps <p>SRO directs the RO to secure the pumps.</p>

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Event Description: 70 gpm RCS leak with failure of containment radiation monitors to initiate automatic functions. Leak rate can be increased incrementally to 100 gpm to expedite reaching the containment radiation monitor high setpoint.

Cue: Initiation of Step 2 of 1-ES-0.1.

	SRO	Note: Shift Supervision and STA must remain informed of RCS leak rate for EPIP applicability.
	RO	<p>*6. CHECK REACTOR TRIP – REQUIRED</p> <ul style="list-style-type: none"> • Adequate makeup not being provided by blender • Leak location • Leak Rate – GREATER THAN 50 GPM <p>The leak rate is greater than 50 gpm, so although the reactor is already tripped, the team will go to step 7.</p>
	RO	<p>7. ALIGN CHG PUMP SUCTION TO RWST</p> <p>a) Open 1-CH-MOV-1115B and 1-CH-MOV-1115D</p> <p>b) Close 1-CH-MOV-1115C and 1-CH-MOV-1115E</p>
	SRO	<p>8. GO TO 1-E-0, REACTOR TRIP OR SAFETY INJECTION</p> <p>SRO will note that upon return to 1-E-0, safety injection is not required.</p>
	BOP	<p>Initiate ARP 1-RM-R8, Containment Gas High RM Alarm</p> <p><i>If directed, the Unit 2 Operator will perform the verifications associated with ARP RM-R8. He will not perform any actions. Place keeping in the ARP will indicate what verification steps he performed.</i></p>

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Event Description: 70 gpm RCS leak with failure of containment radiation monitors to initiate automatic functions. Leak rate can be increased incrementally to 100 gpm to expedite reaching the containment radiation monitor high setpoint.

Cue: Initiation of Step 2 of 1-ES-0.1.

	BOP	<p>ARP 1-RM-R8</p> <p>CAUTION: One bank of MCR Air Bottles must be dumped immediately IAW 0-AP-22.00, 0-AP-50.00, or 1-E-0 upon receiving a valid RM alarm caused by a Fuel Handling accident.</p> <p>NOTE: If high alarm has actuated, the automatic functions associated with that monitor should be verified or performed.</p> <p>1. VERIFY ALARM - READING ON MONITOR OR CHART RECORDER GREATER THAN OR EQUAL TO HIGH SETPOINT</p> <ul style="list-style-type: none"> • 1-RM-RI-160 • 1-RM-RR-100B, Pen 4
	BOP	<p>ARP 1-RM-R8</p> <p>2. EVACUATE CTMT AS NECESSARY</p>
	BOP	<p>ARP 1-RM-R8</p> <p>3. VERIFY CTMT PURGE SYS - ISOLATED</p> <p>a) CTMT PURGE SUP - CLOSED</p> <ul style="list-style-type: none"> • 1-VS-MOV-100A • 1-VS-MOV-100B • 1-VS-MOV-100C • 1-VS-MOV-100D
	BOP	<p>b) CTMT PURGE SUP fans - STOPPED</p> <ul style="list-style-type: none"> • 1-VS-F-4A • 1-VS-F-4B
	BOP	<p>c) CTMT PURGE BYP valve - CLOSED</p> <ul style="list-style-type: none"> • 1-VS-MOV-101

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Event Description: 70 gpm RCS leak with failure of containment radiation monitors to initiate automatic functions. Leak rate can be increased incrementally to 100 gpm to expedite reaching the containment radiation monitor high setpoint.

Cue: Initiation of Step 2 of 1-ES-0.1.

		<p>ARP 1-RM-R8</p> <p><i>The Unit 2 Operator will NOT perform the remainder of this ARP. He will inform the Unit 1 SRO that he has completed as much of the ARP as possible from his side of the control room, but needs his operators to complete the remaining steps.</i></p>
	BOP	<p>4. VERIFY CTMT IA SYS ALIGNMENT</p> <ul style="list-style-type: none"> • 1-IA-TV-101A - CLOSED • 1-IA-TV-101B - CLOSED <p>RNO - Manually align CTMT IA System.</p>
	BOP	<p>ARP 1-RM-R8</p> <p>5. CHECK CTMT IA COMPR OUTSIDE SUCT - OPEN</p> <ul style="list-style-type: none"> • 1-IA-AOV-103
	BOP	<p>ARP 1-RM-R8</p> <p>6. NOTIFY HEALTH PHYSICS TO DO THE FOLLOWING:</p> <ul style="list-style-type: none"> • Verify area evacuated as necessary • Control access as necessary • Survey area as necessary • Investigate cause
	BOP	<p>ARP 1-RM-R8</p> <p>7. OPERATE VENTILATION EQUIPMENT AS NECESSARY:</p> <ul style="list-style-type: none"> • Air recirc fans • Iodine filtration fans

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Event Description: 70 gpm RCS leak with failure of containment radiation monitors to initiate automatic functions. Leak rate can be increased incrementally to 100 gpm to expedite reaching the containment radiation monitor high setpoint.

Cue: Initiation of Step 2 of 1-ES-0.1.

	BOP	<p>ARP 1-RM-R8</p> <p>8. CHECK REFUELING IN PROGRESS</p> <p>8. RNO - Do the following:</p> <p>a) IF increased RCS leakage indicated, THEN perform 1-OPT-RC-10.0, REACTOR COOLANT LEAKAGE, or 1-AP-16.00, EXCESSIVE RCS LEAKAGE, IAW Shift Supervisor direction AND GO TO Step 12.</p>
	BOP	<p>ARP 1-RM-R8</p> <p>12. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"> • Shift Supervisor • OMO • STA • Health Physics • Instrumentation Department <p>- END -</p>

End of Event 7 – Event ends upon stabilization of pressurizer level.

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Event Description: Small Break LOCA with various Phase I isolation valves failing to automatically close. SBLOCA will ramp to 1200 gpm over three minutes.

Cue: Completion of Containment Gas High Level Alarm.

Time	Position	Applicant's Action or Behavior
	Team	<p>Diagnoses increase in RCS leakage with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • 1E-F/G/H6 Pressurizer low level • 1E-F/G/H7 Pressurizer low Pressure SI <p>Indications:</p> <ul style="list-style-type: none"> • Pressurizer level decreasing • Pressurizer pressure decreasing • Actuation of Safety Injection
	SRO	SRO will direct entry into 1-E-0 and initiation of Safety Injection at Step 4.
	RO	<p>Only the performance of the high level steps 1,2, and 3 are required:</p> <p>[1] VERIFY REACTOR TRIP [2] VERIFY TURBINE TRIP [3] VERIFY BOTH AC EMERGENCY BUSES - ENERGIZED</p> <p>[4] CHECK IF SI INITIATED:</p> <p>a) Check if SI is actuated:</p> <ul style="list-style-type: none"> • LHSI pumps – RUNNING • SI annunciators – LIT <ul style="list-style-type: none"> • A-F-3 SI INITIATED – TRAIN A • A-F-4 SI INITIATED – TRAIN B <p>b) Manually initiate SI</p> <p>RO will manually initiate safety injection if an automatic safety injection has not occurred.</p>

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Event Description: Small Break LOCA with various Phase I isolation valves failing to automatically close. SBLOCA will ramp to 1200 gpm over three minutes.

Cue: Completion of Containment Gas High Level Alarm.

	SRO	<p>The team will hold a transient brief. During the brief it will be identified that SI was initiated and the RCS leak has degraded into a small break LOCA.</p> <p><i>The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal with the exception of the previously identified alarms. He will also state that containment conditions and the electrical conditions are as you see them (or as previously discussed depending on the comments from the RO/BOP).</i></p> <p>Following the brief the team will perform 1-E-0 and applicable attachments.</p>
	SRO/BOP	5. Initiate Attachment 1 (Attachment 1 actions contained on pages 54- 58)
	BOP	<p>SRO may provide the BOP with Attachment 8 of 1-E-0 for guidance on AFW control.</p> <p>Actions are summarized below:</p> <ol style="list-style-type: none"> 1. Verify SI is in progress. 2. Verify running or start 1-FW-P-2, 1-FW-P-3A, and 1-FW-P-3B. 3. Maintain minimum AFW flow of 350 gpm [450 gpm] until one SG Narrow Range level is greater than 12% 4. When minimum heat sink has been verified, AFW MOVs should be controlled to maintain intact SG Narrow Range levels between 22% and 50% by throttling AFW Isolation MOVs.

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Event Description: Small Break LOCA with various Phase I isolation valves failing to automatically close. SBLOCA will ramp to 1200 gpm over three minutes.

Cue: Completion of Containment Gas High Level Alarm.

	RO	<p>*6. CHECK RCS AVERAGE TEMPERATURE</p> <ul style="list-style-type: none"> • STABLE AT 547°F <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • TRENDING TO 547°F <p>The team will identify that RCS temperature is decreasing. The team should attribute this to the injection of SI into the RCS and AFW flow to the SGs. It is acceptable for the team to enter the RNO portion of this step and perform the applicable steps (summarized below):</p> <ul style="list-style-type: none"> Stop dumping steam Reduce AFW flow to the SG Close MSTVs if cooldown continues
	RO	<p>7. CHECK PRZR PORVs AND SPRAY VALVES:</p> <ul style="list-style-type: none"> a) PRZR PORVs – CLOSED b) PRZR spray controls <ul style="list-style-type: none"> • Demand at Zero (or) • Controlling Pressure c) PORV block valves - AT LEAST ONE OPEN

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Event Description: Small Break LOCA with various Phase I isolation valves failing to automatically close. SBLOCA will ramp to 1200 gpm over three minutes.

Cue: Completion of Containment Gas High Level Alarm.

	SRO/RO	<p>Depending of progression through 1-E-0 and the rate of RCS pressure decrease the team may secure RCPs based on the Continuous Actions Page (CAP) of 1-E-0.</p> <p>The applicable step within the CAP is listed below.</p> <p>1. RCP TRIP CRITERIA</p> <p>Trip all RCPs if <u>BOTH</u> conditions listed below occur:</p> <p>a. Charging Pumps - AT LEAST ONE RUNNING AND FLOWING TO RCS</p> <p>b. RCS Subcooling - LESS THAN 30°F [85°F]</p> <p>The reactor operator will observe that two or three charging pumps are running and flowing to the RCS as indicated on SI flow meters. The RO will also identify that RCS subcooling is less than 30°F by indication on CETCs and by the loss of RCS Subcooling alarm.</p> <p>Critical Task: [WOG E-1—C] Trip all RCPs within 5 minutes of reaching RCP Trip and Miniflow recirc criteria (KOA).</p> <p>Time Annunciator 1G-B1 (Loss of subcooling) is reached: _____</p> <p>Time RCPs are tripped: _____</p>
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Event Description: Small Break LOCA with various Phase I isolation valves failing to automatically close. SBLOCA will ramp to 1200 gpm over three minutes.

Cue: Completion of Containment Gas High Level Alarm.

		<p><i>Step 8 is listed below as if RCS subcooling has been lost, if subcooling is not lost when this step is reached, the team will utilize the RNO and go to Step 9 to commence the diagnostic steps of 1-E-0.</i></p>
	SRO	<p>NOTE: Seal injection flow should be maintained to all RCPs.</p>
	RO	<p>*8. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:</p> <p>a) Charging Pumps – AT LEAST ONE RUNNING AND FLOWING TO RCS</p> <p>Two or three Charging pumps will be running and flowing to the RCS.</p> <p>b) RCS subcooling - LESS THAN 30°F [85°F]</p> <p>RCS subcooling will be less than 30 °F</p> <p>c) Stop all RCPs</p> <p>The RO will stop RCPs.</p> <p>d) RCS pressure - LESS THAN 1275 psig [1475 PSIG]</p> <p>If RCS pressure is less than 1275 psig the RO or BOP will close 1-CH-MOV-1275A, B, and C.</p> <p>e) Close CHG pump miniflow recirc valves:</p> <ul style="list-style-type: none"> • 1-CH-MOV-1275A • 1-CH-MOV-1275B • 1-CH-MOV-1275C <p>Critical Task: [WOG E-1—C] Trip all RCPs within 5 minutes of reaching RCP Trip and Miniflow recirc criteria (KOA).</p> <p>Time Annunciator 1G-B1 (Loss of subcooling) is reached: _____</p> <p>Time RCPs are tripped: _____</p>

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Event Description: Small Break LOCA with various Phase I isolation valves failing to automatically close. SBLOCA will ramp to 1200 gpm over three minutes.

Cue: Completion of Containment Gas High Level Alarm.

BOP	<p>9. CHECK IF SGs ARE NOT FAULTED:</p> <ul style="list-style-type: none">• Check pressures in all SGsa) STABLE OR INCREASING ANDb) GREATER THAN 100 PSIG <p>BOP will observe a slightly decreasing trend on SG pressures. This will be attributed to the RCS cooldown. The team will not transition to 1-E-2.</p>
BOP SRO	<p>10. CHECK IF SG TUBES ARE NOT RUPTURED:</p> <ul style="list-style-type: none">• Condenser air ejector radiation – NORMAL• SG blowdown radiation – NORMAL• SG MS radiation – NORMAL• TD AFW pump exhaust radiation – NORMAL• SG NR Level - NOT INCREASING IN AN UNCONTROLLED MANNER <p>BOP should observe no abnormalities with Secondary Radiation.</p>
SRO/RO	<p>11. CHECK RCS - INTACT INSIDE CTMT</p> <ul style="list-style-type: none">• CTMT radiation - NORMAL• CTMT pressure - NORMAL• CTMT RS sump level - NORMAL <p>11. RNO - GO TO 1-E-1, LOSS OF REACTOR OR SECONDARY COOLANT.</p>
SRO	<p>The team will hold a transition brief. During the brief it will be identified that a LOCA is in progress and the team will transition to 1-E-1</p> <p><i>The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal with the exception of the previously identified alarms. He will also state that containment conditions and the electrical conditions are as you see them or as discussed by the RO/BOP.</i></p>

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Event Description: Small Break LOCA with various Phase I isolation valves failing to automatically close. SBLOCA will ramp to 1200 gpm over three minutes.

Cue: Completion of Containment Gas High Level Alarm.

Time	Position	Applicant's Action or Behavior
	BOP	<p>ATTACHMENT 1 OF E-0</p> <p>1. VERIFY FW ISOLATION:</p> <ul style="list-style-type: none"> • Feed pump discharge MOVs – CLOSED <ul style="list-style-type: none"> • 1-FW-MOV-150A • 1-FW-MOV-150B • MFW pumps – TRIPPED • Feed REG valves – CLOSED • SG FW bypass flow valves – DEMAND AT ZERO • SG blowdown TVs – CLOSED
	BOP	<p>2. VERIFY CTMT ISOLATION PHASE I:</p> <ul style="list-style-type: none"> • Phase I TVs – CLOSED • 1-CH-TV-1204A will be found OPEN <p>BOP will close 1-CH-TV-1204A.</p> <ul style="list-style-type: none"> • 1-CH-MOV-1381 – CLOSED <p>BOP will identify that 1-CH-MOV-1381 is OPEN and Close the valve.</p> <ul style="list-style-type: none"> • 1-SV-TV-102A – CLOSED • PAM isolation valves – CLOSED <ul style="list-style-type: none"> • 1-DA-TV-103A • 1-DA-TV-103B

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Event Description: Small Break LOCA with various Phase I isolation valves failing to automatically close. SBLOCA will ramp to 1200 gpm over three minutes.

Cue: Completion of Containment Gas High Level Alarm.

	BOP	<p>3. VERIFY AFW PUMPS RUNNING:</p> <p>a) MD AFW pumps – RUNNING (Time Delayed)</p> <p>b) TD AFW pump - RUNNING IF NECESSARY</p>
	BOP	<p>4. VERIFY SI PUMPS RUNNING:</p> <ul style="list-style-type: none"> • CHG pumps – RUNNING • LHSI pumps - RUNNING
	BOP	<p>5. CHECK CHG PUMP AUXILIARIES:</p> <ul style="list-style-type: none"> • CHG pump CC pump – RUNNING • CHG pump SW pump - RUNNING
	BOP	<p>6. CHECK INTAKE CANAL:</p> <ul style="list-style-type: none"> • Level - GREATER THAN 24 FT • Level - BEING MAINTAINED BY CIRC WATER PUMPS
	BOP	<p>7. CHECK IF MAIN STEAMLINES SHOULD BE ISOLATED:</p> <p>a) Check if ANY of the following annunciators - HAVE BEEN LIT</p> <ul style="list-style-type: none"> • E-F-10 (High Steam Flow SI) • B-C-4 (Hi Hi CLS Train A) • B-C-5 (Hi Hi CLS Train B) <p>Identifies annunciators not lit and goes to step 8.</p>

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Event Description: Small Break LOCA with various Phase I isolation valves failing to automatically close. SBLOCA will ramp to 1200 gpm over three minutes.

Cue: Completion of Containment Gas High Level Alarm.

	BOP	<p>*8. CHECK IF CS REQUIRED:</p> <p>a) CTMT pressure – HAS EXCEEDED 23 PSIA</p> <p>Identifies pressure has not exceeded 23 or 17.7 psia and goes to step 10.</p>
	BOP	<p>*10. BLOCK LOW PRZR PRESS SI SIGNAL:</p> <p>a) Check PRZR pressure – LESS THAN 2000 psig</p> <p>b) Turn both LO PRZR PRESS & STM HDR/LINE <input type="checkbox"/>P switches to block</p> <p>c) Verify Permissive Status light C-2 - LIT</p> <p>BOP may block the low pressurizer pressure SI signal depending on current RCS pressure.</p>
	BOP	<p>*11. BLOCK LOW TAVE SI SIGNAL:</p> <p>Step may not be performed at this time (if Tave is greater than 543°F).</p> <p>a) Check RCS Tave - LESS THAN 543°F</p> <p>b) Turn both HI STM FLOW & LO TAVG OR LP switches to block</p> <p>c) Verify Permissive Status light F-1 - LIT</p>

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Event Description: Small Break LOCA with various Phase I isolation valves failing to automatically close. SBLOCA will ramp to 1200 gpm over three minutes.

Cue: Completion of Containment Gas High Level Alarm.

	BOP	<p>NOTE:</p> <ul style="list-style-type: none"> • CHG pumps should be run in the following order of priority: C, B, A. • Subsequent SI signals may be reset by re-performing Step 12. <p>12. VERIFY SI FLOW:</p> <p>a) HHSI to cold legs - FLOW INDICATED</p> <ul style="list-style-type: none"> • 1-SI-FI-1961 (NQ) • 1-SI-FI-1962 (NQ) • 1-SI-FI-1963 (NQ) • 1-SI-FI-1943 or 1-SI-FI-1943A <p>b) Check CHG pumps - THREE RUNNING</p> <p>c) Reset SI.</p> <p>d) Stop one CHG pump and out in AUTO</p> <p>e) RCS pressure - LESS THAN 185 PSIG</p> <p>RNO: e) IF two LHSI pumps are running, THEN do the following:</p> <ol style="list-style-type: none"> 1) Verify reset or reset SI. 2) Stop one LHSI pump and put in AUTO. 3) GO TO Step 13. <p>Depending on RCS pressure the BOP may or may not secure a LHSI pump.</p>
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Op-Test No.: Surry 2008 Scenario No.: 3 Event No.: 8

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Event Description: Small Break LOCA with various Phase I isolation valves failing to automatically close. SBLOCA will ramp to 1200 gpm over three minutes.

Cue: Completion of Containment Gas High Level Alarm.

	BOP	13. VERIFY TOTAL AFW FLOW - GREATER THAN 350 GPM [450 GPM]
	BOP	14. CHECK AFW MOVs - OPEN BOP will identify that all AFW MOVs are not open and will read the RNO portion of this step and manually align valves as necessary.
	BOP	15. INITIATE SI VALVE ALIGNMENT IAW ATTACHMENT 2 See attached copy of Attachment 2.
	BOP	16. INITIATE VENTILATION ALIGNMENT AND AC POWER ALIGNMENT IAW ATTACHMENT 3 See attached copy of Attachment 3: <i>Unit 2 Operator will state that Unit 2 is at 100% power (if asked)</i> <i>Unit 2 will also accept responsibility to complete Attachment 3 if it is given to Unit 2 at the point where differential pressure indications are requested.</i>

Event 8 will end upon transition to 1-E-1.

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Event Description: Large Break LOCA with Hi-Hi- CLS failing to actuate requiring transition to FR-Z.1

Cue: By Examiner, RCP Trip Criteria met, or transition to 1-E-1.

	RO	<p>2. VERIFY SW FLOW TO RS HXs – GREATER THAN 4750 GPM</p> <p>a) Check the following valves - OPEN</p> <ul style="list-style-type: none"> • 1-SW-MOV-103A, B, C, and D • 1-SW-MOV-104A, B, C, and D • 1-SW-MOV-105A, B, C, and D
	RO	<p>3. CHECK RS SYSTEM</p> <p>a) Check RWST Level – LESS THAN 60%</p> <p>RNO would be used if RWST Level was greater than 60%.</p> <p>a) RNO – Monitor RWST Level. When <60% then perform steps 3b and 3c.</p> <p>b) Check ISRS System:</p> <ol style="list-style-type: none"> 1) Check ISRS pumps - RUNNING 2) Check pump operation - NORMAL <p>c) Check OSRS System:</p> <ol style="list-style-type: none"> 1) Check OSRS pumps – RUNNING (Time Delayed) 2) Verify OSRS Valves - OPEN <ul style="list-style-type: none"> • 1-RS-MOV-155A • 1-RS-MOV-155B • 1-RS-MOV-156A • 1-RS-MOV-156B 3) Check pump operation - NORMAL
		<p>4. CHECK INTAKE CANAL LEVEL – GREATER THAN 24 FT</p>
		<p>5. VERIFY CTMT ISOLATION VALVES – CLOSED IAW ATTACHMENT 1. (Refer to Page 63 of this guide)</p>

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Event Description: Large Break LOCA with Hi-Hi- CLS failing to actuate requiring transition to FR-Z.1

Cue: By Examiner, RCP Trip Criteria met, or transition to 1-E-1.

		6. VERIFY MSTVS - CLOSED
		<p>CAUTION:</p> <ul style="list-style-type: none"> • At least one SG must be maintained available for RCS cooldown. • If all SGs are faulted, at least 60 gpm [100 gpm] feed flow should be maintained to each SG. • TD AFW pump Low Flow Shutdown Criteria <ul style="list-style-type: none"> ○ Maintain greater than or equal to 150 gpm total AFW flow when feeding two or less Steam Generators with the TD AFW Pump operating. ○ Methods that may be used to comply with this restriction: <ol style="list-style-type: none"> 1. Increasing total AAFW flow to greater than 150 gpm 2. Feeding ALL Steam Generators 3. Securing the TD AFW Pump <p>7. CHECK IF FEED FLOW SHOULD BE ISOLATED TO ANY SG(s):</p> <p>a) Check pressures in all SGs:</p> <ul style="list-style-type: none"> • ANY DECREASING IN AN UNCONTROLLED MANNER <p style="text-align: center;"><u>OR</u></p> <ul style="list-style-type: none"> • ANY SG COMPLETELY DEPRESSURIZED <p>a) RNO – GO TO STEP 8.</p>
		<p>8. VERIFY SERVICE WATER AVAILABLE:</p> <p>a) Check Intake Canal level – BEING MAINTAINED BY CIR WATER PUMPS</p> <p>b) RETURN TO procedure and step in effect</p>

End of Event 9

Scenario #3 is terminated upon completion of FR-Z.1 or upon initiation of CS flow to containment.

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Malfunction	Delay	Ramp	Trigger	Value	Final	Trigger Type
RC04 - 0 – 1200 GPM RCS Leak	N/A	0	N/A	6	100	Manual update of final value
RC0101 - Large Break LOCA	15	0	11	0	15	Manual
RS1401 - Failure of HI HI CLS Train A to automatically actuate	0	0	16	False	True	Passive
RS1402 - Failure of HI HI CLS Train B to automatically actuate	0	0	16	False	True	Passive

Enter the following REMOTE FUNCTIONS:

Remote Function	Delay	Ramp	Trigger	Value	Final	Trigger Type (Auto or Manual)
DISA_IA101A_ACL – Disable auto-close of 1-IA-TV-101A	0	0	16	Enable	Disable	Passive
DISA_IA101B_ACL – Disable auto-close of 1-IA-TV-101B	0	0	16	Enable	Disable	Passive
DISA_CH204A_ACL – Disable auto-close of 1-CH-TV-1204A	0	0	16	Enable	Disable	Passive
DISA_CH1381_ACL – Disable auto-close of 1-CH-MOV-1381	0	0	16	Enable	Disable	Passive
DISA_CS101A_AOPEN – Disable auto-open of 1-CS-MOV-101A	0	0	16	Enable	Disable	Passive
DISA_CS101B_AOPEN – Disable auto-open of 1-CS-MOV-101B	0	0	16	Enable	Disable	Passive

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DISA_CS101C_AOPEN – Disable auto-open of 1-CS- MOV-101C	0	0	16	Enable	Disable	Passive
DISA_CS101D_AOPEN – Disable auto-open of 1-CS- MOV-101D	0	0	16	Enable	Disable	Passive
DISA_CSP1A_ASTRT – Disable auto-start of 1-CS-P-1A	0	0	16	Enable	Disable	Passive
DISA_CSP1B_ASTRT – Disable auto-start of 1-CS-P-1B	0	0	16	Enable	Disable	Passive

Enter the following OVERRIDES:

Override	Delay	Ramp	Trigger	Value	Final	Trigger Type (Auto or Manual)
None.						

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TRIGGER	TYPE	DESCRIPTION
1	Manual	1-MS-FT-1495 Fails high.
3	Manual	Median Tave Fails low (Charging Flow and Rod Control in Manual).
5	Manual	Loss of 'A' Charging Pump Service Water Pump with a failure of 1-SW-P-10B to automatically start.
7	Manual	All Turbine Governor Valves fail closed over one minute.
9	Manual	RCS leak (~70 gpm).
MANUAL UPDATE	MANUAL UPDATE	Increase the size of RCS leak incrementally to ~100 gpm. DO NOT EXCEED 100 gpm until completion of Containment RM High Alarm.
MANUAL UPDATE	MANUAL UPDATE	Increase the size of RCS leak to 1200 gpm.
11	Manual	Large Break LOCA
16	Passive	Disable Auto Closure of all 1-IA-TV-101A , 1-IA-TV-101B, 1-Ch-TV-1204A, and 1-CH-MOV-1381. Also prevents automatic opening of 1-CS-MOV-101A-D and automatic starting of 1-CS-P-1A/B.

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Verify the following control room setup:

- Place the simulator in RUN and verify normal 100% power operation indications.
- Verify Red Magnets on the following components:

<input type="checkbox"/> 1-EP-BKR-15H3	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Verify 1-RM-RI-112 aligned to A/C SG and 1-RM-RI-113 aligned to B SG (magnets).
- Verify Ovation System operating.
- Reset ICCMs.
- Verify Component Switch Flags.
- Verify Brass Caps properly placed.
- Verify SG PORVs set for 1035 psig.
- Verify Rod Control Group Step Counters indicate properly.
- Verify Ovation CRT display
- Advance Charts the following charts:

Master chart advance switch

- Verify Turbine Thumb Wheel Settings @120 rpm/min and Position 6
- Verify Containment Instrument Air Compressors are on Inside Suction (all RMs reset)
- Verify all ARPs have been cleaned
- Verify CLEAN copies of the following procedures are in place:

<input type="checkbox"/> AP-53.00 (2)	<input type="checkbox"/> AP-23.00	<input type="checkbox"/> AP-16.00 (2)	<input type="checkbox"/> ARP 1G-F8
<input type="checkbox"/> E-0 (2)	<input type="checkbox"/> ES-0.1	<input type="checkbox"/> E-1	<input type="checkbox"/> ARP RM –R8
<input type="checkbox"/> FR-Z.1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> OP-CH-007	<input type="checkbox"/> Reactivity Sheet		
<input type="checkbox"/> OP-ZZ-002	<input type="checkbox"/>		
- Copy of 1-OP-RP-001 (Aligning Control Systems for Performance of Channel I, II, III, IV Process and Protection Testing).
- Verify Reactivity Placard is current.

SIMULATOR OPERATING GUIDE**Brief**

This simulator performance scenario is performed in the EVALUATION MODE. You should not direct questions to the evaluators. Otherwise, you should perform as if you were in the MCR.

Your ability to maintain a log is not being graded, but maintaining a rough log is recommended to help during briefs.

If you need to communicate with the Unit 2 operator, verbally state, "Unit 2" and an instructor will locate to the Unit 2 area and respond to you as quickly as possible.

In the unlikely event that the simulator fails such that illogical indications result, the session will be terminated. In other words, respond to what you see. If there is a problem with the simulation, the session will be terminated or adjusted as appropriate based on the specific problem.

Assign operating positions.

Ask for and answer questions.

Op-Test No.: Surry 2008**Scenario No.: 3****Page 70 of 84****SIMULATOR OPERATING GUIDE**Conduct shift turnover:

Provide normal shift turnover materials reflecting the below initial conditions:

The initial conditions have Unit #1 operating steady state at 100% power with a current boron concentration of 750 ppm. All Unit #1 systems and crossties are operable with the following exception:

- #3 EDG is tagged out for a major overhaul. Four days remain in the seven-day clock for both units.

Unit #2 is at 100% power with all systems and crossties operable.

Shift orders are to maintain 100% power on Unit #1. Shortly after assuming the watch shift orders direct performance of 1-OP-RP-001 (Aligning Control System for Performance of Channel I, II, III, and IV Process and Protection Testing) to allow for Channel III Testing on the next shift. Performance of 1-OP-RP-001 has been authorized and has been PSA analyzed for current plant conditions.

The last shift performed two 50-gallon dilutions.

When the team has accepted the shift, proceed to the Session Conduct Section.

Op-Test No.: Surry 2008**Scenario No.: 3****Page 71 of 84****SIMULATOR OPERATING GUIDE****Session Conduct:**

Ensure conditions in Simulator Set-up are established.

Ensure Trigger 16 is active prior to team entering the simulator.

Verify Exam Security has been established and ASP_AO_OFF = True.

EVENT 1 Performance of 1-OP-RP-001 (Align for CH III Testing)

Operations Supervisor/Management:

- **If contacted**, will acknowledge the completion of 1-OP-RP-001 and that all secondary controls are aligned to Channel IV and that Channel III is not selected for pressurizer level control.

Maintenance:

- **If contacted**, will state that they understand that the plant is aligned for Channel III Testing.

STA:

- **If contacted**, will acknowledge the completion of 1-OP-RP-001 and that all secondary controls are aligned to Channel IV and that Channel III is not selected for pressurizer level control

Role play as other individuals as needed.

Op-Test No.: Surry 2008**Scenario No.: 3****Page 72 of 84****SIMULATOR OPERATING GUIDE****EVENT 2 Selected Steam Flow Channel Fails High on 'C' SG**

When cued by examiner, implement Trigger #1.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of 1-MS-FT-1495. The individual(s) contacted will also acknowledge any TS LCOs and entry into AP-53.00.
- **If contacted**, will recommend to the team that channels remain as they are for now (i.e., do not perform 1-OP-RP-001 at this time).
- **If contacted**, will take responsibility for writing the WR and CR.

STA:

- **If contacted**, will acknowledge the failure of 1-MS-FT-1495. The individual(s) contacted will also acknowledge (but not confirm/deny) any TS LCOs.
- **If asked**, the STA will report that 1-MS-FT-1495 is a Reg. Guide 1.97 component. The STA will also report that upon review of CEP 99-0029 that only one channel of SG feed flow is required per SG, so no actions for Reg. Guide 1.97 are required.
- **If asked**, the STA will review VPAP-2802 and TRM Section 3.3 and report that he has completed his review and this failure does not impact these documents.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

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Maintenance:

- **If contacted**, will acknowledge instrumentation failure and commence investigations and/or efforts to place the channel in trip.

Field Operators:

- **If contacted**, field operators will report no issues at the MFRVs.

Unit 2 Operator:

- If it appears that the SRO/RO will take action to perform 1-OPT-RX-007, the Unit 2 Operator will state that he will have the fourth RO perform 1-OPT-RX-007.

Role play as other individuals as needed.

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EVENT 3 **Median Tave Fails Low**

When cued by examiner, implement Trigger #3.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of Median Tave. The individual(s) contacted will also acknowledge entry into AP-53.00.
- **If asked** concerning the shift manager desires for steam dump control, ask what the Unit Supervisor recommends and state that you will use his recommendation.
- **If asked** for the final position of Control Rods, state you would like them returned to the pre-event rod height (225 steps).
- **If contacted**, will take responsibility for writing the WR and CR.

STA:

- **If contacted**, will acknowledge the failure of Median Tave. The individual(s) contacted will also acknowledge (but not confirm/deny) any TS LCOs.
- **If asked**, the STA will report that Median Tave is NOT a Reg. Guide 1.97 component.
- **If asked**, the STA will review VPAP-2802 and TRM Section 3.3 and report that he has completed his review and this failure does not impact these documents.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

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Maintenance:

- **If contacted**, will acknowledge instrumentation failure and commence investigations and/or efforts to place the channel in trip.
- **If contacted**, will acknowledge that control rods stepped out past 230 steps.

Role play as other individuals as needed.

Op-Test No.: Surry 2008**Scenario No.: 3****Page 76 of 84****SIMULATOR OPERATING GUIDE****EVENT 4 Loss of 1-SW-P-10A and a failure of 1-SW-P-10B to Auto-Start**

When cued by examiner, implement Trigger #5.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of the 'A' Charging Pump Service Water Pump and the failure of 1-SW-P-10B to automatically start.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If contacted**, will acknowledge entry into AP-12.00.
- **If the SM is contacted**, he will state that the electricians have looked at both the pump motor and breaker for 1-SW-P-10A and report that it will take 12-16 hours to repair the motor.
- **If the SM is contacted**, he will state that the electricians reported that the earliest #3 EDG will be ready to be returned to service is 48 hours.

STA:

- **If contacted**, will acknowledge the failure of the 'A' Charging Pump Service Water Pump and the failure of 1-SW-P-10B to automatically start.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

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Field Operators:

- **If contacted**, field operators will report that there is a strong odor coming from the motor of 1-SW-P-10A, but there is no smoke nor fire.
- **If contacted**, the operator will report that 1-SW-P-10B is not running. If the pump is running by the time the operator is dispatched, he will state that the pump is running and does not see any problems with it.
- **If contacted**, a field operator will report the ΔP across the strainers is 0 psid (if the pumps are off). If 1-SW-P-10B is running he will report the ΔP is 1 psid.
- **If asked** for the ΔP across the suction strainers for 1-SW-P-10A/B the operator will state it is approximately 0 psid.
- **If asked** for the ΔP across 1-SW-S-11 the operator will state it is approximately 1 psid, just like it was on logs.

Maintenance:

- **If the electricians are contacted**, they will state that they have looked at both the pump motor and breaker for 1-SW-P-10A and report that it will take 12-16 hours to repair the motor.
- **If the electricians are contacted**, they will state that the earliest #3 EDG will be ready to be returned to service is 48 hours.

Role play as other individuals as needed.

SIMULATOR OPERATING GUIDE**EVENT 5 Ramp Due to 6-hour Clock to HSD**

BOOTH: IF IT APPEARS THAT THE TEAM WILL RAMP AT A RATE OF LESS THAN 1%/MINUTE, CONTACT THE UNIT SUPERVISOR AS THE SHIFT MANAGER AND DIRECT A 1%/MINUTE RAMP.

Operations Supervisor/Management:

- **If contacted**, will acknowledge that the failure of 1-SW-P-10A combined with #3 EDG tagged out yields a 6-hour clock to hot shutdown due to not being able to meet TS 3.2 or 3.3. The individual(s) contacted will just acknowledge (but not confirm/deny) any TS LCOs .
- **If contacted**, will acknowledge entry into AP-23.00 due to the Technical Specifications identified.
- **If asked** for a recommended ramp rate, ask what the Unit Supervisor recommends. When authorized by the NRC, the Shift Manager will direct a 1%/minute ramp rate.
- **As the Shift Manager:** If it appears that the team will ramp at a rate of less than 1%/minute, contact the Unit Supervisor and direct a 1%/minute ramp rate.

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STA:

- **If contacted**, will acknowledge that the failure of 1-SW-P-10A combined with #3 EDG tagged out yields a 6-hour clock to hot shutdown due to not being able to meet TS 3.2 or 3.3. The individual(s) contacted will just acknowledge (but not confirm/deny) any TS LCOs
- **If contacted**, will acknowledge the need to ramp at 1%/minute to HSD due to the TS identified.
- **If asked**, the STA will acknowledge the need to borate and use rods (will acknowledge the team review of OP-RX-010, if performed). If asked to perform the OP-RX-010 review, the STA will state that he is not able to at this time.
- **After directed**, the STA will report that he will review VPAP-2802 for applicability and make any required notifications.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

Maintenance:

- **If contacted**, will acknowledge the requirements to sample the RCS.

Role play as other individuals as needed.

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EVENT 6 **All Turbine Governor Valves Fails Closed**

Implement Trigger #7 when prompted by the lead examiner

Operations Supervisor/Management:

- **If contacted**, will acknowledge the unit transient caused by the turbine governor valves to fail closed and that the Steam Generator PORVs are controlling RCS temperature (unless the team utilizes the Steam Dumps in the steam pressure mode).
- **If contacted**, will acknowledge the entry into ES-0.1.

STA:

- **If asked**, will acknowledge the failure and that RCS temperature is being controlled by the Steam Generator PORVs.
- **If contacted**, will enter the control room and commence reviewing status trees and prepare for the transient brief.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

Field Operators:

- **If directed**, field operators walk down the Unit 1 turbine governor valves and report that there are no obvious problems.

Role play as other individuals as needed.

SIMULATOR OPERATING GUIDE

EVENT 7 **RCS Leakage into Containment with a Failure of a Containment RM**

When cued by examiner, implement Trigger #9. This should occur upon initiation of Step 2 of ES-0.1.

BOOTH: The initial failure will cause a leak rate of approximately 70 gpm. This leak rate (after the team stabilizes pressurizer level) can be incrementally increased to 100 gpm to expedite receipt of the Containment RM High Alarm.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the fact that an RCS leak within the capacity of a charging pump exists.
- **If contacted**, will acknowledge failure of the containment instrument air compressors to swap to outside suction and that manual action was required.
- **If asked** will take responsibility for performing EPIP actions (declarations and notifications).

Maintenance:

- **If contacted** will acknowledge the RCS leak and take appropriate actions.

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Unit 2 Operator:

- **When the Radiation Alarms actuate** the Unit 2 Operator will silence the alarms and inform the Unit 1 SRO of the alarms.
- **If asked for a Trend** the Unit 2 Operator will provide the trend as indicated by the simulator (i.e. radiation levels are rising)
- **If directed** the Unit 2 Operator will perform the verifications associated with ARP RM-R8. He will not perform any actions. Place keeping in the ARP will indicate what verification steps he performed.
- **Upon Completion of Step 3 of the ARP (RM-R8)** the Unit 2 Operator will inform the Unit 1 SRO that he has completed as much of the ARP as possible from his side of the control room, but needs his operators to complete the remaining steps.

STA:

- **If asked**, will attempt to calculate a leak rate (time permitting). He will not provide any additional information, but will report the leak rate that the team reports (i.e., “the RO stated the leak rate was...”).
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal with the exception of the containment radiation alarms. He will also state that containment conditions and the electrical conditions are as you see them.
- **If asked** will take confer with the shift manager on EPIP actions (declarations and notifications).

Role play as other individuals as needed.

SIMULATOR OPERATING GUIDE

EVENT 8 **RCS Leak Increases to 1200 gpm over Three Minutes**

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of 1-CH-TV-1204A and 1-CH-MOV-1381 to automatically close, but that they were closed in accordance with 1-E-0. He will also acknowledge the fact that the leak rate has increase and required initiation of Safety Injection.
- **If informed** will acknowledge the need to and subsequent tripping of the RCPs due to a loss of sub-cooling.

STA:

- **If informed** will acknowledge the need to and subsequent tripping of the RCPs due to a loss of sub-cooling.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal with the exception of the containment radiation alarms. He will also state that containment conditions and the electrical conditions are as you see them.

Unit 2:

- **If asked**, state Unit 2 is at 100 % power.
- State that the Attachment 3 pressure indication readings outside the operator at the controls boundary area all indicate positive pressure.
- Unit 2 will also accept responsibility to complete Attachment 3 **if it is given to Unit 2** at the point where differential pressure indications are requested.
- If asked, 0-AP-50.00, Opposite Unit Emergency, has been initiated.

Op-Test No.: Surry 2008**Scenario No.: 3****Page 84 of 84****SIMULATOR OPERATING GUIDE****EVENT 9 Large Break LOCA**

Operations Supervisor/Management:

- **If contacted**, will acknowledge the Large Break LOCA and the failure of HI HI CLS to actuate and the failure of Containment Spray to align. He will also acknowledge entry into FR-Z.1.

STA:

- **UPON IDENTIFICATION OF CS to re-align, the STA will report that the team is in an Orange Path for FR-Z.1.**

Unit 2 Operator:

- Will silence and acknowledge RM alarms associated with the LB LOCA.

The scenario will end upon reduction of spray flow initiation into containment or upon completion of 1-FR-Z.1.

Facility:	Surry	Scenario No.:	4	Op-Test No.:	2008-301
Examiners:	_____	Operators:	_____	SRO	
	_____		_____	RO	
	_____		_____	BOP	
Initial Conditions:	Unit #1 is at 65% power. All systems and crossties are operable with the following exceptions:				
	<ul style="list-style-type: none"> 1-FW-P-1A is tagged out for motor replacement. 				
Turnover:	Perform 1-OPT-FW-006, Auxiliary Feedwater MOV Test.				

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP/SRO	Perform 1-OPT-FW-006, AFW MOV Test.
2	CH2102	I – RO/SRO	VCT level channel (CH-LT-1115) fails high.
3	FW1303	I – BOP/SRO TS – SRO	SG level channel fails low ('A' SG Chan III – FW-LT-1476).
4	RC1501	C – RO/SRO TS - SRO	Master Pressure Controller output fails high.
5		R – RO/SRO TS - SRO	RCS activity above TS 3.1.D limit requires shutdown/cooldown to below 500°F within 6 hours.
6	RC2403 DISA_SI86 7C(D)_AO PEN	M - All C – RO	SGTR ('C' SG). Safety Injection will be complicated by a failure of 1-SI-MOV-1867C/D to open (SI flowpath isolation valves).
7	VSPS127_ STUCK	C – BOP/SRO	58 Fans fail to auto-start on Safety Injection.
8	MS0303 MS0601 (02)(03)	M – All C – BOP/SRO	Fault on ruptured SG ('C' SG). The fault will be complicated by a failure of the MSTVs to close in auto or manual.

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

Surry 2008-301 Scenario #4Event 1

1-OPT-FW-006 (Auxiliary Feedwater MOV Test) is required to be performed upon shift turnover to complete monthly testing of the MOVs powered from the 'H' Emergency Bus. 'J' Bus valves were completed by the previous shift.

Verifiable Action: (BOP) Opens and closes one AFW MOV per steam generator.

Event 2

VCT level channel 1-CH-LT-1115 fails high causing a VCT high level alarm and causing letdown to divert to the Primary Drain Tank. Actual VCT level will go down until divert valve 1-CH-LCV-1115A is positioned to Normal. SRO should refer to 0-AP-53.00 Attachment 6 to direct RO that Manual control of the blender will be required and automatic swap-over of the CHG pump suction from the VCT to the RWST will not function.

Verifiable Action: (RO) Places divert valve 1-CH-LCV-1115A to Norm

Event 3

The 'A' SG controlling level channel (FW-LT-1476) fails low, causing actual SG level to go up. BOP should take manual control of 'A' MFRV. The SRO will enter 0-AP-53.00 and direct the BOP and RO to defeat the failed channel and return the 'A' MFRV to automatic control.

Verifiable Action: (BOP) Places the 'A' MFRV in manual.

Technical Specification: Tables 3.7-1 items 12, 3.7-2 item 3.a, and 3.7-3 item 3.a

Event 4

The master pressure controller will fail in the high direction. This will cause the spray valves to open and the associated PORV (1-RC-PCV-1455C); both will result in lowering RCS pressure. The RO will take manual control of the MPC and/or spray valve and PORV to stop the pressure decrease. The team will enter AP-31.00 and may enter AP-53.00 prior to entry into AP-31.00. Later in the scenario (prior ramp) a time compression will occur and the master pressure controller will be repaired.

Verifiable Action: (RO) Places the master pressure control in manual and closes 1-RC-PCV-1455C.

Technical Specification: 3.1.A.6 will be applicable. 3.12. F.1 (DNB) if PZR pressure decreases less than 2205 psig.

Event 5

Chemistry reports RCS Total Specific Activity and E-bar such that 100/E-bar is exceeded (by less than 25%; DE I-131 is greater than 1.0 but less than 10.0 uCi/cc). SRO should refer to Tech Spec 3.1.D and direct unit shutdown/cooldown to less than 500 °F within 6 hours of discovery (0-AP-23.00, Rapid Load Reduction).

Verifiable Actions: (RO) Utilizes the control rods and boric acid during the ramp.
(BOP) will operate the turbine during the load decrease.

Technical Specification: 3.1.D

Event 6

A SGTR (300 gpm – ramped in to allow performance of AP-16.00, Excessive RCS Leakage) will occur on the ‘C’ SG. The team should recognize that a primary to secondary leak exists and is rapidly progressing into a SGTR. The SRO will direct implementation of 1-E-0. The RO will trip the reactor and perform the immediate actions of 1-E-0 (including SI initiation). The trip and subsequent safety injection will be complicated by a failure of 1-SI-MOV-1867C and 1-SI-MOV-1867D to open. The RO or BOP will open these valves to establish safety injection flow.

Verifiable Actions: (All) Manual reactor trip
(RO) Open 1-SI-MOV-1867C and 1-SI-MOV-1867D

Critical Task: [WOG E-0 –D] Manually actuate at least one train of SI before RCS subcooling is less than 30 °F.

Actions required to accomplish: Open 1-SI-MOV-1867C

OR

Open 1-SI-MOV-1867D

Critical Task: [SPS E-1—G] Secure one LHSI pump within 30 minutes of initiation of SI (KOA).

Actions required to accomplish: Secure 1-SI-P-1A

OR

Secure 1-SI-P-1B

Event 7

During the performance of 1-E-0 it will be identified that 1-VS-F-58A & B fans failed to auto-start during safety injection. The BOP will manually start the fans in accordance with 1-E-0.

Verifiable Actions: (BOP) Manually start 1-VS-F-58A & B in accordance with 1-E-0.

Event 8

During the performance of 1-E-0, after AFW has been isolated to the ruptured SG (i.e. SG narrow range level is greater than 12%) a fault will occur on the ruptured SG. The team will transition to 1-E-2 to isolate the faulted SG. The team will then transition to 1-E-3 and finally to 1-ECA-3.1.

Verifiable Actions: (All) ECA-3.1

All MSTVs will not automatically or manually close. The BOP will close the Main Steam Non Return Valves, thus allowing a subsequent cooldown with the intact SGs.

Verifiable Actions: (BOP) Close all Main Steam Non Return Valves

SIMULATOR OPERATOR GUIDE
NRC EXAM - SCENARIO 4

Initial Conditions: IC #1 65%, MOL – Cycle 21. The unit has been at 65% power for 4 days.

Pre-load malfunctions:

- SI-MOV-1867C/D fail to open on Safety Injection (SI flowpath isolation valves)
- 1-VS-F-58A & B fails to auto-start on Safety Injection
- Main Steam Trip Valves fail to close automatically or manually
-

Equipment Status/ Procedures/ Alignments/ Data Sheets/ etc.:

- 1-FW-P-1A is tagged out
- Control Room instrumentation channels are selected to Channel III.
-
-

Turnover: Perform 1-OPT-FW-006, Auxiliary Feedwater MOV Test, immediately after shift turnover.

Event	Malf. #'s	Severity	Instructor Notes and Required Feedback
1		NA	Perform 1-OPT-FW-006, AFW MOV Test.
2	CH2102	NA	VCT level channel (CH-LT-1115) fails high.
3	FW1303	NA	SG level channel fails low ('A' SG Chan III – FW-LT-1476).
4	RC1501	NA	Master Pressure Controller output fails high.
5	CH20	NA	RCS activity above TS 3.1.D limit requires shutdown/cooldown to below 500°F within 6 hours.
6	RC2403 DISA_SI86 7C(D)_AO PEN	NA	SGTR ('C' SG). Safety Injection will be complicated by a failure of 1-SI-MOV-1867C/D to open (SI flowpath isolation valves).
7	VSPS127_s tuck	NA	58 Fans fail to auto-start on Safety Injection.
8	MS0303 MS0601 (02)(03)	NA	Fault on ruptured SG ('C' SG). The fault will be complicated by a failure of the MSTVs to close in auto or manual.
END			

SHIFT TURNOVER INFORMATION

OPERATING PLAN:

- The Unit has been at 65% power for the last 4 days.
- Repairs of 1-FW-P-1A are underway, it is expected that the pump will be ready for return to service by the end of the shift.
- Perform 1-OPT-FW-006, Auxiliary Feedwater MOV Test immediately after shift turnover.
- Unit 2 is at 100% Power with all systems and crossties operable.
- Maintain full power operation.

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 1

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Event Description: Perform 1-OPT-FW-006, AFW MOV Test

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior									
		<p>Team will prebrief Initial Conditions, Precautions and Limitations, and procedure prior to entering simulator.</p> <p>Only the 'H' Emergency Bus valves will be tested. 'J' Bus valves were tested on a previous shift</p>									
	SRO	NOTE: Full stroke time is the interval from switch actuation until the light that was LIT at switch actuation changes to NOT LIT.									
	SRO	6.1.1 <u>IF</u> this procedure is used to prove operability of equipment after maintenance, <u>THEN</u> record the Work Order Number and Mark Number below, <u>AND</u> enter N/A in the subsections of Section 6.0 that will NOT be done. <u>IF</u> used to prove monthly operability, <u>THEN</u> enter N/A.									
	RO	<p>6.2.1 Cycle 1-FW-MOV-151E and verify full stroke. Record the time required to close and to open the MOV.</p> <p>1-FW-MOV-151E</p> <table> <thead> <tr> <th>Stroke Time</th> <th>Reference</th> <th>Acceptable Range</th> </tr> </thead> <tbody> <tr> <td>Close: _____</td> <td>20.1 sec</td> <td>17.1 - 23.1 sec</td> </tr> <tr> <td>Open: _____</td> <td>20.3 sec</td> <td>17.3 - 23.3 sec</td> </tr> </tbody> </table>	Stroke Time	Reference	Acceptable Range	Close: _____	20.1 sec	17.1 - 23.1 sec	Open: _____	20.3 sec	17.3 - 23.3 sec
Stroke Time	Reference	Acceptable Range									
Close: _____	20.1 sec	17.1 - 23.1 sec									
Open: _____	20.3 sec	17.3 - 23.3 sec									
	RO	<p>6.2.2 Return 1-FW-MOV-151E to the position as specified by Shift Supervision.</p> <p>Circle as-left position.</p> <p>OPEN / CLOSED</p>									
	RO	<p>6.2.3 Record the stopwatch SQC No. and Cal Due Date.</p> <p>SQC No.: _____ Cal Due Date: _____</p>									

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 1

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Event Description: Perform 1-OPT-FW-006, AFW MOV Test

Cue: By Examiner.

	RO	<p>6.4.1 Cycle 1-FW-MOV-151C and verify full stroke. Record the time required to close and to open the MOV.</p> <p>1-FW-MOV-151C</p> <table> <thead> <tr> <th>Stroke Time</th> <th>Reference</th> <th>Acceptable Range</th> </tr> </thead> <tbody> <tr> <td>Close: _____</td> <td>20.0 sec</td> <td>17.0 - 23.0 sec</td> </tr> <tr> <td>Open: _____</td> <td>20.1 sec</td> <td>17.1 - 23.1 sec</td> </tr> </tbody> </table>	Stroke Time	Reference	Acceptable Range	Close: _____	20.0 sec	17.0 - 23.0 sec	Open: _____	20.1 sec	17.1 - 23.1 sec
Stroke Time	Reference	Acceptable Range									
Close: _____	20.0 sec	17.0 - 23.0 sec									
Open: _____	20.1 sec	17.1 - 23.1 sec									
	RO	<p>6.4.2 Return 1-FW-MOV-151C to the position as specified by Shift Supervision.</p> <p>Circle as-left position.</p> <p>OPEN / CLOSED</p>									
	RO	<p>6.4.3 Record the stopwatch SQC No. and Cal Due Date.</p> <p>SQC No.: _____ Cal Due Date: _____</p>									
	RO	<p>6.6.1 Cycle 1-FW-MOV-151A and verify full stroke. Record the time required to close and to open the MOV.</p> <p>1-FW-MOV-151E</p> <table> <thead> <tr> <th>Stroke Time</th> <th>Reference</th> <th>Acceptable Range</th> </tr> </thead> <tbody> <tr> <td>Close: _____</td> <td>20.6 sec</td> <td>17.6 - 23.6 sec</td> </tr> <tr> <td>Open: _____</td> <td>20.8 sec</td> <td>17.7 - 23.9 sec</td> </tr> </tbody> </table>	Stroke Time	Reference	Acceptable Range	Close: _____	20.6 sec	17.6 - 23.6 sec	Open: _____	20.8 sec	17.7 - 23.9 sec
Stroke Time	Reference	Acceptable Range									
Close: _____	20.6 sec	17.6 - 23.6 sec									
Open: _____	20.8 sec	17.7 - 23.9 sec									
	RO	<p>6.6.2 Return 1-FW-MOV-151A to the position as specified by Shift Supervision.</p> <p>Circle as-left position.</p> <p>OPEN / CLOSED</p>									

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 1

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Event Description: Perform 1-OPT-FW-006, AFW MOV Test

Cue: By Examiner.

	RO	6.6.3 Record the stopwatch SQC No. and Cal Due Date. SQC No.: _____ Cal Due Date: _____
	SRO	7.1.1 Evaluate the test results by reviewing the Acceptance Criteria for the components tested. <ul style="list-style-type: none"> The valve(s) tested travel(s) full stroke within the specified acceptable range.
	SRO	7.1.2 Document the test results. (✓) ___ Satisfactory ___ Unsatisfactory
	SRO	After The Unit SRO determines Satisfactory or Unsatisfactory for the PT, the next malfunction will be implemented. All follow-on tasks will be completed by the Shift Manager.

End Event #1

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 2

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Event Description: VCT Level Channel (CH-LT-1115) fails high

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	RO	Diagnoses failure of 1-CH-LT-1115 with the following indications/alarms: Alarms: <ul style="list-style-type: none"> • 1D-G1 VCT HI-LO LVL Indications: <ul style="list-style-type: none"> • Step change in 1-CH-LI-1115 with no change in redundant level instrument 1-CH-LI-1112 • LETDOWN FLOW - DIVERTED TO BORON RECOVERY SYSTEM
	SRO	Enters 0-AP-53.00 LOSS OF VITAL INSTRUMENTATION / CONTROLS
	RO	[1] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL RO identifies Channel Step change in 1-CH-LI-1115 with no change in redundant level instrument 1-CH-LI-1112
	RO	[2] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION Places CH-LCV-1115A C/S to NORM. Note: This action may not be performed until the team initiates Attachment 6 for VCT level channel failure. Note: Actual VCT level will go down until 1-CH-LCV-1115A is positioned back to the VCT from the PDT. If actual level as sensed by LC-1112 lowers to less than 13%, 1D-H1, VCT LO-LO LVL, will annunciate, but the Charging pump suction source will NOT swap over to the RWST.

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 2

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Event Description: VCT Level Channel (CH-LT-1115) fails high

Cue: By Examiner.

	SRO	NOTE: When the affected instrument/controller malfunction has been addressed by this procedure, recovery actions may continue at Step 12.
	RO	<p>3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS – AFFECTED</p> <ul style="list-style-type: none"> • Nuclear Instrumentation • Pressurizer Pressure control <p>RNO: GO TO Step 6.</p>
	BOP	<p>6. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS – NORMAL</p> <ul style="list-style-type: none"> • Steam Pressure • Steam Flow • Feed Flow • Steam Generator Level <p>Determines all SG parameters are normal for this event.</p>
	BOP	7. CHECK TURBINE FIRST STAGE PRESSURE CHANNELS – NORMAL
	SRO	NOTE: Depending on the instrumentation failure, the Tave input to the Steam Dumps may be invalid, causing the Steam Dumps to stay open longer or never open at all.
	RO	<p>8. CHECK LOOP/MEDIAN ΔT/Tave - NORMAL</p> <ul style="list-style-type: none"> a) Median Tave - NORMAL b) Loop Tave / ΔT - NORMAL

Event Description: VCT Level Channel (CH-LT-1115) fails high

Cue: By Examiner.

	BOP	9. CHECK STEAM SYSTEM CONTROLS – NORMAL a) Steam Dumps/PORVs b) Turbine Controls c) Turbine Valve Positions d) Turbine Monitoring Lights
	RO	10. CHECK PRZR LEVEL CONTROL CHANNELS - NORMAL a) Check PRZR LVL Instrumentation - NORMAL b) Verify Pressurizer heaters – ENERGIZED c) Check Letdown – IN SERVICE d) Check PRZR level control – IN AUTOMATIC

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 2

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Event Description: VCT Level Channel (CH-LT-1115) fails high

Cue: By Examiner.

	SRO	SRO may recall previous note and is not required to perform all of Step 11. (Note prior to Step 3: When the affected instrument/controller malfunction has been addressed by this procedure, recovery actions may continue at Step 12.)
		11. CHECK PROPER OPERATION OF THE FOLLOWING INSTRUMENTS:
	RO	a) Reactor Coolant Flow Instrumentation - NORMAL
	RO	b) PRZR Pressure Protection Instrumentation – NORMAL
	RO	c) CTMT Pressure Instrumentation – NORMAL
	RO	d) RWST Level Instrumentation – NORMAL
	RO	e) VCT Level Instrumentation – NORMAL
		e) RNO – Refer to Attachment 6 (ON NEXT PAGE)
	BOP	f) Underground Fuel Oil Storage Tank Level Instrumentation – NORMAL
	RO	g) Chemical Addition Tank Level Instrumentation – NORMAL
	BOP	h) Emergency Condensate Makeup Tank Level Instrumentation – NORMAL
	BOP	i) Fire Protection and Domestic Water Tank Level Instrumentation - NORMAL

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 2

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Event Description: VCT Level Channel (CH-LT-1115) fails high

Cue: By Examiner.

	RO	<p><u>Attachment 6</u></p> <p>()-CH-LT-()115</p> <ul style="list-style-type: none"> • If ()-CH-LT-()115 fails high, ()-CH-LCV-()115A will open. Manual control of the blender will be required. Automatic swap-over of the CHG pump suction from the VCT to the RWST will not function. • ()-CH-LT-()115 provides input to the following: <ul style="list-style-type: none"> a. VCT High level divert of ()-CH-LCV-()115A to PDT at 85% b. VCT High level alarm at 82% c. Auto makeup to VCT stop at 34% d. Auto makeup to VCT start at 27% e. VCT Low level alarm at 24% f. CHG pump suction swap over to the RWST at 13% (2/2)
	SRO	<p>12. Review OPT-RX-001, Rx Power Calorimetric using PCS computer program, to determine operability of calorimetric and need to perform OPT-RX-007, Shift Average Power Calculation.</p> <p>SRO/RO determines that OPT-RX-001 is not impacted and OPT-RX-007 will not need to be performed.</p>
	SRO	<p>13. CHECK FAILED INSTRUMENT - IS A REGULATORY GUIDE 1.97 VARIABLE</p> <p><i>SRO directs STA to review Reg. Guide 1.97. The STA will report that 1-CH-LT-1115 is not a Reg. Guide 1.97 component.</i></p> <p>RNO – GO TO Step 15</p>

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 2

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Event Description: VCT Level Channel (CH-LT-1115) fails high

Cue: By Examiner.

	SRO	<p>15. Review the following:</p> <ul style="list-style-type: none"> • TS 3.7 • VPAP-2802 • TRM Section 3.3, Instrumentation <p><i>SRO directs STA to review VPAP-2802 and TRM Section 3.3. The STA reports that he has completed his reviews; VPAP-2802 and the TRM are not impacted.</i></p>
	SRO	<p>16. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"> • Shift Supervision • OMO • STA (PRA determination) • I&C <p>- END -</p>

END – Event 2

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 3

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Event Description: SG level channel FW-LT-1476 fails low ('A' SG Chan III).

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	Diagnoses channel failure with the following indications/alarms: Alarms: <ul style="list-style-type: none"> • 1H-G5 STM GEN 1A LVL ERROR • 1H-C5 STM GEN 1A Lo-Lo LVL • 1F-G7 STM GEN 1A Lo-Lo LVL CH3 Indications: <ul style="list-style-type: none"> • 1-FW-FCV-1478 respond to level channel failure by opening in automatic
	SRO	Enters 0-AP-53.00, Loss of Vital Instrumentation / Controls.
	RO	[1] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL Verifies Channel I and II are NORMAL.
	BOP	[2] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION BOP takes manual control of 'A' SG feed reg valve and decreases demand (FF < SF) to restore level to program.
	SRO	NOTE: When the affected instrument/controller malfunction has been addressed by this procedure, recovery actions may continue at Step 12.
	RO	3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS – AFFECTED <ul style="list-style-type: none"> • Nuclear Instrumentation • Pressurizer Pressure control RNO: GO TO Step 6.

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 3

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Event Description: SG level channel FW-LT-1476 fails low ('A' SG Chan III).

Cue: By Examiner.

BOP	<p>6. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS – NORMAL</p> <ul style="list-style-type: none"> • Steam Pressure • Steam Flow • Feed Flow • Steam Generator Level <p>Determines CH III Steam Generator Level instrumentation for 'A' SG is NOT normal.</p> <p>Step 6. RNO</p> <p>IF SG Level Channel III has failed, THEN do the following:</p>
RO	<p>a) Place the associated Feed Reg Valve in MANUAL.</p>
SRO	<p>b) IF manual control of Feedwater is inoperable, THEN do the following: (Not Applicable)</p> <ol style="list-style-type: none"> 1) Control SG level with Feedwater Isolation MOVs. 2) Consult with the Shift Manager concerning the need to place the MFRV on the jack. <p>c) Control SG level at program level.</p> <p>d) Main Feed Reg Valve Bypass Valves may be used for fine control of SG level.</p>

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 3

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Event Description: SG level channel FW-LT-1476 fails low ('A' SG Chan III).

Cue: By Examiner.

		<p>Step 6. RNO (Continued)</p> <p>Perform follow-up actions:</p> <p>a) Consult with Shift Manager on need to initiate ()-OP-RP-001, ALIGNING CONTROL SYSTEM FOR PERFORMANCE OF CHANNEL I, II, III, AND IV PROCESS AND PROTECTION TESTING.</p> <p>b) Refer to the following Tech Spec 3.7 items:</p> <ul style="list-style-type: none"> • Table 3.7-1, 12 and 17 • Table 3.7-2, 1.c, 1.e, and 3.a • Table 3.7-3, 2.a, and 3.a <p>Determines Table 3.7-1 item 12, Table 3.7-2 item 3.a, and Table 3.7-3 are applicable (place channel in trip w/in 72 hours).</p> <p>c) Refer to Attachment 1.</p> <p>d) IF no other instrumentation failure exists, THEN GO TO Step 12.</p>
	SRO	<p>12. Review OPT-RX-001, Rx Power Calorimetric using PCS computer program, to determine operability of calorimetric and need to perform OPT-RX-007, Shift Average Power Calculation.</p> <p>If the FRV bypass valves are manipulated, the `SRO/RO determines that OPT-RX-001 is impacted and OPT-RX-007 will need to be performed.</p> <p><i>If it appears that the SRO/RO will take action to perform 1-OPT-RX-007, the Unit 2 Operator will state that he will have the fourth RO perform 1-OPT-RX-007.</i></p>
	SRO	<p>13. CHECK FAILED INSTRUMENT - IS A REGULATORY GUIDE 1.97 VARIABLE (Go to Step 14 if not Reg. Guide 1.97)</p> <p><i>SRO directs STA to review Reg. Guide 1.97. The STA will report that 1-FW-LT-1476 is a Reg. Guide 1.97 component.</i></p>

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 3

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Event Description: SG level channel FW-LT-1476 fails low ('A' SG Chan III).

Cue: By Examiner.

	SRO	<p>14. REVIEW CEP 99-0029, REG GUIDE 1.97 OPERABILITY, REPORTABILITY, AND ALTERNATE INDICATIONS</p> <p><i>SRO directs STA to review CEP 99-0029. The STA will report that Reg. Guide 1.97 only requires one channel of SG Level indication per steam generator and no actions are required.</i></p>
	SRO	<p>15. Review the following:</p> <ul style="list-style-type: none"> • TS 3.7 • VPAP-2802 • TRM Section 3.3, Instrumentation <p><i>SRO directs STA to review VPAP-2802 and TRM Section 3.3. The STA reports he has completed these reviews and there is no impact.</i></p>
	SRO	<p>16. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"> • Shift Supervision • OMO • STA (PRA determination) • I&C <p>- END -</p>

End Event #3

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 4

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Event Description: Master Pressure Controller Output fails high.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	RO	<p>Diagnoses Master Pressure Controller failure with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • C-A8, Pressurizer Pressure Controller High Output • D-H4, Przr Sfty Valve or PORV OPEN • C-B8, Pressurizer Low Pressure <p>Indications:</p> <ul style="list-style-type: none"> • Decreasing RCS Pressure • Pressure PORV 1455C open indicating lights <p>If RCS pressure decreases below 2205 psig, Technical Specification 3.12.F will be entered. The team has 2-hours (IAW TS 3.12.F) to restore pressurizer pressure to greater than 2205 psig.</p>
	SRO	Enters 0-AP-53.00 LOSS OF VITAL INSTRUMENTATION / CONTROLS
	BOP	<p>[1] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL</p> <p>BOP identifies all pressure protection instrumentation is normal and the PORV should NOT be open</p>
	BOP	<p>[2] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION</p> <p>RO manually closes RC-PCV-1455C. RO places the Master Pressure Controller in MANUAL and reduces output to close pressurizer spray valves. RO may pre-emptively close the PORV block valve RC-MOV-1536.</p>

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 4

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Event Description: Master Pressure Controller Output fails high.

Cue: By Examiner.

	SRO	NOTE: When the affected instrument/controller malfunction has been addressed by this procedure, recovery actions may continue at Step 12.
	RO	3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS – AFFECTED <ul style="list-style-type: none"> • Nuclear Instrumentation • Pressurizer Pressure control
	RO	4. CHECK PRZR SPRAY VALVE CONTROLLERS – NORMAL
	SRO	5. GO TO THE APPROPRIATE ABNORMAL PROCEDURE <ul style="list-style-type: none"> • AP-4.00, Nuclear Instrumentation Malfunction • AP-31.00, Increasing or decreasing RCS Pressure Team transitions to AP-31.00, Increasing or decreasing RCS Pressure.
	SRO	Initiates AP-31.00, Increasing or decreasing RCS Pressure.
	SRO	NOTE: EIPs may be applicable.
	BOP	1. CHECK TURBINE LOAD - STABLE
	RO	2. CHECK RCS PRESSURE - DECREASING.

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Event Description: Master Pressure Controller Output fails high.

Cue: By Examiner.

SRO	<p>CAUTION:</p> <ul style="list-style-type: none"> • Decreasing RCS pressure will cause the OT ΔT setpoint to decrease. • A Safety Injection may occur if the unit is not tripped prior to RCS pressure decreasing below 2100 psig. <p>NOTE:</p> <ul style="list-style-type: none"> • PRZR PORV 1-RC-PCV-1455C should be declared inoperable if the Master Controller is placed in Manual. • RCS pressure decrease will cause a slight decrease in RCS Tave due to negative reactivity from the moderator pressure coefficient.
RO	<p>3. CHECK MASTER CONTROLLER RESPONSE - NORMAL FOR PLANT CONDITIONS</p> <ul style="list-style-type: none"> • 1-RC-PC-1444J <p>3. RNO – Do the following:</p> <ol style="list-style-type: none"> a) Place 1-RC-PC-1444J, PRZR PRESS MASTER CNTRL, in MANUAL. b) Decrease demand on PRZR PRESS MASTER CNTRL to raise RCS pressure.

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Event Description: Master Pressure Controller Output fails high.

Cue: By Examiner.

	RO	<p>4. CHECK RCS PRESSURE – STILL DECREASING.</p> <p>Reports RCS pressure is not decreasing.</p> <p>RNO : GO TO Step 17</p> <p>Team may answer this question as if no actions were taken in AP-53.00 (acceptable method). If so, the team will ...</p> <ol style="list-style-type: none"> 5. Verify no pressure loss through the PRZR PORVs <ol style="list-style-type: none"> a) Close or verify close PRZR PORVs b) Close Block MOV to isolate any PORV which will not close or is leaking. 6. Turn on all PRZR Heaters 7. Verify Closed or close 1-CH-HCV-1311, Aux Spray Isolation. 8. Check Aux Spray Line – Leakage Suspected 8. RNO – GO TO STEP 10 10. Place Spray Valve Controllers in Manual and adjust demand to zero. 11. Check either of the following conditions: <ul style="list-style-type: none"> o Either Spray Valve will not close o Either Spray valve is suspected of leaking 11. RNO – GO TO STEP 13 13. Check RCS Pressure – Stabilizing or increasing 14. GO TO STEP 17
	SRO	<p>17. NOTIFY THE FOLLOWING:</p> <ul style="list-style-type: none"> • OM on call • STA • Instrument Shop

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Event Description: Master Pressure Controller Output fails high.

Cue: By Examiner.

	SRO	<p>18. CHECK PRZR PORVS – EITHER INOPERABLE</p> <ul style="list-style-type: none"> • 1-RC-PCV-1455C • 1-RC-PCV-1456 <p>When it is identified that 1-RC-PCV-1455C is inoperable Technical Specification 3.1.A.6 applies. The team has one hour to close the associated block valve.</p>
	RO	<p>19. CLOSE BLOCK VALVE FOR INOPERABLE PORV</p> <ul style="list-style-type: none"> • 1-RC-MOV-1536 if 1-RC-PCV-1455C inoperable • 1-RC-MOV-1535 if 1-RC-PCV-1456 inoperable <p>SRO Exits 1-hour TS clock to close the associated block valve for an inoperable PORV (i.e., PORV is in manual).</p>
	BOP	<p>20. MAINTAIN STABLE TURBINE LOAD UNTIL PRESSURE CONTROL SYSTEM IS RETURNED TO NORMAL</p>
	BOOTH	<p>Upon initiation of the next event (Unit Ramp) Maintenance will report a time compression has occurred and the Master Pressure Controller can be returned to service.</p>

End of Event #4

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Event Description: RCS activity above TS 3.1.D limit requires shutdown/cooldown to below 500°F within 6 hours.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	SRO	<p><i>Booth: Chemistry reports E-BAR is 114% of the limit and Dose Equivalent I-131 is 3.4 μCi/ml</i></p> <ul style="list-style-type: none"> • Refers to Tech Spec 3.1.D.1. • Determines 100/E exceeded. • Determines action statement requires shutdown/cooldown less than 500 °F within 6 hours of detection. • Enters 0-AP-23.00, Rapid Load Reduction. <p><i>If the SM is asked for a recommended ramp rate, ask what the Unit Supervisor recommends. When authorized by the NRC, the Shift Manager will direct a 1%/minute ramp rate.</i></p> <p>RO may refer to Operator Aid for expected reactivity changes.</p>
	SRO	Initiates 0-AP-23.00, RAPID LOAD REDUCTION

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Event Description: RCS activity above TS 3.1.D limit requires shutdown/cooldown to below 500°F within 6 hours.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	SRO	<p>0-AP-23.00, RAPID LOAD REDUCTION</p> <p>CAUTION: Conservative decision-making must be maintained during rapid load reductions. If uncertain or degrading conditions arise which could adversely affect the safety of the plant, or if any criteria in Attachment 1 is exceeded, the load reduction should be terminated by tripping the Reactor or the turbine, or both, depending on power level.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • Actions that can be completed independently of preceding steps may be performed out of sequence as directed by the SRO. • If at any time plant conditions no longer require rapid load reduction, actions should continue at Step 35. • RCS Tave must be maintained less than or equal to 577°F and RCS pressure must be maintained greater than or equal to 2205 psig. • Tech Spec 3.12.F.1 should be reviewed if either parameter is exceeded. • I & C should be contacted to provide assistance with adjusting IRPIs. • When the turbine is not being actively ramped, the REFERENCE and SETTER values must remain matched to prevent inadvertent ramp. <p>1. INITIATE PLANT LOAD REDUCTION AT 5%/MINUTE OR LESS:</p>
	BOP	a) Verify turbine valve position - NOT ON LIMITER
	RO	b) Insert control rods in AUTO or MANUAL as necessary to maintain Tave and Tref matched
	BOP	c) Verify or place turbine in IMP IN or IMP OUT as determined by Shift Supervision
		d) Adjust SETTER to desired power level
		e) Adjust LOAD RATE %/MIN thumbwheel to desired ramp rate (1%/minute)
		f) Initiate Turbine load reduction using OPERATOR AUTO (pushes the white GO button)

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Event Description: RCS activity above TS 3.1.D limit requires shutdown/cooldown to below 500°F within 6 hours.

Cue: By Examiner.

		g) Reduce Turbine Valve Position Limiter as load decreases
	SRO	<p>2. CHECK EMERGENCY BORATION – REQUIRED TO REDUCE TAVE-TREF MISMATCH</p> <p>The team will decide to emergency borate based on the Tave – Tref difference.</p>
	SRO	<p>NOTE: Step 3 or Step 4 may be performed repeatedly to maintain Tref and Tave matched, ΔFlux in band, and control rod position above the LO-LO insertion limit.</p>
	RO	<p>3. PERFORM AN EMERGENCY BORATION IAW THE FOLLOWING:</p> <p>a) Verify or raise CHG flow to greater than 75 gpm</p> <p>b) Transfer the in-service BATP to FAST</p> <p>c) Open ()-CH-MOV-()350</p> <p>d) Monitor EMRG BORATE FLOW</p> <ul style="list-style-type: none"> • ()-CH-FI-()110 <p>e) After required emergency boration, perform the following:</p> <p>1) Close ()-CH-MOV-()350</p> <p>2) Transfer the in-service BATP to AUTO</p> <p>3) Restore Charging flow control to normal</p>
	RO	<p>4. ESTABLISH A NORMAL BORATION TO MAINTAIN CONTROL ROD POSITION ABOVE THE LO-LO INSERTION LIMITS IAW ()-OP-CH-007, BLENDER OPERATIONS</p> <p>1-OP-CH-007 Boration instructions on pages 29, 30, and 31.</p>

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Event Description: RCS activity above TS 3.1.D limit requires shutdown/cooldown to below 500°F within 6 hours.

Cue: By Examiner.

	RO	<p>5. INCREASE SURVEILLANCE OF RCS PRESSURE</p> <p>a) Turn all PRZR heaters ON</p> <p>b) Control ramp rate to maintain RCS pressure greater than 2205 psig</p>
	BOP	6. MONITOR STEAM DUMPS FOR PROPER OPERATION
	SRO	<p>7. NOTIFY THE FOLLOWING:</p> <ul style="list-style-type: none"> • Energy Supply (MOC) • Polishing Building • Chemistry • OMOG
	SRO	<p>8. EVALUATE THE FOLLOWING:</p> <ul style="list-style-type: none"> • EPIP applicability <p><i>The Shift Manager will review EPIPs for applicability. They are not applicable.</i></p> <ul style="list-style-type: none"> • VPAP-2802, NOTIFICATIONS AND REPORTS, applicability <p><i>SRO directs STA to review VPAP-2802. The STA reports that he has completed his review of VPAP-2802 and no notifications are required.</i></p>
	SRO	<p>*9. CHECK ISOTOPIC ANALYSIS OF RCS – REQUIRED</p> <ul style="list-style-type: none"> • Reactor power has decreased more than 15% in one hour
	SRO	<p>10. HAVE CHEMISTRY PERFORM ISOTOPIC ANALYSIS OF RCS FOR IODINE WITHIN 2 TO 6 HOURS</p> <p><i>SRO directs Chemistry to perform an isotopic analysis of the RCS in 2 to 6 hours. Chemistry will acknowledge the requirement to sample the RCS.</i></p>

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Event Description: RCS activity above TS 3.1.D limit requires shutdown/cooldown to below 500°F within 6 hours.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	RO	<p>1-OP-CH-007 Actions</p> <p>RO retrieves a copy of 1-OP-CH-007.</p> <p>RO reviews the initial conditions.</p> <p>3.1 Verify Primary Grade water is available to the Blender.</p> <p>Observes PG pump is running.</p> <p>3.2 Verify at least one Boric Acid Transfer Pump is in Automatic and aligned to the Blender. <u>If</u> the boric acid flow path to the blender is unavailable, <u>THEN</u> enter N/A.</p> <p>Observes a Boric Acid Pump is in automatic and aligned to the Blender</p> <p>RO reviews the Precautions and Limitations</p> <p>4.1 Control rod position, Tave, and/or power level should be observed when making up to the RCS.</p> <p>4.2 Operation of the pressurizer heaters and spray valves should be used to equalize Boron concentration (Cb) when changing Cb.</p> <p>4.3 The blender must be frequently monitored for proper operation during the entire duration of the makeup.</p> <p>4.4 The Reactor Operator shall notify Shift Supervisor before performing any Blender evolution.</p> <p>4.5 Rapidly changing VCT level and pressure may affect RCP Seal leakoff, which should be monitored for normal response.</p> <p>4.6 Calculations involving reactivity must be independently verified.</p> <p>RO goes to Section 5.3 of the procedure.</p>
	RO	<p>5.3 Boration</p> <p>CAUTION: The blender must be frequently monitored for proper operation during the entire duration of the make up.</p>

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Event Description: RCS activity above TS 3.1.D limit requires shutdown/cooldown to below 500°F within 6 hours.

Cue: By Examiner.

		<p>NOTE: This subsection will be used for the first boration of the shift. Attachment 2 will be used as a guide for further borations for the remainder of the shift.</p>
RO	5.3.1	Notify Shift Supervision of impending Boration.
	5.3.2	Place the MAKE-UP MODE CNTRL switch in the STOP position.
	5.3.3	Adjust both of the following controllers for the flow rate and total gallons of Boric Acid for the boration. IF the BA FLOW CNTRL controller setpoint has previously been set, THEN enter N/A for that substep. <ul style="list-style-type: none"> a. 1-CH-FC-1113A, BA FLOW CNTRL (N/A) _____ GPM (IAW Attachment 5) b. 1-CH-YIC-1113, BA SUPPLY BATCH INTEGRATOR (GAL) _____ GAL <ul style="list-style-type: none"> 1. Depress PRESET A Button (Controller will read the last value entered into the controller; reads in tenths of gallons.) 2. To clear PRESET A, depress the CLR Button. Enter N/A if not required. 3. Enter desired PRESET A value. Enter N/A if not required. 4. Depress ENT Button.
RO	5.3.4	Place the MAKE-UP MODE SEL switch in the BORATE position.
RO	5.3.5	Place the MAKE-UP MODE CNTRL switch in the START position.
RO	5.3.6	Verify all of the following conditions. <ul style="list-style-type: none"> a. 1-CH-FCV-1113A, BORIC ACID TO BLENDER, is controlling in AUTO. b. 1-CH-FCV-1113B, BLENDER TO CHG PUMP, is open. c. 1-CH-FCV-1114A, PGW TO BLENDER, is closed. d. 1-CH-FCV-1114B, BLENDER TO VCT, is closed.
RO		<p>CAUTION: There is potential for the Blender Integrator to lock up if the RATE function is in use at the end of make up. (Integrator lock up does not affect the Blender AUTO function.)</p>

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Event Description: RCS activity above TS 3.1.D limit requires shutdown/cooldown to below 500°F within 6 hours.

Cue: By Examiner.

		<p>NOTE: The rate of Boric Acid addition may be seen by depressing the C RATE/TOTAL Button on the Boric Acid Integrator. The total amount of Boric Acid added may be seen by depressing the C RATE/TOTAL Button again.</p>
RO	5.3.7	IF performing a unit ramp, THEN adjust Boric Acid flow on 1-CH-FC-1113A as required. Otherwise, enter N/A.
RO	5.3.8	IF it is desired to stop the Boration before the selected amount, THEN place the MAKE-UP MODE CNTRL switch in the STOP position. IF the BA SUPPLY BATCH INTEGRATOR (GAL) is used to stop the flow, THEN enter N/A for this step.
RO	5.3.9	WHEN the desired amount of makeup has been reached, THEN verify 1-CH-FCV-1113B closes.
RO	5.3.10	WHEN boration is complete, THEN do the following. IF boric acid is to remain in the Blender to support ramping the Unit, THEN enter N/A. <ul style="list-style-type: none"> a. Manually blend approximately 20 gallons to flush the boration path IAW Subsection 5.5. b. Enter N/A for Steps 5.3.11 through 5.3.14.
RO	5.3.11	Place the MAKE-UP MODE CNTRL switch in the STOP position.
RO	5.3.12	Place the MAKE-UP MODE SEL switch in the AUTO position.
RO	5.3.13	Place the MAKE-UP MODE CNTRL switch in the START position.
RO	5.3.14	Notify Shift Supervision of Blender status.

END – Event 5

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Event Description: 'C' SGTR with SI flowpath isolation valves SI-MOV-1867C & D failing to open.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	Team	<p>Diagnoses the SGTR with the following indications:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • Air Ejector Radiation Monitor Alert and High alarm • N-16 Alert • N-16 High <p>Indications:</p> <ul style="list-style-type: none"> • Decreasing pressurizer level • Decreasing RCS Pressure • Increasing charging flow • Air Ejector Counts increasing
	SRO	Direct initiation of AP-16.00, EXCESSIVE RCS LEAKAGE
	SRO RO	<p>Note: If SI Accumulators are isolated, 1-AP-16.01, SHUTDOWN LOCA, should be used for guidance.</p> <p>Note: RCS average temperature has a direct impact on pressurizer level.</p> <p>[1] INCREASE CHG FLOW USING 1-CH-FCV-1122 IN MANUAL TO MAINTAIN PRZR LEVEL AT PROGRAM SETPOINT, AS NECESSARY</p> <p>RO places charging in manual and maintains level at program (dependent on current power level) (immediate action)</p>

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Event Description: 'C' SGTR with SI flowpath isolation valves SI-MOV-1867C & D failing to open.

Cue: By Examiner.

	RO	<p>[2] CHECK RCS LEAK RATE</p> <ul style="list-style-type: none"> • Pressurizer level – Decreasing (or) • Charging Flow – 25 gpm above pre-event value <p>RO determines RCS leak rate is > 25 gpm (immediate action)</p>
	RO	<p>[3] VERIFY CLOSED OR CLOSE NORMAL AND EXCESS LETDOWN ISOLATIONS:</p> <ul style="list-style-type: none"> • 1-CH-LCV-1460A • 1-CH-LCV-1460B • 1-RC-HCV-1557A • 1-RC-HCV-1557B • 1-RC-HCV-1557C • 1-RH-HCV-1142 <p>Closes 1-CH-LCV-1460A and 1-CH-LCV-1460B (immediate action).</p>
	RO	<p>[4] VERIFY THE FOLLOWING PARAMETERS – STABLE OR INCREASING</p> <ul style="list-style-type: none"> • PRZR Level • PRZR Pressure • RCS Subcooling <p>Identifies all parameters are decreasing</p> <p>RNO</p> <p>GO TO 1-E-0, REACTOR TRIP OR SAFETY INJECTION</p>
	SRO	<p>Direct RO to perform the Immediate Actions of E-0, REACTOR TRIP OR SAFETY INJECTION</p>

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Event Description: 'C' SGTR with SI flowpath isolation valves SI-MOV-1867C & D failing to open.

Cue: By Examiner.

	RO	<p>[1] VERIFY REACTOR TRIP:</p> <p>a) Manually trip reactor</p> <p>Pushes the reactor trip push buttons.</p> <p>b) Check the following:</p> <ul style="list-style-type: none"> • All Rods On Bottom light – LIT • Reactor trip and bypass breakers – OPEN • Neutron flux - DECREASING
	RO	<p>[2] VERIFY TURBINE TRIP:</p> <p>a) Manually trip the turbine</p> <p>Pushes the turbine trip push buttons.</p> <p>b) Verify all turbine stop valves - CLOSED</p> <p>c) Isolate reheaters by closing MSR steam supply SOV</p> <ul style="list-style-type: none"> • 1-MS-SOV-104
	RO	<p>d) Verify generator output breakers – OPEN (Time Delayed)</p>
	RO	<p>[3] VERIFY BOTH AC EMERGENCY BUSES - ENERGIZED</p>

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Event Description: 'C' SGTR with SI flowpath isolation valves SI-MOV-1867C & D failing to open.

Cue: By Examiner.

	<p>RO</p> <p>RO</p>	<p>[4] CHECK IF SI INITIATED:</p> <p>a) Check if SI is actuated:</p> <ul style="list-style-type: none"> • LHSI pumps – RUNNING • SI annunciators – LIT <ul style="list-style-type: none"> • A-F-3 SI INITIATED – TRAIN A • A-F-4 SI INITIATED – TRAIN B <p>b) Manually Initiate SI</p> <p>Depresses SI Actuation buttons, to either back-up the automatic safety injection or to manually initiate safety injection.</p>
	RO	<p>Diagnose failure of SI-MOV-1867C and D to open based on no Safety Injection flow to the core.</p> <p>Manually open SI-MOV-1867C and D.</p> <p>Critical Task: [WOG E-0 –D] Manually actuate at least one train of SI before RCS subcooling is less than 30 °F.</p> <p>NOTE – Diagnosis and actions may occur at anytime after Safety Injection is initiated but must be completed before completion of Attachment 2 of E-0. The team may elect to open 1-SI-MOV-1867C and D at this time or may utilize Attachment 2.</p> <p>Attachment 2 of 1-E-0 is contained on pages 39, 40, and 41.</p>
	SRO	<p>The team will hold a transient on brief. During the brief it will be identified that SI was initiated and a SGTR exists on 'C' SG.</p> <p><i>The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal with the exception of the previously identified alarms. He will also state that containment conditions and the electrical conditions are as you see them.</i></p> <p>Following the brief the team will perform 1-E-0 and applicable attachments.</p>

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Event Description: 'C' SGTR with SI flowpath isolation valves SI-MOV-1867C & D failing to open.

Cue: By Examiner.

	SRO/BOP	5. Initiate Attachment 1 (Attachment 1 actions contained under Event 7 on pages 44-47)
	SRO/RO	SRO may direct the BOP to perform Attachment 10 of 1-E-0 for Ruptured SG Isolation and AFW Control. This may or may not be initiated at any time during the performance of E-0. Attachment 10 actions are contained on pages 42-43.
	RO	<p>*6. CHECK RCS AVERAGE TEMPERATURE</p> <ul style="list-style-type: none"> • STABLE AT 547°F <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • TRENDING TO 547°F <p>The team will identify that RCS temperature is decreasing. The team should attribute this to the injection of SI into the RCS and AFW flow to the SGs. It is acceptable for the team to enter the RNO portion of this step and perform the applicable steps (summarized below):</p> <ul style="list-style-type: none"> Stop dumping steam Reduce AFW flow to the SG Close MSTVs if cooldown continues
	RO	<p>7. CHECK PRZR PORVs AND SPRAY VALVES:</p> <ul style="list-style-type: none"> a) PRZR PORVs – CLOSED b) PRZR spray controls <ul style="list-style-type: none"> • Demand at Zero (or) • Controlling Pressure c) PORV block valves - AT LEAST ONE OPEN

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Event Description: 'C' SGTR with SI flowpath isolation valves SI-MOV-1867C & D failing to open.

Cue: By Examiner.

	<p>SRO</p> <p>RO</p>	<p>NOTE: Seal injection flow should be maintained to all RCPs.</p> <p>*8. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:</p> <p>a) Charging Pumps – AT LEAST ONE RUNNING AND FLOWING TO RCS</p> <p>Two or three Charging pumps will be running and flowing to the RCS.</p> <p>b) RCS subcooling - LESS THAN 30°F [85°F]</p> <p>RCS subcooling will NOT be less than 30 °F</p> <p>RNO for the step is to go to step 9.</p>
	BOP	<p>9. CHECK IF SGs ARE NOT FAULTED:</p> <ul style="list-style-type: none"> • Check pressures in all SGs <ul style="list-style-type: none"> a) STABLE OR INCREASING <li style="text-align: center;">AND b) GREATER THAN 100 PSIG

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Event Description: 'C' SGTR with SI flowpath isolation valves SI-MOV-1867C & D failing to open.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	SRO	<p>ATTACHMENT 2 of 1-E-0</p> <p>This attachment can be performed at any time during 1-E-0. It is a pre-emptive action, so it is not required to be performed.</p> <p>NOTE: Components previously aligned by SI termination steps, must not be realigned by this Attachment.</p>
	RO/BOP	<p>ATTACHMENT 2 of 1-E-0</p> <p>1. Verify opened or open CHG pump suction from RWST MOVs.</p> <ul style="list-style-type: none"> • 1-CH-MOV-1115B • 1-CH-MOV-1115D
	RO/BOP	<p>ATTACHMENT 2 of 1-E-0</p> <p>2. Verify closed or close CHG pump suction from VCT MOVs.</p> <ul style="list-style-type: none"> • 1-CH-MOV-1115C • 1-CH-MOV-1115E
	RO/BOP	<p>ATTACHMENT 2 of 1-E-0</p> <p>3. Verify running or start at least two CHG pumps. (listed in preferred order)</p> <ul style="list-style-type: none"> • 1-CH-P-1C • 1-CH-P-1B • 1-CH-P-1A
	RO/BOP	<p>ATTACHMENT 2 of 1-E-0</p> <p>4. Verify opened or open HHSI to cold legs MOVs.</p> <ul style="list-style-type: none"> • 1-SI-MOV-1867C • 1-SI-MOV-1867D <p>RO opens 1-SI-MOV-1867C/D if not previously opened.</p> <p>Critical Task: [WOG E-0 –D] Manually actuate at least one train of SI before RCS subcooling is less than 30 °F.</p>

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Event Description: 'C' SGTR with SI flowpath isolation valves SI-MOV-1867C & D failing to open.

Cue: By Examiner.

	RO/BOP	ATTACHMENT 2 of 1-E-0 5. Verify closed or close CHG line isolation MOVs. <ul style="list-style-type: none">• 1-CH-MOV-1289A• 1-CH-MOV-1289B
	RO/BOP	ATTACHMENT 2 of 1-E-0 6. Verify closed or close Letdown orifice isolation valves. <ul style="list-style-type: none">• 1-CH-HCV-1200A• 1-CH-HCV-1200B• 1-CH-HCV-1200C
	RO/BOP	ATTACHMENT 2 of 1-E-0 7. Verify opened or open LHSI suction from RWST MOVs. <ul style="list-style-type: none">• 1-SI-MOV-1862A• 1-SI-MOV-1862B
	RO/BOP	ATTACHMENT 2 of 1-E-0 8. Verify opened or open LHSI to cold legs MOVs. <ul style="list-style-type: none">• 1-SI-MOV-1864A• 1-SI-MOV-1864B
	RO/BOP	ATTACHMENT 2 of 1-E-0 9. Verify running or start at least one LHSI pump. <ul style="list-style-type: none">• 1-SI-P-1A• 1-SI-P-1B

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Event Description: 'C' SGTR with SI flowpath isolation valves SI-MOV-1867C & D failing to open.

Cue: By Examiner.

	RO/BOP	ATTACHMENT 2 of 1-E-0 10. Verify High Head SI flow to cold legs indicated. <ul style="list-style-type: none">• 1-SI-FI-1961• 1-SI-FI-1962• 1-SI-FI-1963• 1-SI-FI-1943 or 1-SI-FI-1943A
	RO/BOP	ATTACHMENT 2 of 1-E-0 11. IF flow not indicated, THEN manually start pumps and align valves. IF flow NOT established, THEN consult with Shift Supervision to establish another high pressure injection flow path while continuing with this procedure. <ul style="list-style-type: none">• Alternate SI to Cold legs• Hot leg injection

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Event Description: 'C' SGTR with SI flowpath isolation valves SI-MOV-1867C & D failing to open.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP/RO	ATTACHMENT 10 of 1-E-0 This attachment can be performed at any time during 1-E-0. It is a pre-emptive action, so it is not required to be performed. 1. Verify SI is in progress. If SI is not in progress, then return to procedure step in effect. BOP identifies that SI is in progress.
	BOP/RO	ATTACHMENT 10 of 1-E-0 2. Identify Ruptured SG by one of the following conditions: <ul style="list-style-type: none"> • Unexpected rise in any SG Narrow Range level • High radiation from any SG MS line monitor • High radiation from any SG Blowdown line BOP with SRO concurrence identifies 'C' SG as the ruptured SG
	BOP/RO	ATTACHMENT 10 of 1-E-0 3. Verify running or start AFW Pumps, as necessary <ul style="list-style-type: none"> • 1-FW-P-3A • 1-FW-P3B • 1-FW-P-2
	BOP/RO	ATTACHMENT 10 of 1-E-0 4. When ruptured SG Narrow Range level is greater than 12%, then isolate feed flow to ruptured SG by closing SG AFW Isolation MOVs: <ul style="list-style-type: none"> • SG C, 1-FW-MOV-151A and 1-FW-MOV-151B BOP closes 1-FW-MOV-151A/B when SG level is greater than 12% Narrow Range.

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Event Description: 'C' SGTR with SI flowpath isolation valves SI-MOV-1867C & D failing to open.

Cue: By Examiner.

	BOP/RO	<p>ATTACHMENT 10 of 1-E-0</p> <p>5. Defeat the auto open signal for the ruptured SG AFW MOVs using the following switches:</p> <ul style="list-style-type: none"> • 1-FW-43-3-AFW-S, H TRAIN DISABLE SELECTOR SWITCH • 1-FW-43-4-AFW-S, J TRAIN DISABLE SELECTOR SWITCH
	BOP/RO	<p>ATTACHMENT 10 of 1-E-0</p> <p>6. Place both of the following key switches in the DISABLE SELECTED position:</p> <ul style="list-style-type: none"> • 1-FW-43-1-AFW-E, H TRAIN AUTO OPEN ENABLE SWITCH • 1-FW-43-2-AFW-E, J TRAIN AUTO OPEN ENABLE SWITCH
	BOP/RO	<p>ATTACHMENT 10 of 1-E-0</p> <p>CAUTION: At least one SG must be maintained available for RCS cooldown.</p> <p>7. Locally close steam supply valve to the TD AFW pump:</p> <ul style="list-style-type: none"> • 1-MS-158 <p>BOP directs field operator to close 1-MS-158.</p> <p><i>The field operator will acknowledge the requirement to close 1-MS-158. The field operator will later report that 1-MS-158 is closed.</i></p>
	BOP	<p>ATTACHMENT 10 of 1-E-0</p> <p>8. Control Feed Flow to the SG IAW the following requirements:</p> <ul style="list-style-type: none"> • Minimum AFW flow is 350 gpm with SI initiated, until one SG Narrow Range level is greater than 12% • When minimum heat sink has been verified, AFW MOVs should be controlled to maintain intact SG Narrow Range levels between 22% and 50%. <ul style="list-style-type: none"> • SG A, 1-FW-MOV-151E and 1-FW-MOV-151F • SG B, 1-FW-MOV-151C and 1-FW-MOV-151DB

End of Event 6

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 7

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Event Description: Attachment 1 of E-0 with 1-VS-F-58A & B failing to auto-start on SI.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	<p>ATTACHMENT 1 OF E-0</p> <p>1. VERIFY FW ISOLATION:</p> <ul style="list-style-type: none"> • Feed pump discharge MOVs – CLOSED • 1-FW-MOV-150A • 1-FW-MOV-150B • MFW pumps – TRIPPED • Feed REG valves – CLOSED • SG FW bypass flow valves – DEMAND AT ZERO • SG blowdown TVs – CLOSED
	BOP	<p>2. VERIFY CTMT ISOLATION PHASE I:</p> <ul style="list-style-type: none"> • Phase I TVs – CLOSED • 1-CH-MOV-1381 – CLOSED • 1-SV-TV-102A – CLOSED • PAM isolation valves – CLOSED <ul style="list-style-type: none"> • 1-DA-TV-103A • 1-DA-TV-103B
	BOP	<p>3. VERIFY AFW PUMPS RUNNING:</p> <ul style="list-style-type: none"> a) MD AFW pumps – RUNNING (Time Delayed) b) TD AFW pump - RUNNING IF NECESSARY

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Event Description: Attachment 1 of E-0 with 1-VS-F-58A & B failing to auto-start on SI.

Cue: By Examiner.

	BOP	<p>4. VERIFY SI PUMPS RUNNING:</p> <ul style="list-style-type: none"> • CHG pumps – RUNNING • LHSI pumps - RUNNING
	BOP	<p>5. CHECK CHG PUMP AUXILIARIES:</p> <ul style="list-style-type: none"> • CHG pump CC pump – RUNNING • CHG pump SW pump - RUNNING
	BOP	<p>6. CHECK INTAKE CANAL:</p> <ul style="list-style-type: none"> • Level - GREATER THAN 24 FT • Level - BEING MAINTAINED BY CIRC WATER PUMPS
	BOP	<p>7. CHECK IF MAIN STEAMLINES SHOULD BE ISOLATED:</p> <p>a) Check if ANY of the following annunciators - HAVE BEEN LIT</p> <ul style="list-style-type: none"> • E-F-10 (High Steam Flow SI) • B-C-4 (Hi Hi CLS Train A) • B-C-5 (Hi Hi CLS Train B) <p>Identifies annunciators not lit and goes to step 8.</p>
	BOP	<p>*8. CHECK IF CS REQUIRED:</p> <p>a) CTMT pressure – HAS EXCEEDED 23 PSIA</p> <p>Identifies pressure has not exceeded 23 or 17.7 psia and goes to step 10.</p>

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Event Description: Attachment 1 of E-0 with 1-VS-F-58A & B failing to auto-start on SI.

Cue: By Examiner.

	BOP	<p>*10. BLOCK LOW PRZR PRESS SI SIGNAL:</p> <ol style="list-style-type: none"> a) Check PRZR pressure – LESS THAN 2000 psig b) Turn both LO PRZR PRESS & STM HDR/LINE ΔP switches to block c) Verify Permissive Status light C-2 - LIT <p>BOP may block the low pressurizer pressure SI signal depending on current RCS pressure.</p>
	BOP	<p>*11. BLOCK LOW TAVE SI SIGNAL:</p> <p>Step may not be performed at this time (if Tave is greater than 543°F).</p> <ol style="list-style-type: none"> a) Check RCS Tave - LESS THAN 543°F b) Turn both HI STM FLOW & LO TAVG OR LP switches to block c) Verify Permissive Status light F-1 - LIT
	BOP	<p>NOTE:</p> <ul style="list-style-type: none"> • CHG pumps should be run in the following order of priority: C, B, A. • Subsequent SI signals may be reset by re-performing Step 12. <p>12. VERIFY SI FLOW:</p> <ol style="list-style-type: none"> a) HHSI to cold legs - FLOW INDICATED <ul style="list-style-type: none"> • 1-SI-FI-1961 (NQ) • 1-SI-FI-1962 (NQ) • 1-SI-FI-1963 (NQ) • 1-SI-FI-1943 or 1-SI-FI-1943A b) Check CHG pumps - THREE RUNNING c) Reset SI. d) Stop one CHG pump and out in AUTO e) RCS pressure - LESS THAN 185 PSIG <p>RNO: e) IF two LHSI pumps are running, THEN do the following:</p>

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Event Description: Attachment 1 of E-0 with 1-VS-F-58A & B failing to auto-start on SI.

Cue: By Examiner.

		<ol style="list-style-type: none"> 1) Verify reset or reset SI. 2) Stop one LHSI pump and put in AUTO. 3) GO TO Step 13. <p>Critical Task: [SPS E-1—G] Secure one LHSI pump within 30 minutes of initiation of SI (KOA).</p>
	BOP	13. VERIFY TOTAL AFW FLOW - GREATER THAN 350 GPM [450 GPM]
	BOP	<p>14. CHECK AFW MOVs - OPEN</p> <p>BOP will identify that all AFW MOVs are not open and will read the RNO portion of this step and manually align valves as necessary.</p>
	BOP	<p>15. INITIATE SI VALVE ALIGNMENT IAW ATTACHMENT 2</p> <p>See attached copy of Attachment 2.</p> <p>Depending on timing, this attachment may have already been completed.</p>
	BOP	<p>16. INITIATE VENTILATION ALIGNMENT AND AC POWER ALIGNMENT IAW ATTACHMENT 3</p> <p>See attached copy of Attachment 3:</p> <p>Identify failure of 1-VS-F-58A & B to auto-start on Safety Injection and manually start fans.</p> <p><i>Unit 2 Operator will state that Unit 2 is at 100% power (if asked)</i></p> <p><i>Unit 2 will also accept responsibility to complete Attachment 3 if it is given to Unit 2 at the point where differential pressure indications are requested.</i></p>

End of Event 7

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Event Description: Ruptured SG will become Faulted. Team will transition to 1-E-2, proceed to 1-E3 and complete the scenario in 1-ECA-3.1

Cue: Fault on SG will commence during Step 2 of 1-E-3 after the team identifies the ruptured SG (or when directed by the lead examiner).

Time	Position	Applicant's Action or Behavior
	SRO	Initiate E-3, Ruptured Steam Generator Isolation.
	RO	<p>1-E-3 Actions</p> <p>NOTE: Seal injection flow should be maintained to all RCPs.</p> <p>*1. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:</p> <p>a) Charging Pumps – AT LEAST ONE RUNNING AND FLOWING TO RCS</p> <p>RO will identify that two charging pumps are running.</p> <p>b) RCS subcooling - LESS THAN 30°F [85°F]</p> <p>RO will identify that RCS subcooling is greater than 30°F</p> <p>RNO is to go to step 2</p>
	SRO	<p>1-E-3 Actions</p> <p>2. IDENTIFY RUPTURED SG(s):</p> <ul style="list-style-type: none"> • Unexpected rise in any SG narrow range level OR • High radiation from any SG MS line monitor OR • High radiation from any SG blowdown line OR • High radiation from any SG sample <p>Crew should observe 'C' SG NR level going up unexpectedly.</p>

Event Description: Ruptured SG will become Faulted. Team will transition to 1-E-2, proceed to 1-E3 and complete the scenario in 1-ECA-3.1

Cue: Fault on SG will commence during Step 2 of 1-E-3 after the team identifies the ruptured SG (or when directed by the lead examiner).

	Team	<p>Diagnoses the SG Fault with the following indications:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • High Steam Flow SI • Header to Line SI <p>Indications:</p> <ul style="list-style-type: none"> • High Steam Flow on the Ruptured SG • Decreasing RCS Pressure • Increasing charging flow
	SRO	<p>Initiate E-2, Faulted Steam Generator Isolation.</p> <p>This transition to 1-E-2 is based on Continuous Actions Page Criteria.</p>
	SRO RO	<p>1-E-2 Actions</p> <p>CAUTION:</p> <ul style="list-style-type: none"> • At least one SG must be maintained available for RCS cooldown. • Any faulted SG or secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown. <p>1. CHECK MSTV AND BYPASS VALVE ON AFFECTED SG(s) - CLOSED</p> <p>1. RNO – Manually close the MSTVs and locally close the bypass valves.</p> <p><u>IF</u> MSTVs can <u>NOT</u> be closed, <u>THEN</u> close MS MRVs.</p> <p>BOP will manually close the MS Non-Return Valves on the Vertical Board:</p> <ul style="list-style-type: none"> • MS-NRV-101A • MS-NRV-101B • MS-NRV-101C

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 8

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Event Description: Ruptured SG will become Faulted. Team will transition to 1-E-2, proceed to 1-E3 and complete the scenario in 1-ECA-3.1

Cue: Fault on SG will commence during Step 2 of 1-E-3 after the team identifies the ruptured SG (or when directed by the lead examiner).

	RO	<p>1-E-2 Actions</p> <p>2. CHECK IF ANY SG SECONDARY SIDE IS INTACT:</p> <ul style="list-style-type: none"> • Check pressures in all SGs – ANY STABLE OR INCREASING <p>RO will report that the ‘A’ and ‘B’ SG are stable for plant conditions. An RCS cooldown may be in progress at this time and a discussion that the SG pressures are stable for plant conditions may ensue.</p>
	BOP	<p>1-E-2 Actions</p> <p>3. IDENTIFY FAULTED SG(S):</p> <p>a) Check pressures in all SGs:</p> <ul style="list-style-type: none"> • ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • ANY SG COMPLETELY DEPRESSURIZED <p>Reports the ‘C’ SG is faulted.</p>

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Event Description: Ruptured SG will become Faulted. Team will transition to 1-E-2, proceed to 1-E3 and complete the scenario in 1-ECA-3.1

Cue: Fault on SG will commence during Step 2 of 1-E-3 after the team identifies the ruptured SG (or when directed by the lead examiner).

	SRO	<p>1-E-2 Actions</p> <p>CAUTION:</p> <ul style="list-style-type: none"> • If the TD AFW pump is the only available source of feed flow, steam supply to the TD AFW pump must be maintained from at least one SG. • TD AFW pump Low Flow Shutdown Criteria: <p>Maintain greater than or equal to 150-gpm total AFW flow when feeding two or less Steam Generators with the TD AFW Pump operating.</p> <p>Methods that may be used to comply with this restriction:</p> <ol style="list-style-type: none"> 1) Increasing total AFW flow to greater than 150 gpm 2) Feeding ALL Steam Generators 3) Securing the TD AFW Pump
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Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 8

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Event Description: Ruptured SG will become Faulted. Team will transition to 1-E-2, proceed to 1-E3 and complete the scenario in 1-ECA-3.1

Cue: Fault on SG will commence during Step 2 of 1-E-3 after the team identifies the ruptured SG (or when directed by the lead examiner).

BOP	<p>1-E-2 Actions</p> <p>4. ISOLATE FAULTED SG(s):</p> <ul style="list-style-type: none"> • Close AFW MOV(s) <p>BOP will close 1-FW-MOV-151A and 1-FW-MOV-151B.</p> <ul style="list-style-type: none"> • Defeat the auto-open signal for the faulted SG AFW MOVs using the following switches:
BOP	<ul style="list-style-type: none"> • 1-FW-43-3-AFW-S, H TRAIN DISABLE SELECTOR SWITCH • 1-FW-43-4-AFW-S, J TRAIN DISABLE SELECTOR SWITCH • Place both of the following key switches in the DISABLE SELECTED position: <ul style="list-style-type: none"> • 1-FW-43-1-AFW-E, H TRAIN AUTO OPEN ENABLE SWITCH • 1-FW-43-2-AFW-E, J TRAIN AUTO OPEN ENABLE SWITCH <p>BOP will select the switches to defeat the automatic open feature of the 'C' SG AFW MOVs. This may have already been completed with Attachment 10 of 1-E-0</p> <ul style="list-style-type: none"> • Isolate MFW line: <ol style="list-style-type: none"> a) Close SG FW isolation MOV(s) <p>Closes or verifies 1-FW-MOV-154C is closed.</p> <ol style="list-style-type: none"> b) Locally close feed REG bypass valve manual isolation valve(s): <ul style="list-style-type: none"> • 1-FW-26 for SG A • 1-FW-57 for SG B • 1-FW-88 for SG C <p>Directs a field operator to close 1-FW-88 in #1MER.</p> <p><i>If directed, the field operator will close 1-FW-88 and report the status of the valve back to the MCR.</i></p>

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Event Description: Ruptured SG will become Faulted. Team will transition to 1-E-2, proceed to 1-E3 and complete the scenario in 1-ECA-3.1

Cue: Fault on SG will commence during Step 2 of 1-E-3 after the team identifies the ruptured SG (or when directed by the lead examiner).

	BOP	<p>1-E-2 Actions</p> <p>4. ISOLATE FAULTED SG(s): (Continued)</p> <ul style="list-style-type: none"> • Locally close steam supply valve(s) to TD AFW pump: <ul style="list-style-type: none"> • 1-MS-87 for SG A • 1-MS-120 for SG B • 1-MS-158 for SG C <p>Directs a field operator to close 1-MS-158 in Unit 1 Safeguards.</p> <p><i>If directed, the field operator will close 1-MS-158 and report the status of the valve back to the MCR.</i></p>
	BOP	<ul style="list-style-type: none"> • Close or verify closed SG PORV(s) • Close or verify closed SG blowdown TVs
	BOP	<p>1-E-2 Actions</p> <p>5. CHECK ECST LEVEL - GREATER THAN 20%</p> <p>Observes ECST indicator on vertical board is greater than 20%.</p>
	SRO	<p>1-E-2 Actions</p> <p>6. CHECK SECONDARY RADIATION:</p> <p>a) Consult with TSC or SEM to determine if FAULTED SG should be aligned for sampling</p> <p><i>If contacted, the TSC will evaluate sampling the faulted/ruptured SG.</i></p> <p>b) Initiate periodic activity sampling of INTACT SGs IAW Attachment 1</p>

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 8

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Event Description: Ruptured SG will become Faulted. Team will transition to 1-E-2, proceed to 1-E3 and complete the scenario in 1-ECA-3.1

Cue: Fault on SG will commence during Step 2 of 1-E-3 after the team identifies the ruptured SG (or when directed by the lead examiner).

	BOP	<p>1-E-2 Actions</p> <p>6. CHECK SECONDARY RADIATION: (Continued)</p> <p>c) Check unisolated secondary radiation monitors:</p> <ul style="list-style-type: none"> • Main steamline • TD AFW pump exhaust • Condenser air ejector <p>Indications are available on the NRC MS RM for the 'C' SG.</p> <p>d) Secondary Radiation - NORMAL</p> <p>The BOP will report that conditions are NOT NORMAL.</p> <p>d) RNO – GO TO 1-E-3, STEAM GENERATOR TUBE RUPTURE</p> <p>The team will transition to 1-E-3</p>
	SRO	<p>The team will hold a transition brief. During the brief it will be identified that 'C' SG is faulted and ruptured, current isolation status of the faulted/ruptured SG and that the team is transitioning to 1-E-3.</p> <p><i>The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal with the exception of the previously identified alarms. He will also state that containment conditions and the electrical conditions are as you see them.</i></p>
	SRO	Initiate E-3, Ruptured Steam Generator Isolation.

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Event Description: Ruptured SG will become Faulted. Team will transition to 1-E-2, proceed to 1-E3 and complete the scenario in 1-ECA-3.1

Cue: Fault on SG will commence during Step 2 of 1-E-3 after the team identifies the ruptured SG (or when directed by the lead examiner).

	RO	<p>1-E-3 Actions</p> <p>NOTE: Seal injection flow should be maintained to all RCPs.</p> <p>*1. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:</p> <p>a) Charging Pumps – AT LEAST ONE RUNNING AND FLOWING TO RCS</p> <p>RO will identify that two charging pumps are running.</p> <p>b) RCS subcooling - LESS THAN 30°F [85°F]</p> <p>RO will identify that RCS subcooling is greater than 30°F</p> <p>RNO is to go to step 2</p>
	SRO	<p>1-E-3 Actions</p> <p>2. IDENTIFY RUPTURED SG(s):</p> <ul style="list-style-type: none"> • Unexpected rise in any SG narrow range level OR • High radiation from any SG MS line monitor OR • High radiation from any SG blowdown line OR • High radiation from any SG sample <p>Crew should observe 'C' as being ruptured and faulted.</p>

Event Description: Ruptured SG will become Faulted. Team will transition to 1-E-2, proceed to 1-E3 and complete the scenario in 1-ECA-3.1

Cue: Fault on SG will commence during Step 2 of 1-E-3 after the team identifies the ruptured SG (or when directed by the lead examiner).

	<p>SRO</p> <p>BOP</p>	<p>1-E-3 Actions</p> <p>CAUTION:</p> <ul style="list-style-type: none"> • If the TD AFW pump is the only available source of feed flow, steam supply to the TD AFW pump must be maintained from at least one SG. • At least one SG must be maintained available for RCS cooldown. <p>3. ISOLATE RUPTURED SG(s):</p> <ol style="list-style-type: none"> a) Adjust ruptured SG PORV controller setpoint to 1035 psig b) Check ruptured SG(s) PORV – CLOSED c) Verify blowdown TVs from ruptured SG(s) – CLOSED d) Locally close steam supply valve(s) to TD AFW pump: <ul style="list-style-type: none"> • 1-MS-158 for ‘C’ SG <p>The BOP may have already closed this valve in accordance with Attachment 10 of 1-E-0 or IAW 1-E-2.</p> <ol style="list-style-type: none"> e) Close ruptured SG(s) MSTV <p>The BOP should state that 1-MS-TV-101C can not be closed and that the Non-Return Valve is already closed (RNO for this step).</p>
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Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 8

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Event Description: Ruptured SG will become Faulted. Team will transition to 1-E-2, proceed to 1-E3 and complete the scenario in 1-ECA-3.1

Cue: Fault on SG will commence during Step 2 of 1-E-3 after the team identifies the ruptured SG (or when directed by the lead examiner).

	BOP	<p>1-E-3 Actions</p> <p>CAUTION: If any ruptured SG is faulted, feed flow to that SG should remain isolated during subsequent recovery actions unless needed for RCS cooldown.</p> <p>* 4. CHECK RUPTURED SG LEVEL:</p> <p>a) Narrow range level - GREATER THAN 12% [18%]</p> <p>b) Stop feed flow to ruptured SG(s)</p> <p>c) Defeat the auto open signal for the ruptured SG AFW MOVs using the following switches:</p> <ul style="list-style-type: none"> • 1-FW-43-3-AFW-S, H TRAIN DISABLE SELECTOR SWITCH • 1-FW-43-4-AFW-S, J TRAIN DISABLE SELECTOR SWITCH <p>d) Place both of the following key switches in the DISABLE SELECTED position:</p> <ul style="list-style-type: none"> • 1-FW-43-1-AFW-E, H TRAIN AUTO OPEN ENABLE SWITCH • 1-FW-43-2-AFW-E, J TRAIN AUTO OPEN ENABLE SWITCH
	BOP	<p>1-E-3 Actions</p> <p>CAUTION: Major steam flow paths from the ruptured SG should be isolated before initiating RCS cooldown.</p> <p>5. CHECK RUPTURED SG PRESSURE – GREATER THAN 350 PSIG</p> <p>The BOP will identify that the ruptured SG pressure is less than 350 psig.</p> <p>5. RNO – GO TO 1-ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT – SUBCOOLED RECOVERY DESIRED.</p>
	SRO	<p>The team will hold a transition brief. During the brief it will be identified that 'C' SG is faulted and ruptured, current isolation status of the faulted/ruptured SG and that the team is transitioning to 1-ECA-31.</p> <p><i>The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions, containment conditions and the electrical conditions are as you see them.</i></p>

Op-Test No.: Surry 2008 Scenario No.: 4 Event No.: 8

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Event Description: Ruptured SG will become Faulted. Team will transition to 1-E-2, proceed to 1-E3 and complete the scenario in 1-ECA-3.1

Cue: Fault on SG will commence during Step 2 of 1-E-3 after the team identifies the ruptured SG (or when directed by the lead examiner).

	SRO	Initiate ECA-3.1, SGTR with Loss of Reactor Coolant – Subcooled Recovery.
		1-ECA-3.1 Actions
	RO	1. RESET BOTH TRAINS OF SI
		1-ECA-3.1 Actions
	RO	2. RESET CLS: a) Check CTMT pressure – HAS EXCEEDED 17.7 psia a) RNO – GO TO Step 3
		1-ECA-3.1 Actions
	RO	3. VERIFY INSTRUMENT AIR AVAILABLE: a) Check annunciator B-E-6 – NOT LIT b) Check at least one CTMT IA compressor - RUNNING • 1-IA-C-4A or 1-IA-C-4B c) Verify 1-IA-TV-100 - OPEN
		1-ECA-3.1 Actions
	BOP	*4. VERIFY ALL AC BUSES – ENERGIZED BY OFFSITE POWER
		1-ECA-3.1 Actions
		Caution: PRZR heaters should not be energized until PRZR level indicates greater than the minimum recommended by STA to verify heaters are covered.
	RO	5. DEENERGIZE PRZR HEATERS a) Put all PRZR heater switches in LOCKOUT (Group C in PTL) b) Have STA review Attachment 2 to determine minimum indicated PRZR level that will verify heaters are covered.

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Event Description: Ruptured SG will become Faulted. Team will transition to 1-E-2, proceed to 1-E3 and complete the scenario in 1-ECA-3.1

Cue: Fault on SG will commence during Step 2 of 1-E-3 after the team identifies the ruptured SG (or when directed by the lead examiner).

		<p>1-ECA-3.1 Actions</p> <p>*6. CHECK IF CS SHOULD BE STOPPED:</p> <p>a) Spray pumps – ANY RUNNING</p> <p>a) RNO – GO TO Step 8</p>
		<p>1-ECA-3.1 Actions</p> <p>Caution: If any ruptured SG is faulted, feed flow to that SG should remain isolated during subsequent recovery actions unless needed for RCS cooldown.</p> <p>*8. CHECK RUPTURED SG LEVEL:</p> <p>a) Narrow range level – GREATER THAN 12% [18%]</p> <p>Recalls from the Note above that feed flow to the faulted ruptured SG will remain isolated. Goes to Step 9.</p>
		<p>1-ECA-3.1 Actions</p> <p>Caution: RCS pressure should be monitored. If RCS pressure decreases in an uncontrolled manner to less than 250 psig [400 psig], one LHSI pump must be manually restarted to supply water to the RCS.</p> <p>*9. CHECK IF LHSI PUMPS SHOULD BE STOPPED:</p> <p>a) Check LHSI pumps – ANY RUNNING WITH SUCTION ALIGNED TO RWST.</p> <p>b) Check RCS Pressure:</p> <ul style="list-style-type: none"> • Pressure – GREATER THAN 250 PSIG [400PSIG] • Pressure – STABLE OR INCREASING <p>c) Stop LHSI pumps and place in AUTO</p>

End of Event 8 – Ends upon ENTERING 1-ECA-3.1.

End of Scenario 4

SIMULATOR OPERATOR'S GUIDE

Simulator SetupInitial Conditions:

Recall IC -255 and implement TRIGGER #16 to activate all passive malfunctions and verify Trigger #16 implemented.

Open the monitor window and add the following points to it:

- ASP_AO_OFF = True
- vsps127_stuck(1) = True
- vsps127_stuck(2) = True
- ms_158
- fw_88

Enter the following MALFUNCTIONS:

Malfunction	Delay	Ramp	Trigger	Value	Final	Trigger Type (Auto or Manual)
CH2102 VCT Level Channel fails High	15	30	1	0	1	Manual
FW1303 'A' SG Channel III fails low (FW-LT-1476)	15	30	3	0	-1	Manual
RC1501 Master Pressure Contoller Output fails high	15	30	5	0	1	Manual
RC2403 'C' SGTR	15	300	9	0	45	Manual
MS0303 Fault on 'C' SG	15	0	11	0	50	Manual
MS0601 'A' MSTV fails to close	0	0	16	NA	NA	Manual
MS0602 'A' MSTV fails to close	0	0	16	NA	NA	Manual
MS0603 'A' MSTV fails to close	0	0	16	NA	NA	Manual

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Enter the following REMOTE FUNCTIONS:

Remote Function	Delay	Ramp	Trigger	Value	Final	Trigger Type (Auto or Manual)
DISA_SI867C_AOPEN	0	0	16	Enable	Disable	Manual
DISA_SI867D_AOPEN	0	0	16	Enable	Disable	Manual

Enter the following OVERRIDES:

Override	Delay	Ramp	Trigger	Value	Final	Trigger Type (Auto or Manual)
None.						

SIMULATOR OPERATOR'S GUIDE

TRIGGER	TYPE	DESCRIPTION
1	MAN	Initiates VCT level channel failure
3	MAN	Initiates 'A' SG level channel (III) failure
5	MAN	Initiates Master Pressure Controller failing high
9	MAN	Initiates 'C' SGTR
11	MAN	Initiates fault on 'C' SG at Step 2 of E-3.
16	MAN	Initiates all passive failures

SIMULATOR OPERATOR'S GUIDE

Verify the following control room setup:

- Place the simulator in RUN and verify normal 100% power operation indications.
- Verify Red Magnets on the following components:

<input type="checkbox"/> 1-FW-P-1A (both motors)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Verify 1-RM-RI-112 aligned to A/B SG and 1-RM-RI-113 aligned to C SG (magnets).
- Verify Ovation System operating.
- Reset ICCMs.
- Verify Component Switch Flags.
- Verify Brass Caps properly placed.
- Verify SG PORVs set for 1035 psig.
- Verify Rod Control Group Step Counters indicate properly.
- Verify Ovation CRT display.
- Advance Charts the following charts:

Master chart advance switch

- Verify Turbine Thumb Wheel Settings @120 rpm/min and Position 6
- Verify Containment Instrument Air Compressors are on Inside Suction (all RMs reset)
- Verify all ARPs have been cleaned
- Verify CLEAN copies of the following procedures are in place:

<input type="checkbox"/> AP-53.00 (3)	<input type="checkbox"/> AP-31.00	<input type="checkbox"/> AP-23.00	<input type="checkbox"/>
<input type="checkbox"/> E-0	<input type="checkbox"/> E-2	<input type="checkbox"/> E-3 (2)	<input type="checkbox"/> ECA-3.1
<input type="checkbox"/> OP-CH-007		<input type="checkbox"/> Reactivity Sheet	
<input type="checkbox"/> OP-ZZ-002		<input type="checkbox"/>	

- Copy of OPT-FW-006 (partially completed).**
- Verify Reactivity Placard is current.

SIMULATOR OPERATOR'S GUIDE**Brief**

This simulator performance scenario is performed in the EVALUATION MODE. You should not direct questions to the evaluators. Otherwise, you should perform as if you were in the MCR.

Your ability to maintain a log is not being graded, but maintaining a rough log is recommended to help during briefs.

If you need to communicate with the Unit 2 operator, verbally state, "Unit 2" and an instructor will locate to the Unit 2 area and respond to you as quickly as possible.

In the unlikely event that the simulator fails such that illogical indications result, the session will be terminated. In other words, respond to what you see. If there is a problem with the simulation, the session will be terminated or adjusted as appropriate based on the specific problem.

Assign operating positions.

Ask for and answer questions.

Op-Test No.: Surry 2008**Scenario No.: 4****Page 65 of 77****SIMULATOR OPERATOR'S GUIDE**Conduct shift turnover:

Provide normal shift turnover materials reflecting the below initial conditions:

1-FW-P-1A is tagged out for motor replacement.

Unit #2 is at 100% power with all systems and crossties operable.

Shift orders are to maintain 65% power on Unit #1 and perform 1-OPT-FW-006 (Auxiliary Feedwater MOV Test) as soon as possible after turnover.

After completion of AFW MOV cycling, you are to give the procedure to the Shift Manager for evaluation of acceptance criteria and performance of any Follow-On tasks.

The last shift performed two 50-gallon dilutions.

When the team has accepted the shift, proceed to the Session Conduct Section.

SIMULATOR OPERATOR'S GUIDE**Session Conduct:**

Ensure conditions in Simulator Set-up are established.

Ensure Trigger 16 is active prior to team entering the simulator.

Verify Exam Security has been established and ASP_AO_OFF = True.

EVENT 1 Performance of 1-OPT-FW-006 (AFW MOV Test)**BOOTH:**

30 minutes prior to the beginning of the scenario, provide the team with a copy of 1-OPT-FW-006, AFW MOV Test. This OPT will be partially filled out since the previous shift performed the procedure for the "J" Bus components. The team will pre-brief the OPT prior to entering the simulator.

Direct the team that after completion of AFW MOV cycling, they are to give the procedure to the Shift Manager for evaluation of acceptance criteria and performance of any Follow-On tasks.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the completion of the test.
- **The Shift Manager** will administratively complete the procedure (i.e., upon completion on valve strokes and procedure completion the SM will perform the test evaluation and subsequent follow-on actions).

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE**EVENT 2 VCT LEVEL TRANSMITTER FAILS HIGH (1-CH-LT-1115)**

When cued by examiner, implement Trigger #1.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of 1-CH-LT-1115. The individual(s) contacted will also acknowledge entry into AP-53.00.
- **If contacted**, will take responsibility for writing the WR and CR.

STA:

- **If contacted**, will acknowledge the failure of 1-CH-LT-1115. The individual(s) contacted will also acknowledge (but not confirm/deny) any TS LCOs.
- **If asked**, the STA will report that 1-CH-LT-1115 is NOT a Reg. Guide 1.97 component.
- **If asked**, the STA will review VPAP-2802 and TRM Section 3.3 and report that he has completed his review and this failure does not impact these documents.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

SIMULATOR OPERATOR'S GUIDE**Maintenance:**

- **If contacted**, will acknowledge instrumentation failure and commence investigations to determine the cause of the failure.

Field Operators:

- **If contacted**, field operators will report no issues locally at the level transmitters.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 3 1-FW-LT-1476 (Channel III SG Level Transmitter) Fails Low

When cued by examiner, implement Trigger #3.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of 1-FW-LT-1476. The individual(s) contacted will also acknowledge any TS LCOs and entry into AP-53.00.
- **If contacted**, will take responsibility for writing the WR and CR.

STA:

- **If contacted**, will acknowledge the failure of 1-FW-LT-1476. The individual(s) contacted will also acknowledge (but not confirm/deny) any TS LCOs.
- **If asked**, the STA will report that 1-FW-LT-1476 is a Reg. Guide 1.97 component. The STA will also report that upon review of CEP 99-0029 that only one channel of SG level indication is required per SG, so no actions for Reg. Guide 1.97 are required.
- **If asked**, the STA will review VPAP-2802 and TRM Section 3.3 and report that he has completed his review and this failure does not impact these documents.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

SIMULATOR OPERATOR'S GUIDE**Maintenance:**

- **If contacted**, will acknowledge instrumentation failure and commence investigations and/or repair efforts.

Field Operators:

- **If contacted**, field operators will report no issues at the MFRVs.

Unit 2:

- If team directs performance of 1-OPT-RX-007, Shift Average Power Calculation, state that you will have the 4th RO perform the procedure.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 4 Master Pressure Controller Output Fails High

When cued by examiner, implement Trigger #5.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of the master pressure controller. The individual(s) contacted will also acknowledge any TS LCOs (i.e., close associated block valve).
- **If contacted**, will take responsibility for writing the WR and CR.
- **If contacted**, will acknowledge entry into AP-53.00 and AP-31.00.

STA:

- **If contacted**, will acknowledge the failure of the master pressure controller. The individual(s) contacted will also acknowledge any TS LCOs (i.e., close associated block valve). The STA will not confirm or deny any TS decisions.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

Maintenance:

- **If contacted**, will acknowledge the failure of the master pressure controller and commence investigations. Upon initiation of the next failure a time compression will occur and Maintenance will report the MPC has been repaired and should be returned to service.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE**EVENT 5 RCS Activity Above Technical Specification Limits**

When cued by examiner, as Chemistry, call the Unit Supervisor and make the following report:

“The latest RCS sample indicates that E-BAR is 114% of the limit and Dose Equivalent I-131 is 3.4 $\mu\text{Ci/ml}$ ”

Operations Supervisor/Management:

- **If contacted**, will acknowledge the chemistry results. The individual(s) contacted will just acknowledge (but not confirm/deny) any TS LCOs .
- **If contacted**, will acknowledge entry into AP-23.00 due to the Technical Specifications identified.
- **If asked**, the shift manager will assume responsibilities for EIPs.
- **If asked** for a recommended ramp rate, ask what the Unit Supervisor recommends. When authorized by the NRC, the Shift Manager will direct a 1%/minute ramp rate.
- **As the Shift Manager:** If it appears that the team will ramp at a rate of less than 1%/minute, contact the Unit Supervisor and direct a 1%/minute ramp rate.

SIMULATOR OPERATOR'S GUIDE

STA:

- **If contacted**, will acknowledge the chemistry results. The individual(s) contacted will just acknowledge (but not confirm/deny) any TS LCOs .
- **If contacted**, will acknowledge the need to ramp.
- **If asked**, the STA will acknowledge the need to borate and use rods (will acknowledge the team review of OP-RX-010, if performed). If asked to perform the OP-RX-010 review, the STA will state that he is not able to at this time.
- **After directed**, the STA will report that he will review VPAP-2802 for applicability and make any required notifications.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

Maintenance:

- **If contacted**, will acknowledge the requirements to sample the RCS.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 6 SGTR on 'C' SG with 1-SI-MOV-1867C/D Failing to Open

When cued by examiner, implement Trigger #9.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the fact that a tube rupture exists on the 'C' SG. Will acknowledge entry into E-0, the subsequent SI and the need to go to E-3.
- **If contacted**, will acknowledge the isolation of 'C' SG (if informed).
- **If contacted**, will acknowledge the failure of 1-SI-MOV-1867C/D to open and the subsequent manual realignment of the valves.

STA:

- **If asked**, will report that he will calculate the time to 'B' fill, time permitting.
- **If contacted**, will enter the control room and commence reviewing status trees and prepare for the transient brief (items are reported "as you see them or previously reported").

Field Operators:

- **If directed**, field operators will perform local manipulations (close 1-MS-158)

Unit 2 Operator:

- **When** radiation alarms sound on the radiation alarm panel, silence the alarms when directed and report the alarm to the Unit 1 SRO.
- **If directed** perform the associated RM ARP without leaving the confines of the Unit 2 control area. If actions or verifications are required on the Unit 1 side, inform the Unit 1 SRO of the need for an operator to complete the ARP.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE**EVENT 7 Attachment 1 of 1-E-0 (Failure of 1-VS-F-58A/B to Auto-Start)**

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of 1-VS-F-58A/B to automatically start, but that they were started in accordance with 1-E-0.

STA:

- **If contacted**, will acknowledge the failure of 1-VS-F-58A/B to automatically start, but that they were started in accordance with 1-E-0.

Field Operators:

- **If directed**, field operators will perform local manipulations (1-MS-158).

Unit 2:

- **If asked**, state Unit 2 is at 100 % power.
- State that the Attachment 3 pressure indication readings outside the operator at the controls boundary area all indicate positive pressure.
- Unit 2 will also accept responsibility to complete Attachment 3 **if it is given to Unit 2** at the point where differential pressure indications are requested.
- If asked, 0-AP-50.00, Opposite Unit Emergency, has been initiated.

SIMULATOR OPERATOR'S GUIDE**EVENT 8 Ruptured SG Becomes Faulted**

When cued by examiner or upon identification of the ruptured SG in Step 2 of 1-E-3, implement Trigger #11.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the subsequent fault on the previously identified ruptured SG. Will also acknowledge any TS information (time permitting) and information related to radiation monitors alarming.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If asked**, the TSC will evaluate sampling of the faulted/ruptured SG.

Unit 2 Operator:

- **When** radiation alarms sound on the radiation alarm panel, silence the alarms when directed and report the alarm to the Unit 1 SRO.
- **If directed** perform the associated RM ARP without leaving the confines of the Unit 2 control area. If actions or verifications are required on the Unit 1 side, inform the Unit 1 SRO of the need for an operator to complete the ARP.

Field Operators:

- **If directed**, field operators will perform local manipulations (1-FW-88).

Role play as other individuals as needed.

The scenario will end upon reduction of entering 1-ECA-3.1 or at the lead examiners discretion.

SIMULATOR OPERATOR'S GUIDE

Facility:	Surry	Scenario No.:	5	Op-Test No.:	2008-301
Examiners:	_____	Operators:	_____	SRO	
	_____		_____	RO	
	_____		_____	BOP	
Initial Conditions:	Unit 1 is at 100% power with all systems and crossies operable.				
Turnover:	Maintain 100% power				
Event No.	Malf. No.	Event Type*	Event Description		
1		R – RO/SRO	Perform OPT-RX-005, Control Rod Assembly Partial Movement for “C” Bank rods.		
2	MS1305	I – BOP/SRO TS – SRO	Controlling steam pressure channel failure (‘B’SG) (high)		
3	NI1004	I – RO/SRO N-BOP TS – SRO	PR NI N-44 fails high Place channel in trip (normal for BOP)		
4	TU1001 TU1802	C-BOP/SRO	Loss of EHC pump with auto-start failure of standby pump		
5	RC04	C – RO/SRO	RCS leak in containment (AP-16)		
6	TDLY29 TDLY50 TDLY292	M – All C – RO/SRO	Manual Reactor Trip with Safety Injection. The trip will be complicated by a failure of main generator to trip.		
7	DISA_ISP1 A(B)_AST RT	C – BOP/SRO	LHSI pumps and HHSI pumps fail to auto start		
8	RC0101	M - All	LBLOCA		
9	SI2201 SI2202	M - All	LHSI Pumps trip leading to ECA-1.1		

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

Surry 2008-301 Scenario #5Event 1

1-OPT-RX-005 (Control Rod Assembly Partial Movement) is required to be performed upon shift turnover. The previous shift has completed all banks with the exception of 'C' Bank. The team will brief prior to turnover on the performance of 1-OPT-RX-005 on the 'C' Control Bank.

Verifiable Action: (RO) Inserts and withdraws rods in accordance with 1-OPT-RX-005

Event 2

1-PT-MS-1485 fails high causing the 'B' MFRV to open and the 'B' SG level to go up. The BOP should take manual control of the 'B' MFRV. The SRO should enter 0-AP-53.00 (Loss of Vital Instrumentation / Controls) and direct BOP to select redundant steam flow channel (thus defeating the failed steam pressure channel) and return the 'B' MFRV to automatic.

Verifiable Action: (BOP) Takes manual control of 'B' MFRV.

Technical Specifications: Table 3.7-1 item 17, Table 3.7-2 items 1.c and 1.e, and Table 3.7-3 item 2.a.

Event 3

PRNI N-44 will fail high causing rods to step in at 72 spm. The RO will place rod control in manual to stop rod insertion. The SRO will initiate 0-AP-53.00 (Loss of Vital Instrumentation / Controls), then transition to AP-4.00, Nuclear Instrumentation Malfunction. The SRO will review Technical Specifications.

Verifiable Action: (RO) Takes manual control of RCS temperature (Rod Control to Manual).
(BOP) Removes N-44 from service.

Technical Specification: Table 3.7.1. Items 2, 5, and 6. #.12.D

Event 4

The running EHC pump trips with failure of the standby pump to auto-start. The team will initiate ARP 1-TS-D2, EH Fluid Low Pressure. The SRO will direct manually starting the standby pump which will return EHC pressure to normal.

Verifiable Action: (BOP) Manually starts standby EH pump.

Event 5

An RCS leak to containment will be ramped in to approximately 300 gpm over several minutes. The team will initiate AP-16.00 (Excessive RCS Leakage) and the RO will perform the immediate actions of AP-16.00 (i.e., take manual control of charging, isolate letdown and stabilize pressurizer level).

Verifiable Actions: (RO) Perform the immediate actions of AP-16.00

Event 6

Due to the RCS leak, AP-16.00 (Excessive RCS Leakage) will direct a reactor trip and safety injection. The trip will be complicated by a failure of the main generator to automatically trip.

Verifiable Actions: (All) E-0, Safety Injection.
(RO) Manual trip of the main generator

Event 7

The BOP will identify that 1-CH-P-1A, 1-CH-P-1B, 1-SI-P-1A and 1-SI-P-1B have not started. The pumps will be started in accordance with 1-E-0.

Verifiable Actions: (BOP) Start HHSI and LHSI pumps

Event 8

The RCS leak in containment will continue to degrade to a Large Break LOCA. As RCS pressure decreases, RCP trip criteria will be met, thus requiring the RCPs to be tripped.

Verifiable Actions: (RO) Trip the RCPs

Critical Task: Critical Tasks: [WOG E-1—C] Trip all RCPs within 5 minutes of reaching RCP Trip and Mini-flow recirc criteria (KOA).

Actions required to accomplish:	Trip 1-RC-P-1A
	Trip 1-RC-P-1B
	Trip 1-RC-P-1C

Event 9

Later in the event the LHSI pumps will trip and not be able to be re-started. The team will then transition to 1-ECA-1.1 and will align make-up to the RWST in accordance with 1-ECA-1.1.

Critical Task: [WOG ECA-1.1—B] Initiate actions to makeup to the RWST before beginning RCS cooldown to cold shutdown.

Actions required to accomplish:	Secure components (based on plant conditions) taking a suction from the RWST and initiate make-up to the RWST IAW 1-ECA-1.1.
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SIMULATOR OPERATOR GUIDE
NRC EXAM - SCENARIO 5

Initial Conditions: IC #1 100%, MOL – Cycle 21. The unit has been at 100% power for 4 days.

Pre-load malfunctions:

- **Failure of main generator to trip**
- **HHSI pumps fail to automatically start**
- **LHSI pumps fail to automatically start**
-

Equipment Status/ Procedures/ Alignments/ Data Sheets/ etc.:

- **Control Room instrumentation channels are selected to Channel III.**
-
-

Turnover:

Maintain 100% power.

Event	Malf. #'s	Severity	Instructor Notes and Required Feedback
1		NA	Perform OPT-RX-005, Control Rod Assembly Partial Movement for "C" Bank rods
2	MS1305	NA	Controlling steam pressure channel failure ('B'SG)
3	NI1004	NA	PR NI N-44 fails high
4	TU1001 TU1802	N/A	Loss of EHC pump with auto-start failure of standby pump
5	RC04	NA	RCS leak in containment (AP-16)
6	TDLY29 TDLY50 TDLY292	NA	Manual Reactor Trip with Safety Injection. The trip will be complicated by a failure of main generator to trip.
7	DISA_ISP1 A(B)_AST RT	NA	LHSI pumps and HHSI pumps fail to auto start
8	RC0101	NA	LBLOCA
9	SI2201 SI2202	NA	LHSI Pumps trip leading to ECA-1.1
END			

SHIFT TURNOVER INFORMATION

OPERATING PLAN:

- The Unit has been at 100% power since last refueling outage.
- Unit 2 is at 100% Power with all systems and crossties operable.
- Maintain full power operation.
- Perform 1-OPT-RX-005 (Control Rod Assembly Partial Movement) for 'C' Bank of Control Rods upon completion of shift turnover.
- Upon completion of 1-OPT-RX-005 maintain pressurizer heaters energized (i.e. 1-OP-RC-019 should not be performed upon completion of the test).

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 1

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Event Description: Perform 1-OPT-RX-005, Control Rod Assembly Partial Movement for 'C' Bank rods.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		<p>Team will prebrief Initial Conditions, Precautions and Limitations, and procedure prior to entering simulator.</p> <p>Section 6.1 and 6.2 will be completed by the previous shift and is included here for reference only.</p>
		Section 6.1 Work Preparation
	SRO	6.1.1 IF this procedure is used to test less than all six banks, THEN enter N/A in those subsections NOT to be done. IF a full test is to be done, THEN enter N/A for this step.
	SRO	6.1.2 IF the PCS Computer is inoperable, THEN enter N/A for Steps 6.4.5, 6.5.5, 6.6.5, 6.7.5, and 6.8.5. Otherwise, enter N/A for this Step.
	RO	6.1.3 Energize all available Pressurizer Heaters IAW 1-OP-RC-019, Pressurizer Heater Operation. Enter N/A if all available heaters energized.
	RO	6.1.4 Verify redundant PLC updating by swapping CERPI Monitors prior to start of test.
		Section 6.2 Bank Overlap Verification and Documentation
	RO	<p>6.2.1 Record the step counter DEMAND POSTN for CONT BANKS A, B, C, D, and Shutdown Banks.</p> <p>A: <u>226</u> B: <u>226</u> C: <u>226</u> D: <u>225</u> SBA: <u>226</u> SBB: <u>226</u></p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 1

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Event Description: Perform 1-OPT-RX-005, Control Rod Assembly Partial Movement for 'C' Bank rods.

Cue: By Examiner.

	RO	<p>6.2.2 Record the bank overlap thumbwheel settings.</p> <p>S1: <u>128</u> S2: <u>226</u> S3: <u>256</u> S4: <u>354</u> S5: <u>384</u> S6: <u>482</u></p>
	RO	<p>6.2.3 Record the bank overlap counter number and the step counter DEMAND POSTN for CONT BANK D.</p> <p>Bank Overlap Counter: <u>609</u> CONT BANK D: <u>225</u> Difference: <u>384</u></p> <p>Required Bank Overlap Difference: 384 Steps</p>
	RO	<p>6.2.4 IF the difference in Step 6.2.3 is NOT 384, THEN notify the Instrumentation & Control Department (I & C). IF the difference is 384, THEN enter N/A.</p>
		<p>6.4 Control Bank C</p>
	SRO	<p>NOTE: Abnormal Procedures 0-AP-1.00, Rod Control System Malfunction, and 0-AP-1.02, Individual Rod Position Indicators (IRPI), should not be implemented for Step Counter / rod deviation unless the deviation is greater than 12 steps.</p>
	RO	<p>6.4.1 Turn the ROD CONT MODE SEL switch to CBC</p>
	RO	<p>6.4.2 Record the baseline rod position on the Withdrawn line in Attachment 1, Table 2, Control Bank C.</p>
	RO	<p>6.4.3 Insert Control Bank C 12 steps.</p>
	RO	<p>6.4.4 Complete the Inserted line in Attachment 1, Table 2.</p>
	RO	<p>6.4.5 Verify 1G-B5, COMPU PRINTOUT ROD CONTR SYS, is LIT.</p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 1

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Event Description: Perform 1-OPT-RX-005, Control Rod Assembly Partial Movement for 'C' Bank rods.

Cue: By Examiner.

	RO	6.4.6 Verify 1G-G7, ROD BANK C LO LIMIT, is LIT.
	SRO	NOTE: In the event the Group 1 and Group 2 Step Counters are not the same after the next Step, they must be made the same by stepping out only to prevent a Rod Group Sequence Error. This will leave rods at 230 steps and prevent rod group misalignment.
	RO	6.4.7 Withdraw Control Bank C to 235 steps as indicated by the Group Step Demand Counters.
	RO	6.4.8 Pulse the Group Step Demand Counters down to 230 steps using Attachment 2 for guidance.
	RO	6.4.9 Insert Control Bank C to position recorded in Step 6.2.1. Record position below: _____ step
	RO	6.4.10 Calculate in Attachment 1, Table 2 the Control Bank C Insertion and compare with the Reference.
	RO	6.4.11 Verify alarms 1G-B5, COMPU PRINTOUT ROD CONTR SYS, and 1G-G7, ROD BANK C LO LIMIT are NOT LIT. IF the alarms will NOT clear AND are still LIT, THEN GO TO the appropriate annunciator response procedure.
		6.9 Rods in Automatic, and Bank Overlap Verification and Documentation
	RO	6.9.1 AFTER verifying that T AVG is within $\pm 1^\circ\text{F}$ of T REF, THEN put the ROD CONT MODE SEL switch in AUTO. IF the rods are NOT to be put in automatic at this time, THEN enter N/A.
	RO	6.9.2 Record the step counter DEMAND POSTN for CONT BANKs A, B, and C. A: _____ B: _____ C: _____

Event Description: Perform 1-OPT-RX-005, Control Rod Assembly Partial Movement for 'C' Bank rods.

Cue: By Examiner.

	RO	<p>6.9.3 Record the bank overlap thumbwheel settings.</p> <p>S1: _____ S2: _____ S3: _____ S4: _____ S5: _____ S6: _____</p> <p><i>A field operator will report the following (if dispatched):</i> S1: <u>128</u> S2: <u>226</u> S3: <u>256</u> S4: <u>354</u> S5: <u>384</u> S6: <u>482</u></p>
	RO	<p>6.9.4 Record the bank overlap counter number and the step counter DEMAND POSTN for CONT BANK D.</p> <p>Bank Overlap Counter: _____ CONT BANK D: _____ Difference: _____</p> <p>Required Bank Overlap Difference: 384 Steps</p> <p><i>A field operator will report the Bank Overlap Counter from the simulator if dispatched.</i></p>
	RO	<p>6.9.5 IF the difference in Step 6.9.4 is NOT 384, THEN notify the Instrumentation & Control Department (I & C). IF the difference is 384, THEN enter N/A.</p>
	RO	<p>6.9.6 Deenergize Pressurizer Heaters as directed by Shift Supervision IAW 1-OP-RC-019, Pressurizer Heater Operation.</p> <p><i>The shift manager will direct the team to maintain the pressurizer heaters energized for the remainder of this shift.</i></p>
	RO	<p>6.9.7 Notify Chemistry to obtain a sample of the RCS for Radio-Cobalt analysis for the evaluation and trending of a crud burst or crud levels following quarterly rod exercise.</p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 1

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Event Description: Perform 1-OPT-RX-005, Control Rod Assembly Partial Movement for 'C' Bank rods.

Cue: By Examiner.

		7.0 FOLLOW-ON
		NOTE: Annunciators are included in this test for tracking purposes only. They are not required to prove operability of the Rod Control System.
		7.1 Acceptance Criteria
	RO	<p>7.1.1 Evaluate the test results by reviewing the Acceptance Criteria for the components tested. (✓)</p> <ul style="list-style-type: none"> • When the rods are inserted 12 steps, the GP 1 and GP 2 step counter Insertion is 12. • When the rods are inserted 12 steps, the CERPI Insertion is 12 +12/-6 steps (6 to 24 steps) • The difference in Steps 6.2.3 and 6.9.4 is 384 with Control Banks A, B, and C at 226 steps. • The thumbwheel settings in Steps 6.2.2 and 6.9.3 are: <ul style="list-style-type: none"> S1 128 steps S2 226 steps S3 256 steps S4 354 steps S5 384 steps S6 482 steps
	RO	<p>7.1.2 Document the test results. (✓)</p> <p style="text-align: center;">_____ Satisfactory _____ Unsatisfactory</p>

Event Description: Perform 1-OPT-RX-005, Control Rod Assembly Partial Movement for 'C' Bank rods.

Cue: By Examiner.

		7.2 Follow-On Tasks
	SRO	<p>7.2.1 IF the test was satisfactory, THEN enter N/A in the following substeps. IF the test was unsatisfactory, THEN do the following:</p> <ul style="list-style-type: none"> a. Document the reason for the unsatisfactory test in Operator Comments. b. Notify the System Engineer and record the name. System Engineer: _____ c. Initiate a Condition Report and record the number. CR Number: _____ d. Initiate a Work Request and record the number. WR Number: _____ <p>SRO will mark N/A for these steps</p>
	SRO	<p>7.2.2 IF a partial operability test was done, THEN document the reason for the partial test in Operator Comments. IF a full test was done, THEN enter N/A.</p>

End Event #1

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 2

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Event Description: Controlling channel (1-MS-PT-1485) steam pressure fails high.

Cue: Upon completion of 1-OPT-RX-005 or cue by examiner.

Time	Position	Applicant's Action or Behavior
	BOP	<p>Diagnoses failure 1-MS-PT-1485 with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • 1H-E6 STM GEN 1B FW >< STM FLOW • 1F-C8 STM GEN 1B CH 3 FW < STM FLOW • 1H-G6 STM GEN 1B LVL ERROR. <p>Indications:</p> <ul style="list-style-type: none"> • Step increase in 1B SG Steam Flow indication Channel III. • Step increase in 1B SG Steam Pressure indication Channel III. • Increasing level on 'B' SG. <p><i>When the shift manager is informed of this event, he will take responsibility for completing the remaining actions in 1-OPT-RX-005.</i></p>
	SRO	Enters 0-AP-53.00 LOSS OF VITAL INSTRUMENTATION / CONTROLS
	BOP	<p>[1] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL</p> <p>BOP identifies Channel IV indication for steam flow/pressure is NORMAL.</p>
	BOP	<p>[2] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION</p> <p>BOP takes manual control of 'B' SG feed reg valve and decreases demand (FF < SF) to restore level to program.</p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 2

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Event Description: Controlling channel (1-MS-PT-1485) steam pressure fails high.

Cue: Upon completion of 1-OPT-RX-005 or cue by examiner.

	SRO	NOTE: When the affected instrument/controller malfunction has been addressed by this procedure, recovery actions may continue at Step 12.
	RO	<p>3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS – AFFECTED</p> <ul style="list-style-type: none"> • Nuclear Instrumentation • Pressurizer Pressure control <p>RNO: GO TO Step 6.</p>
	BOP	<p>6. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS – NORMAL</p> <ul style="list-style-type: none"> • Steam Pressure • Steam Flow • Feed Flow • Steam Generator Level
	BOP	Determines CH III steam flow and steam pressure instrumentation for 'B' SG is NOT normal.
	BOP	<p>Step 6. RNO</p> <p>IF the selected steam flow, steam pressure, or feed flow input to the SG Water Level Control system has failed, THEN do the following:</p> <p>a) Place the associated Feed Reg Valve in MANUAL.</p> <p>Verifies 'B' SG MFRV controller, 1-FW-FCV-1488, in manual</p>
	BOP	<p>b) Control SG level at program level (44%, a band may be given).</p> <p>Verifies 'B' SG NR level is returning to program level.</p>
	RO	<p>c) Select the redundant channel for affected SG(s)</p> <p>Selects Channel IV Steam Flow for 'B' SG using two-position selector switch on Vertical Board 1-2 (applicant may also place the associated Feed Flow channel in Channel IV)</p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 2

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Event Description: Controlling channel (1-MS-PT-1485) steam pressure fails high.

Cue: Upon completion of 1-OPT-RX-005 or cue by examiner.

	<p>BOP</p> <p>SRO</p>	<p>Step 6. RNO (Continued)</p> <p>d) WHEN SG level returned to normal, THEN place the Feed Reg Valve in AUTOMATIC.</p> <p>Places 'B' SG FRV controller, 1-FW-FCV-1488, in automatic control.</p> <p>Perform follow-up actions:</p> <p>a) Consult with Shift Manager on need to initiate ()-OP-RP-001, ALIGNING CONTROL SYSTEM FOR PERFORMANCE OF CHANNEL I, II, III, AND IV PROCESS AND PROTECTION TESTING.</p> <p>b) Refer to the following Tech Spec 3.7 items:</p> <ul style="list-style-type: none"> • Table 3.7-1, 12 and 17 • Table 3.7-2, 1.c, 1.e, and 3.a • Table 3.7-3, 2.a, and 3.a <p>Determines Table 3.7-1 item 17 is applicable, Table 3.7-2 item 1c and 1e is applicable and Table 3.7-3 item 2a is applicable (place channel in trip w/in 72 hours).</p> <p>c) Refer to Attachment 1.</p> <p>d) IF no other instrumentation failure exists, THEN GO TO Step 12.</p>
	SRO	<p>12. Review OPT-RX-001, Rx Power Calorimetric using PCS computer program, to determine operability of calorimetric and need to perform OPT-RX-007, Shift Average Power Calculation.</p> <p>SRO/RO determines that OPT-RX-001 is impacted and OPT-RX-007 will need to be performed.</p> <p><i>If it appears that the SRO/RO will take action to perform 1-OPT-RX-007, the Unit 2 Operator will state that he will have the fourth RO perform 1-OPT-RX-007.</i></p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 2

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Event Description: Controlling channel (1-MS-PT-1485) steam pressure fails high.

Cue: Upon completion of 1-OPT-RX-005 or cue by examiner.

	SRO	<p>13. CHECK FAILED INSTRUMENT - IS A REGULATORY GUIDE 1.97 VARIABLE</p> <p><i>SRO directs STA to review Reg. Guide 1.97. The STA will report that 1-MS-PT-1485 and 1-MS-FT-1485 are both is a Reg. Guide 1.97 components.</i></p>
	SRO	<p>14. REVIEW CEP 99-0029, REG GUIDE 1.97 OPERABILITY, REPORTABILITY, AND ALTERNATE INDICATIONS</p> <p><i>SRO directs STA to review CEP 99-0029. The STA will report that the Reg. Guide 1.97 only requires two channels of Steam Pressure indication per steam generator and no actions are required. The STA will also report that the Reg. Guide 1.97 only requires one channel of Steam Flow indication per steam generator and no actions are required.</i></p>
	SRO	<p>15. Review the following:</p> <ul style="list-style-type: none"> • TS 3.7 <p>Determines Table 3.7-1 item 17 is applicable, Table 3.7-2 item 1c and 1e is applicable and Table 3.7-3 item 2a is applicable (place channel in trip w/in 72 hours).</p> <ul style="list-style-type: none"> • VPAP-2802 • TRM Section 3.3, Instrumentation <p><i>SRO directs STA to review VPAP-2802 and TRM Section 3.3. The STA reports he has completed these reviews and there is no impact.</i></p>
	SRO	<p>16. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"> • Shift Supervision • OMO • STA (PRA determination) • I&C <p><i>When the shift manager is informed of this event, he will take responsibility for completing the remaining actions in 1-OPT-RX-005.</i></p> <p>- END -</p>

END – Event 2

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 3

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Event Description: Power Range NI (N-44) fails high.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	RO	Diagnose the failure with the following indications: Alarms: <ul style="list-style-type: none"> • 1G-G1 NIS PWR RNG HI FLUX ROD STOP • 1G-E4 NIS PWR RNG CH AVG FLUX DEVIATION Indications: <ul style="list-style-type: none"> • PR average flux reads high • Control Rods are stepping in. May place control rods in MANUAL independently (per 1G-G1) or in accordance with 0-AP-53.00 and then transition to AP-4.00.
	SRO	Enters 0-AP-53.00 LOSS OF VITAL INSTRUMENTATION / CONTROLS
	RO	[1] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL RO identifies N-41, 42, 43 are indicating normal.
	RO	[2] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION RO will place Rod Control in Manual to stop the automatic insertion.

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 3

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Event Description: Power Range NI (N-44) fails high.

Cue: By Examiner.

	SRO	NOTE: When the affected instrument/controller malfunction has been addressed by this procedure, recovery actions may continue at Step 12.
	RO	3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS – AFFECTED <ul style="list-style-type: none"> • Nuclear Instrumentation • Pressurizer Pressure control
	RO	4. CHECK PRZR SPRAY VALVE CONTROLLERS – NORMAL
	SRO	5. GO TO THE APPROPRIATE ABNORMAL PROCEDURE <ul style="list-style-type: none"> • AP-4.00, Nuclear Instrumentation Malfunction • AP-31.00, Increasing or decreasing RCS Pressure <p>Team transitions to AP-4.00, Nuclear Instrumentation Malfunction.</p>
	SRO	Enters 1-AP-4.00, NUCLEAR INSTRUMENTATION MALFUNCTION
	RO	AP-4.0 Actions 1. CHECK NI MALFUNCTION – POWER RANGE FAILURE
	RO/BOP	AP-4.0 Actions 2. STABILIZE UNIT CONDITIONS
	RO	AP-4.0 Actions 3. CHECK N-44 - FAILED
	RO	AP-4.0 Actions 4. VERIFY ROD CONTROL - IN MANUAL

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 3

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Event Description: Power Range NI (N-44) fails high.

Cue: By Examiner.

	BOP	AP-4.0 Actions 5. PLACE 1-MS-43-N16, REACTOR POWER SOURCE, IN THE N43 POSITION (SWITCH LOCATED ON NI PROTECTION CHNL III CABINET)
	RO	AP-4.0 Actions 6. CHECK N-43 - FAILED 6. RNO - GO TO Step 8.
	RO	AP-4.0 Actions 8. CHECK POWER RANGE CHANNELS - ONLY ONE FAILED
	SRO	AP-4.0 Actions NOTE: Performance of Attachment 1 to place the failed Power Range Channel in trip requires I&C assistance for N-41, N-42, or N-43. 9. INITIATE ATTACHMENT 1 TO PLACE FAILED CHANNEL IN TRIP WITHIN 72 HOURS Note: Applicable actions from Attachment 1 begin on the following page.
	RO	AP-4.0 Actions 10. CHECK NI MALFUNCTION – INTERMEDIATE RANGE FAILURE 10. RNO - GO TO Step 19.
	RO	AP-4.0 Actions 19. CHECK NI MALFUNCTION – SOURCE RANGE FAILURE 19. RNO - GO TO Step 38.
	SRO	AP-4.0 Actions 38. NOTIFY THE FOLLOWING <ul style="list-style-type: none">• Instrument Shop• OM on call

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 3

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Event Description: Power Range NI (N-44) fails high.

Cue: By Examiner.

		AP-4.00 Attachment 1
		AP-4.0 Attachment 1 Actions (Normal Actions for BOP)
	BOP	<p><u>ONE POWER RANGE CHANNEL INOPERABLE</u></p> <p>1. Perform the following at the NIS panel within 72 hours.</p> <ul style="list-style-type: none"> • Comparator and Rate Drawer <ul style="list-style-type: none"> a. Select the failed channel on the COMPARATOR CHANNEL DEFEAT switch. b. Verify annunciator 1G-E4, NIS PWR RANGE CH AVG FLUX DEVIATION - NOT LIT. • Miscellaneous Control and Indication Panel <ul style="list-style-type: none"> a. Select the failed channel on the ROD STOP BYPASS switch. b. Verify annunciator 1G-G1, NIS PWR RNG HI FLUX ROD STOP – NOT LIT. c. Select the failed channel on the UPPER SECTION defeat switch. d. Verify annunciator 1G-C4, UPPER ION CHAMBER DEVIATION OR AUTO DEFEAT < 50% - NOT LIT. e. Select the failed channel on the LOWER SECTION defeat switch. f. Verify annunciator 1G-D4, LOWER ION CHAMBER DEVIATION OR AUTO DEFEAT < 50% - NOT LIT.

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 3

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Event Description: Power Range NI (N-44) fails high.

Cue: By Examiner.

	BOP	<p>AP-4.0 Attachment 1 Actions (Normal Actions for BOP)</p> <p>NOTE: Annunciator NIS PWR RNG HI STPT (1E-E5, 1E-F5, 1E-G5, or 1E-H5) for the channel being placed in trip, NIS PWR RNG LOSS OF DET VOLT (1G-C3), and NIS DROPPED ROD FLUX DECREASE > 5% PER 2 SEC (1G-H1) will alarm when the instrument power fuses are pulled.</p> <p>2. Place the failed Power Range channel in trip IAW the following:</p> <ol style="list-style-type: none"> a. At the Power Range drawer, remove the INSTRUMENT POWER fuses. b. At the Power Range drawer, put the POWER RANGE TEST switch in the TEST position. c. Verify annunciator 1G-H1, NIS DROPPED ROD FLUX DECREASE > 5% PER 2 SEC - LIT. d. Verify annunciator 1G-C3, NIS PWR RNG LOSS OF DET VOLT – LIT.
	BOP	<p>AP-4.0 Attachment 1 Actions (Normal Actions for BOP)</p> <p>3. Remove the following PCS points for the failed channel from scan:</p> <ul style="list-style-type: none"> • N-44, N0047A and N0048A <p>The team may opt to have I&C remove these points from scan.</p>
		<p>Note: Step 4 is not applicable for N-44; Step 5 is for reactor power greater than 75%.</p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 3

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Event Description: Power Range NI (N-44) fails high.

Cue: By Examiner.

	SRO	<p>AP-4.0 Attachment 1 Actions</p> <p>5. IF reactor power is greater than 75%, THEN do either a OR b below:</p> <p>a) Determine the core quadrant balance using the incore movable detectors when any of the following occur.</p> <ul style="list-style-type: none"> • Twelve hours have passed since the last core quadrant balance was performed. • A change in Reactor power level greater than 10%. • Control rod movement of greater than 30 inches (48 steps) <p>b) Within 12 hours, reduce Reactor power to less than or equal to 75% of rated power, and within 78 hours, reduce the High Flux trip setpoints to less than or equal to 85% of rated power.</p>
	SRO	<p>AP-4.0 Attachment 1 Actions</p> <p>6. IF Reactor power is less than or equal to 75%, and will remain there, THEN within 78 hours, reduce the High Flux trip setpoint to less than or equal to 85% of rated power.</p> <p>SRO contacts shift manager and/or instrument technicians</p>
	SRO	<p>AP-4.0 Attachment 1 Actions</p> <p>7. Refer to Tech Spec Table 3.7-1, Item 2, 5, 6, and 20.</p> <p>Determines 3.7-1 items 2 and 5 are applicable (trip channel w/in 72 hr; restrict power to 75% and reduce trip setpoints to 85% or 12 hr QPTR)</p>
	SRO	<p>AP-4.0 Attachment 1 Actions</p> <p>8. Refer to Tech Spec 3.12.D.</p>

End Event #3

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 4

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Event Description: Loss of EHC pump with auto-start failure of standby pump.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	<p>Diagnoses loss of EH pump with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • 1-TS-D2 EH Fluid Low Pressure <p>Indications:</p> <ul style="list-style-type: none"> • Abnormal pump indications at control switch
	SRO	Direct initiation of 1-TS-D2 EH Fluid Low Pressure
	BOP BOP	<p>Note: The EH fluid low pressure alarm is set to actuate at 1550 psig. Actuation between 1500 – 1600 psig is acceptable.</p> <p>1 CHECK STANDBY EH PUMP AUTO STARTED.</p> <ul style="list-style-type: none"> • MP1 • MP2 <p>BOP reports standby pump is not running and ARP reader goes to RNO column.</p> <p>The team may opt to start the standby EH pump at this time (as this pump should have automatically started).</p> <p><i>BOOTH: If it appears that the RO will be the candidate that will start the standby EHC pump, contact the RO as reactor engineering on the gaitronics concerning the recent failure of N-44. Ask questions as if reactor engineering was gathering data (i.e., what is reactor power and flux currently indicating, etc...).</i></p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 4

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Event Description: Loss of EHC pump with auto-start failure of standby pump.

Cue: By Examiner.

BOP	<p>1. RNO – Locally check EH System.</p> <p>BOP may dispatch personnel to locally investigate the cause of the pump trip.</p> <p><u>IF</u> leakage indicated, <u>THEN</u> GO TO Step 3.</p> <p>Local reports will state that leakage is NOT indicated.</p> <p><u>IF</u> leakage <u>NOT</u> indicated, <u>THEN</u> do the following:</p> <p>a) <u>IF</u> EH system pressure has dropped to 1450 psig, <u>THEN</u> start the standby EH pump.</p> <p>The BOP will start the standby EH Pump.</p> <p>b) GO TO Step 4</p>
BOP	<p>NOTE: EHC Pump discharge flow indicators reading greater than 5 gpm (total flow) indicates possible flow through a Governor Moog Servo valve.</p> <p>4. CHECK FOR LEAKAGE THROUGH GOVERNOR MOOG SERVO VALVES</p> <ul style="list-style-type: none"> • 1-EH-FI-100 for 1-EH-P-MP1 • 1-EH-FI-101 for 1-EH-P-MP2 • Erratic movement on Turbine Governor Valve(s) <p>Personnel dispatched will report no movement on the Governor Valves and no flow indicated on 1-EH-FI-100 and 1-EH-FI-101.</p>
	<p>5. CHECK EH PUMPS – ONLY ONE RUNNING</p>
	<p>NOTE: The EH relief valve is set at 2300 psig.</p> <p>6. LOCALLY CHECK EH PRESSURE – BETWEEN 1925 TO 2075 PSIG</p> <p>Personnel dispatched will report local pressure (if a pump is running) at 2000 psig.</p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 4

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Event Description: Loss of EHC pump with auto-start failure of standby pump.

Cue: By Examiner.

	BOP	7. CHECK STANDBY EH PUMP – NOT TURNING BACKWARDS Personnel dispatched will report the standby pump is not rotating backwards.
	BOP	NOTE: The EH pump discharge strainers are located at the top of the EH control block. Strainer ΔP can be determined by the difference between system pressure and running pump pressure (MP-1 or MP-2). Normal strainer ΔP is 40 – 50 psid. 8. CHECK EH PUMP DISCHARGE STRAINER ΔP – LESS THAN 50 PSID Personnel dispatched will report local strainer ΔP is 44 psid.
	BOP	9. SUBMIT WORK REQUEST ON ANNUNCIATOR OR INSTRUMENTATION AS NECESSARY.
	SRO	10. NOTIFY THE FOLLOWING: <ul style="list-style-type: none"> • OMOG • STA END

END – Event 4

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 5

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Event Description: RCS leak in containment (AP-16, Excessive RCS Leakage).

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	Team	<p>Diagnoses RCS leak with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • RM-Q8 Containment Gas Radiation Monitor • 1B-A3 Containment Sump High Level • 1C-B8 Pressurizer low pressure <p>Indications:</p> <ul style="list-style-type: none"> • Charging Flow increasing • Pressurizer level decreasing • Pressurizer pressure decreasing
	SRO	Direct initiation of AP-16.00, EXCESSIVE RCS LEAKAGE
	SRO RO	<p>Note: If SI Accumulators are isolated, 1-AP-16.01, SHUTDOWN LOCA, should be used for guidance.</p> <p>Note: RCS average temperature has a direct impact on pressurizer level.</p> <p>[1] INCREASE CHG FLOW USING 1-CH-FCV-1122 IN MANUAL TO MAINTAIN PRZR LEVEL AT PROGRAM SETPOINT, AS NECESSARY</p> <p>RO places charging in manual and attempts to maintain level at program (immediate action).</p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 5

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Event Description: RCS leak in containment (AP-16, Excessive RCS Leakage).

Cue: By Examiner.

	RO	<p>[2] CHECK RCS LEAK RATE</p> <ul style="list-style-type: none"> • Pressurizer level – Decreasing (or) • Charging Flow – 25 gpm above pre-event value <p>RO estimates RCS leak rate is > 25 gpm (immediate action)</p>
	RO	<p>[3] VERIFY CLOSED OR CLOSE NORMAL AND EXCESS LETDOWN ISOLATIONS:</p> <ul style="list-style-type: none"> • 1-CH-LCV-1460A • 1-CH-LCV-1460B • 1-RC-HCV-1557A • 1-RC-HCV-1557B • 1-RC-HCV-1557C • 1-RH-HCV-1142 <p>Closes 1-CH-LCV-1460A and 1-CH-LCV-1460B (immediate action).</p>
	RO	<p>[4] VERIFY THE FOLLOWING PARAMETERS – STABLE OR INCREASING</p> <ul style="list-style-type: none"> • PRZR Level • PRZR Pressure • RCS Subcooling <p>Identifies all parameters are stable, but beginning to decrease and cannot be controlled. The team should identify this and trip the reactor based on the continually degrading conditions.</p> <p>RNO</p> <p>GO TO 1-E-0, REACTOR TRIP OR SAFETY INJECTION</p>
	SRO	<p>Direct RO to perform the Immediate Actions of E-0, REACTOR TRIP OR SAFETY INJECTION</p>

End of Event #5

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 6

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Event Description: Manual Reactor Trip/Safety Injection with failure of main generator to trip.

Cue: RCS leak rate increasing such that a reactor trip is desired.

	SRO/BOP	5. Initiate Attachment 1 (Attachment 1 actions contained under Event 7 on pages 37 - 41).
	BOP	<p>SRO may provide the BOP with Attachment 8 of 1-E-0 for guidance on AFW control.</p> <p>Actions are summarized below:</p> <ol style="list-style-type: none"> 1. Verify SI is in progress. 2. Verify running or start 1-FW-P-2, 1-FW-P-3A, and 1-FW-P-3B. 3. Maintain minimum AFW flow of 350 gpm [450 gpm] until one SG Narrow Range level is greater than 12% 4. When minimum heat sink has been verified, AFW MOVs should be controlled to maintain intact SG Narrow Range levels between 22% and 50% by throttling AFW Isolation MOVs.
	RO	<p>*6. CHECK RCS AVERAGE TEMPERATURE</p> <ul style="list-style-type: none"> • STABLE AT 547°F <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • TRENDING TO 547°F <p>The team will identify that RCS temperature is decreasing. The team should attribute this to the injection of SI into the RCS and AFW flow to the SGs. It is acceptable for the team to enter the RNO portion of this step and perform the applicable steps (summarized below):</p> <ul style="list-style-type: none"> Stop dumping steam Reduce AFW flow to the SG Close MSTVs if cooldown continues

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 6

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Event Description: Manual Reactor Trip/Safety Injection with failure of main generator to trip.

Cue: RCS leak rate increasing such that a reactor trip is desired.

	RO	<p>7. CHECK PRZR PORVs AND SPRAY VALVES:</p> <p>a) PRZR PORVs – CLOSED</p> <p>b) PRZR spray controls</p> <ul style="list-style-type: none"> • Demand at Zero (or) • Controlling Pressure <p>c) PORV block valves - AT LEAST ONE OPEN</p>
	SRO/RO	<p>Depending on progression through 1-E-0 and the rate of RCS pressure decrease the team may secure RCPs based on the Continuous Actions Page (CAP) of 1-E-0.</p> <p>The applicable step within the CAP is listed below.</p> <p>1. RCP TRIP CRITERIA</p> <p>Trip all RCPs if <u>BOTH</u> conditions listed below occur:</p> <p>a. Charging Pumps - AT LEAST ONE RUNNING AND FLOWING TO RCS</p> <p>b. RCS Subcooling - LESS THAN 30°F [85°F]</p> <p>The reactor operator will observe that two or three charging pumps are running and flowing to the RCS as indicated on SI flow meters. The RO will also identify that RCS subcooling is less than 30°F by indication on CETCs and by the loss of RCS Subcooling alarm.</p> <p>Critical Task: [WOG E-1—C] Trip all RCPs within 5 minutes of reaching RCP Trip and Miniflow recirc criteria (KOA).</p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 6

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Event Description: Manual Reactor Trip/Safety Injection with failure of main generator to trip.

Cue: RCS leak rate increasing such that a reactor trip is desired.

	<p><i>Step 8 is listed below as if RCS subcooling has been lost, if subcooling is not lost when this step is reached, the team will utilize the RNO and go to Step 9 to commence the diagnostic steps of 1-E-0.</i></p> <p>SRO NOTE: Seal injection flow should be maintained to all RCPs.</p> <p>*8. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:</p> <p>RO a) Charging Pumps – AT LEAST ONE RUNNING AND FLOWING TO RCS</p> <p>Two or three Charging pumps will be running and flowing to the RCS.</p> <p>b) RCS subcooling - LESS THAN 30°F [85°F]</p> <p>RCS subcooling will be less than 30 °F</p> <p>c) Stop all RCPs</p> <p>The RO will stop RCPs.</p> <p>d) RCS pressure - LESS THAN 1275 psig [1475 PSIG]</p> <p>If RCS pressure is less than 1275 psig the RO or BOP will close 1-CH-MOV-1275A, B, and C.</p> <p>e) Close CHG pump miniflow recirc valves:</p> <ul style="list-style-type: none"> • 1-CH-MOV-1275A • 1-CH-MOV-1275B • 1-CH-MOV-1275C <p>Critical Task: [WOG E-1—C] Trip all RCPs within 5 minutes of reaching RCP Trip and Miniflow recirc criteria (KOA).</p>
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Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 6

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Event Description: Manual Reactor Trip/Safety Injection with failure of main generator to trip.

Cue: RCS leak rate increasing such that a reactor trip is desired.

BOP	<p>9. CHECK IF SGs ARE NOT FAULTED:</p> <ul style="list-style-type: none"> • Check pressures in all SGs a) STABLE OR INCREASING AND b) GREATER THAN 100 PSIG <p>BOP will observe a slightly decreasing trend on SG pressures. This will be attributed to the RCS cooldown. The team will not transition to 1-E-2.</p>
BOP	<p>10. CHECK IF SG TUBES ARE NOT RUPTURED:</p> <ul style="list-style-type: none"> • Condenser air ejector radiation – NORMAL • SG blowdown radiation – NORMAL • SG MS radiation – NORMAL • TD AFW pump exhaust radiation – NORMAL • SG NR Level - NOT INCREASING IN AN UNCONTROLLED MANNER <p>BOP should observe no abnormalities with Secondary Radiation.</p>
SRO	
SRO/RO	<p>11. CHECK RCS - INTACT INSIDE CTMT</p> <ul style="list-style-type: none"> • CTMT radiation - NORMAL • CTMT pressure - NORMAL • CTMT RS sump level - NORMAL <p>11. RNO - GO TO 1-E-1, LOSS OF REACTOR OR SECONDARY COOLANT.</p>
SRO	<p>The team will hold a transition brief. During the brief it will be identified that a LOCA is in progress and the team will transition to 1-E-1</p> <p><i>The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal, with the exception of the alarms already received. He will also state that containment conditions and the electrical conditions are as you see them (or as reported by the RO/BOP).</i></p>

END – Event 6

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 7

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Event Description: LHSI and HHSI pumps fail to auto start.

Cue: By Examiner.

	SRO	<p>ATTACHMENT 2 of 1-E-0</p> <p>This attachment can be performed at any time during 1-E-0. It is a pre-emptive action, so it is not required to be performed.</p> <p>NOTE: Components previously aligned by SI termination steps, must not be realigned by this Attachment.</p>
	RO	<p>ATTACHMENT 2 of 1-E-0</p> <p>1. Verify opened or open CHG pump suction from RWST MOVs.</p> <ul style="list-style-type: none"> • 1-CH-MOV-1115B • 1-CH-MOV-1115D
	RO	<p>ATTACHMENT 2 of 1-E-0</p> <p>2. Verify closed or close CHG pump suction from VCT MOVs.</p> <ul style="list-style-type: none"> • 1-CH-MOV-1115C • 1-CH-MOV-1115E
	RO	<p>ATTACHMENT 2 of 1-E-0</p> <p>3. Verify running or start at least two CHG pumps. (listed in preferred order)</p> <ul style="list-style-type: none"> • 1-CH-P-1C • 1-CH-P-1B • 1-CH-P-1A <p>RO will start the non-running charging pumps.</p>
	RO	<p>ATTACHMENT 2 of 1-E-0</p> <p>4. Verify opened or open HHSI to cold legs MOVs.</p> <ul style="list-style-type: none"> • 1-SI-MOV-1867C • 1-SI-MOV-1867D

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 7

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Event Description: LHSI and HHSI pumps fail to auto start.

Cue: By Examiner.

	RO	ATTACHMENT 2 of 1-E-0 5. Verify closed or close CHG line isolation MOVs. <ul style="list-style-type: none"> • 1-CH-MOV-1289A • 1-CH-MOV-1289B
	RO	ATTACHMENT 2 of 1-E-0 6. Verify closed or close Letdown orifice isolation valves. <ul style="list-style-type: none"> • 1-CH-HCV-1200A • 1-CH-HCV-1200B • 1-CH-HCV-1200C
	RO	ATTACHMENT 2 of 1-E-0 7. Verify opened or open LHSI suction from RWST MOVs. <ul style="list-style-type: none"> • 1-SI-MOV-1862A • 1-SI-MOV-1862B
	RO	ATTACHMENT 2 of 1-E-0 8. Verify opened or open LHSI to cold legs MOVs. <ul style="list-style-type: none"> • 1-SI-MOV-1864A • 1-SI-MOV-1864B
	RO	ATTACHMENT 2 of 1-E-0 9. Verify running or start at least one LHSI pump. <ul style="list-style-type: none"> • 1-SI-P-1A • 1-SI-P-1B <p>RO starts both LHSI pumps.</p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 7

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Event Description: LHSI and HHSI pumps fail to auto start.

Cue: By Examiner.

	RO	ATTACHMENT 2 of 1-E-0 10. Verify High Head SI flow to cold legs indicated. <ul style="list-style-type: none">• 1-SI-FI-1961• 1-SI-FI-1962• 1-SI-FI-1963• 1-SI-FI-1943 or 1-SI-FI-1943A
	RO	ATTACHMENT 2 of 1-E-0 11. IF flow not indicated, THEN manually start pumps and align valves. IF flow NOT established, THEN consult with Shift Supervision to establish another high pressure injection flow path while continuing with this procedure. <ul style="list-style-type: none">• Alternate SI to Cold legs• Hot leg injection

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 7

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Event Description: LHSI and HHSI pumps fail to auto start.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	<p data-bbox="541 540 855 566">ATTACHMENT 1 OF E-0</p> <p data-bbox="541 602 893 627">1. VERIFY FW ISOLATION:</p> <ul data-bbox="591 666 1197 1070" style="list-style-type: none"> <li data-bbox="591 666 1080 691">• Feed pump discharge MOVs – CLOSED <li data-bbox="591 729 844 755">• 1-FW-MOV-150A <li data-bbox="591 793 844 819">• 1-FW-MOV-150B <li data-bbox="591 857 921 883">• MFW pumps – TRIPPED <li data-bbox="591 921 959 946">• Feed REG valves – CLOSED <li data-bbox="591 985 1197 1010">• SG FW bypass flow valves – DEMAND AT ZERO <li data-bbox="591 1049 981 1074">• SG blowdown TVs – CLOSED
	BOP	<p data-bbox="541 1140 1037 1166">2. VERIFY CTMT ISOLATION PHASE I:</p> <ul data-bbox="591 1204 1009 1544" style="list-style-type: none"> <li data-bbox="591 1204 905 1229">• Phase I TVs – CLOSED <li data-bbox="591 1268 968 1293">• 1-CH-MOV-1381 – CLOSED <li data-bbox="591 1332 943 1357">• 1-SV-TV-102A – CLOSED <li data-bbox="591 1395 1009 1421">• PAM isolation valves – CLOSED <ul data-bbox="640 1459 865 1544" style="list-style-type: none"> <li data-bbox="640 1459 865 1485">• 1-DA-TV-103A <li data-bbox="640 1523 865 1549">• 1-DA-TV-103B

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 7

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Event Description: LHSI and HHSI pumps fail to auto start.

Cue: By Examiner.

	BOP	<p>3. VERIFY AFW PUMPS RUNNING:</p> <ul style="list-style-type: none"> a) MD AFW pumps – RUNNING (Time Delayed) b) TD AFW pump - RUNNING IF NECESSARY
	BOP	<p>4. VERIFY SI PUMPS RUNNING:</p> <ul style="list-style-type: none"> • CHG pumps – RUNNING • LHSI pumps - RUNNING <p>If not previously performed – Identifies only one CHG pump and no LHSI pumps are running.</p> <p>RNO</p> <p>Manually starts 2 LHSI pumps and 2 HHSI pumps.</p>
	BOP	<p>5. CHECK CHG PUMP AUXILIARIES:</p> <ul style="list-style-type: none"> • CHG pump CC pump – RUNNING • CHG pump SW pump - RUNNING
	BOP	<p>6. CHECK INTAKE CANAL:</p> <ul style="list-style-type: none"> • Level - GREATER THAN 24 FT • Level - BEING MAINTAINED BY CIRC WATER PUMPS

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 7

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Event Description: LHSI and HHSI pumps fail to auto start.

Cue: By Examiner.

	BOP	<p>7. CHECK IF MAIN STEAMLINES SHOULD BE ISOLATED:</p> <p>a) Check if ANY of the following annunciators - HAVE BEEN LIT</p> <ul style="list-style-type: none"> • E-F-10 (High Steam Flow SI) • B-C-4 (Hi Hi CLS Train A) • B-C-5 (Hi Hi CLS Train B) <p>Identifies annunciators not lit and goes to step 8.</p>
	BOP	<p>*8. CHECK IF CS REQUIRED:</p> <p>a) CTMT pressure – HAS EXCEEDED 23 PSIA</p> <p>Identifies pressure has not exceeded 23 or 17.7 psia and goes to step 10.</p>
	BOP	<p>*10. BLOCK LOW PRZR PRESS SI SIGNAL:</p> <p>a) Check PRZR pressure – LESS THAN 2000 psig</p> <p>b) Turn both LO PRZR PRESS & STM HDR/LINE <input type="checkbox"/>P switches to block</p> <p>c) Verify Permissive Status light C-2 - LIT</p> <p>BOP may block the low pressurizer pressure SI signal depending on current RCS pressure.</p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 7

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Event Description: LHSI and HHSI pumps fail to auto start.

Cue: By Examiner.

	BOP	<p>*11. BLOCK LOW TAVE SI SIGNAL:</p> <p>Step may not be performed at this time (if Tave is greater than 543°F).</p> <ol style="list-style-type: none"> a) Check RCS Tave - LESS THAN 543°F b) Turn both HI STM FLOW & LO TAVG OR LP switches to block c) Verify Permissive Status light F-1 - LIT
	BOP	<p>NOTE:</p> <ul style="list-style-type: none"> • CHG pumps should be run in the following order of priority: C, B, A. • Subsequent SI signals may be reset by re-performing Step 12. <p>12. VERIFY SI FLOW:</p> <ol style="list-style-type: none"> a) HHSI to cold legs - FLOW INDICATED <ul style="list-style-type: none"> • 1-SI-FI-1961 (NQ) • 1-SI-FI-1962 (NQ) • 1-SI-FI-1963 (NQ) • 1-SI-FI-1943 or 1-SI-FI-1943A b) Check CHG pumps - THREE RUNNING c) Reset SI. d) Stop one CHG pump and out in AUTO e) RCS pressure - LESS THAN 185 PSIG <p>RNO: e) IF two LHSI pumps are running, THEN do the following:</p> <ol style="list-style-type: none"> 1) Verify reset or reset SI. 2) Stop one LHSI pump and put in AUTO. 3) GO TO Step 13. <p>Depending on RCS pressure the BOP may or may not secure a LHSI pump.</p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 7

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Event Description: LHSI and HHSI pumps fail to auto start.

Cue: By Examiner.

	BOP	13. VERIFY TOTAL AFW FLOW - GREATER THAN 350 GPM [450 GPM]
	BOP	14. CHECK AFW MOVs - OPEN BOP will identify that all AFW MOVs are not open and will read the RNO portion of this step and manually align valves as necessary.
	BOP	15. INITIATE SI VALVE ALIGNMENT IAW ATTACHMENT 2 See pages 34, 35, and 36. Depending on timing, this attachment may have already been completed.
	BOP	16. INITIATE VENTILATION ALIGNMENT AND AC POWER ALIGNMENT IAW ATTACHMENT 3 See attached copy of Attachment 3: <i>Unit 2 Operator will state that Unit 2 is at 100% power (if asked)</i> <i>Unit 2 will also accept responsibility to complete Attachment 3 if it is given to Unit 2 at the point where differential pressure indications are requested.</i>

End of Event 7

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 8

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Event Description: Large Break LOCA.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		<p><i>As the team transitions from 1-E-0, the STA should identify the following CSFST flow path:</i></p> <p><i>FR-P.1 – RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITION (RED PATH)</i></p> <p><i>Depending on plant conditions, the STA may also identify the following CSFST flow path:</i></p> <p><i>FR-C.2 – RESPONSE TO DEGRADED CORE CONDITIONS (ORANGE PATH)</i></p>
	<p>RO</p> <p>SRO</p>	<p>1-FR-P.1 Actions</p> <p>1. CHECK RCS PRESSURE – GREATER THAN 185 PSIG [250 PSIG]</p> <p>1. RNO – IF LHSI pump flow greater than 1000 gpm, THEN RETURN TO procedure and step in effect.</p> <p>The team will identify that they have LHSI flow greater than 1000 gpm and exit FR-P.1.</p>
		<p>Following the transition out of 1-FR-P.1, the team will return to 1-E-1. However, depending on plant conditions the team may transition to 1-FR-C.2.</p> <p>FR-C.2 Actions are contained at the end of this document. Additionally, the actions are “grayed” as it is not expected that they will be used.</p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 8

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Event Description: Large Break LOCA.

Cue: By Examiner.

	SRO	1-E-1, Loss of Reactor or Secondary Coolant
	RO	<p>1-E-1 Actions</p> <p>1. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:</p> <ul style="list-style-type: none"> a) Charging Pumps - AT LEAST ONE RUNNING AND FLOWING TO RCS b) RCS subcooling - LESS THAN 30°F [85°F] c) Stop all RCPs d) RCS pressure - LESS THAN 1275 PSIG [1475 PSIG] e) Close CHG pump miniflow recirc valves: <ul style="list-style-type: none"> • 1-CH-MOV-1275A • 1-CH-MOV-1275B • 1-CH-MOV-1275C
	BOP	<p>1-E-1 Actions</p> <p>2. CHECK IF SGs ARE NOT FAULTED:</p> <ul style="list-style-type: none"> • Check pressures in all SGs: <ul style="list-style-type: none"> • STABLE OR INCREASING <p style="text-align: center;">AND</p> • GREATER THAN 100 PSIG

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 8

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Event Description: Large Break LOCA.

Cue: By Examiner.

	BOP	<p>1-E-1 Actions</p> <p>*3. CHECK INTACT SG LEVELS:</p> <p>a) Narrow range level – GREATER THAN 12% [18%]</p> <p>b) Check emergency buses – BOTH ENERGIZED</p> <p>c) Control feed flow to maintain narrow range level between 22% and 50%</p>
	BOP	<p>1-E-1 Actions</p> <p>4. CHECK IF SG TUBES ARE NOT RUPTURED:</p> <ul style="list-style-type: none"> • Condenser air ejector radiation - NORMAL • SG blowdown radiation - NORMAL • SG main steam radiation - NORMAL • TD AFW pump exhaust radiation - NORMAL • SG NR Level - NOT INCREASING IN AN UNCONTROLLED MANNER
	SRO RO	<p>1-E-1 Actions</p> <p>CAUTION: If any PRZR PORV opens because of high PRZR pressure, the PORV must be verified closed or isolated after pressure decreases to less than 2335 psig.</p> <p>*5. CHECK PRZR PORVs AND BLOCK VALVES:</p> <p>a) Power to PRZR PORV block valves - AVAILABLE</p> <p>b) PRZR PORVs - CLOSED</p> <p>c) PRZR PORV block valves - AT LEAST ONE OPEN</p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 8

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Event Description: Large Break LOCA.

Cue: By Examiner.

	RO	<p>1-E-1 Actions</p> <p>*6. CHECK IF SI FLOW SHOULD BE REDUCED:</p> <p>a) RCS subcooling based on CETCs - GREATER THAN 30°F [85°F]</p> <p>a) RNO - GO TO Step 7</p> <p>b) Secondary heat sink:</p> <ul style="list-style-type: none"> • Total feed flow to INTACT SGs - GREATER THAN 350 GPM [450 GPM] <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • Narrow range level in at least one intact SG - GREATER THAN 12% [18%] <p>c) RCS pressure - STABLE OR INCREASING</p> <p>c) RNO - GO TO Step 7.</p>
	RO	<p>1-E-1 Actions</p> <p>*7. CHECK IF HI HI CLS INITIATED:</p> <ul style="list-style-type: none"> • CS pump(s) - RUNNING <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • Any Hi Hi CLS annunciator - LIT
	RO	<p>1-E-1 Actions</p> <p>8. VERIFY SERVICE WATER AVAILABLE:</p> <p>a) Check Intake Canal level – BEING MAINTAINED BY CW PUMPS</p> <p>b) GO TO Step 12</p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 8

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Event Description: Large Break LOCA.

Cue: By Examiner.

	BOP	1-E-1 Actions 16. CHECK IF EDGs CAN BE STOPPED: a) Verify AC emergency buses – ENERGIZED BY OFFSITE POWER b) Reset both trains of SI if necessary c) Stop any unloaded EDGs IAW Attachment 1
	RO	1-E-1 Actions 17. VERIFY INSTRUMENT AIR AVAILABLE: a) Check annunciator B-E-6 - NOT LIT b) Check at least one CTMT IA compressor - RUNNING • 1-IA-C-4A or 1-IA-C-4B c) Verify 1-IA-TV-100 - OPEN

End of Event 8

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 9

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Event Description: LHSI pumps trip leading to ECA-1.1.

Cue: At Step 18b of 1-E-1 or by lead examiner.

Time	Position	Applicant's Action or Behavior
	RO	<p>1-E-1 Actions</p> <p>18. INITIATE EVALUATION OF PLANT STATUS:</p> <p>a) Verify at least one train of cold leg recirculation capability:</p> <p>1) Train A - AVAILABLE</p> <ul style="list-style-type: none"> • 1-SI-P-1A • 1-SI-MOV-1863A • 1-SI-MOV-1885A and D • 1-SI-MOV-1860A • 1-SI-MOV-1862A • 1-CH-MOV-1115B and D <p>2) Train B - AVAILABLE</p> <ul style="list-style-type: none"> • 1-SI-P-1B • 1-SI-MOV-1863B • 1-SI-MOV-1885B and C • 1-SI-MOV-1860B • 1-SI-MOV-1862B • 1-CH-MOV-1115B and D <p>a) RNO - IF cold leg recirculation capability can NOT be verified, THEN GO TO 1-ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.</p> <p>Depending on the timing of this event, the team may transition to 1-ECA-1.1 at this time or the second time through the procedural loop</p> <p>The team may transitions to 1-ECA-1.1 at this time (see page 53) or continue on in E-1 (either path is acceptable).</p>
	RO	<p>1-E-1 Actions (procedural loop)</p> <p>18. INITIATE EVALUATION OF PLANT STATUS (continued):</p> <p>b) Check auxiliary building radiation - NORMAL</p> <ul style="list-style-type: none"> • MGPI vent-vent monitors • Auxiliary Building Control Area Monitor <p><i>If asked, Unit 2 will report that both the MGPI vent-vent monitor and Auxiliary Building Control Area monitor are indicating normally.</i></p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 9

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Event Description: LHSI pumps trip leading to ECA-1.1.

Cue: At Step 18b of 1-E-1 or by lead examiner.

	SRO	<p>I-E-1 Actions (procedural loop)</p> <p>18. INITIATE EVALUATION OF PLANT STATUS (continued):</p> <p>c) Consult with TSC on need to obtain any of the following samples:</p> <ul style="list-style-type: none"> • RCS: <ul style="list-style-type: none"> ○ Boron ○ Activity • CTMT Sump: <ul style="list-style-type: none"> ○ Chlorides ○ Boron ○ pH ○ Activity • CTMT Atmosphere: <ul style="list-style-type: none"> ○ H2 ○ Activity • SGs: <ul style="list-style-type: none"> ○ Activity ○ Sodium ○ Chlorides ○ pH ○ Conductivity ○ Boron <p><i>If asked, the shift manager (or TSC) will perform Step 18c of 1-E-1.</i></p>
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Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 9

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Event Description: LHSI pumps trip leading to ECA-1.1.

Cue: At Step 18b of 1-E-1 or by lead examiner.

	SRO -	<p>1-E-1 Actions (procedural loop)</p> <p>18. INITIATE EVALUATION OF PLANT STATUS (continued):</p> <p>d) Initiate evaluation of plant equipment:</p> <ul style="list-style-type: none"> • Electrical Distribution • Safeguards • Water/Gaseous supply and storage • Radiation Monitoring • Nuclear Instrumentation • CVCS • Ventilation • Post-Accident Monitoring • Instrument Air System <p><i>If asked, Unit 2 will report that both the systems as normal, with the exception of Unit 1 Radiation Monitors in containment and the fuel building (shine)..</i></p>
	SRO RO	<p>1-E-1 Actions (procedural loop)</p> <p>NOTE:</p> <ul style="list-style-type: none"> • CHG pumps should be run in the following order of priority: C, B, A • The highest priority charging pump should be aligned to the normal header. <p>19. ESTABLISH CHG PUMP REDUNDANT FLOW PATHS</p> <p>a) Check CHG pumps – THREE RUNNING</p> <p>a) RNO – IF one CHG pump running then go to Step 20</p> <p>IF two CHG pumps running, THEN do the following:</p> <ol style="list-style-type: none"> 1) Verify or place the non-running CHG pump in PTL. 2) GO TO Step 19c.

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Event Description: LHSI pumps trip leading to ECA-1.1.

Cue: At Step 18b of 1-E-1 or by lead examiner.

		1-E-1 Actions (procedural loop)
		19. ESTABLISH CHG PUMP REDUNDANT FLOW PATHS (continued)
	RO	c) Open alternate HHSI to cold legs <ul style="list-style-type: none"> • 1-SI-MOV-1842
	RO/BOP	d) Align one CHG pump to flow through the normal SI HDR by closing the associated alternate discharge MOV: <ul style="list-style-type: none"> • 1-CH-P-1A 1-CH-MOV-1287A • 1-CH-P-1B 1-CH-MOV-1287B • 1-CH-P-1C 1-CH-MOV-1287C
		RO/BOP will close 1-CH-MOV-1287C.
	RO/BOP	e) Align the other running CHG pump to flow through the normal SI HDR by closing the associated normal discharge MOV <ul style="list-style-type: none"> • 1-CH-P-1A 1-CH-MOV-1286A • 1-CH-P-1B 1-CH-MOV-1286B • 1-CH-P-1C 1-CH-MOV-1286C
		RO/BOP will close 1-CH-MOV-1286B.
	RO/BOP	f) Close the normal discharge MOV on the NON-RUNNING CHG Pump <ul style="list-style-type: none"> • 1-CH-P-1A 1-CH-MOV-1286A • 1-CH-P-1B 1-CH-MOV-1286B • 1-CH-P-1C 1-CH-MOV-1286C
		RO/BOP will close 1-CH-MOV-1286A.
	RO/BOP	g) Verify HHSI flow through BOTH headers <ul style="list-style-type: none"> • 1-SI-FI-1940 • 1-SI-FI-1940A • 1-SI-FI-1943 • 1-SI-FI-1943A

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 9

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Event Description: LHSI pumps trip leading to ECA-1.1.

Cue: At Step 18b of 1-E-1 or by lead examiner.

	RO	<p>1-E-1 Actions (procedural loop)</p> <p>20. CHECK IF RCS COOLDOWN AND DEPRESSURIZATION IS REQUIRED:</p> <p>a) RCS Pressure – GREATER THEN 250 PSIG [400 PSIG]</p> <p>a) RNO – IF LHSI pump flow greater than 1000 gpm, THEN GO TO Step 21.</p>
	RO	<p>1-E-1 Actions (procedural loop)</p> <p>21. CHECK IF TRANSFER TO COLD LEG RECIRCULATION IS REQUIRED</p> <p>a) RWST Level – LESS THAN 20%</p> <p>a) RNO – RETURN TO STEP 18.</p>
		<p>-E-1 Actions</p> <p>18. INITIATE EVALUATION OF PLANT STATUS:</p> <p>a) Verify at least one train of cold leg recirculation capability:</p> <p>1) Train A - AVAILABLE</p> <ul style="list-style-type: none"> • 1-SI-P-1A • 1-SI-MOV-1863A • 1-SI-MOV-1885A and D • 1-SI-MOV-1860A • 1-SI-MOV-1862A • 1-CH-MOV-1115B and D <p>2) Train B - AVAILABLE</p> <ul style="list-style-type: none"> • 1-SI-P-1B • 1-SI-MOV-1863B • 1-SI-MOV-1885B and C • 1-SI-MOV-1860B • 1-SI-MOV-1862B • 1-CH-MOV-1115B and D <p>a) RNO - IF cold leg recirculation capability can NOT be verified, THEN GO TO 1-ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.</p>

Op-Test No.: Surry 2008 Scenario No.: 5 Event No.: 9

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Event Description: LHSI pumps trip leading to ECA-1.1.

Cue: At Step 18b of 1-E-1 or by lead examiner.

		1-ECA-1.1, Loss of Emergency Coolant Recirculation
	SRO	<p>CAUTION:</p> <ul style="list-style-type: none"> • If emergency coolant recirculation capability is restored, return to the procedure and step in effect. • If suction source is lost to any SI or spray pump, the pump should be stopped. • Maintain greater than or equal to 150 gpm total AFW flow when feeding two or less Steam Generators with the TD AFW pump operating. Methods that may be used to comply with this restriction: <ol style="list-style-type: none"> 1) Increasing total AFW flow to greater than 150 gpm 2) Feeding ALL Steam Generators 3) Securing the TD AFW Pump <p>NOTE:</p> <ul style="list-style-type: none"> • Attachment 2 provides a graph of the minimum amount of RCS makeup flow required to remove decay heat. • If procedure has been entered due to CTMT sump blockage, FRs should NOT be implemented until directed. • The minimum containment sump level for manual restart of LHSI pump suction is 6.0 ft.
	RO	<p>1. CHECK EMERGENCY COOLANT RECIRCULATION EQUIPMENT - AVAILABLE</p> <p>a) Check the following pumps - AVAILABLE:</p> <ul style="list-style-type: none"> • 1-SI-P-1A AND • 1-CH-P-1A, B, or C <p>a) RNO - GO TO Step 2.</p>

FR-C.2 Actions

	SRO	<p>1-FR-C.2 Actions (included if plant conditions warrant entry)</p> <p>Caution:</p> <ul style="list-style-type: none"> • If RWST level decreases to less than 20%, the SI system should be aligned for cold leg recirculation using 1-ES-1.3, TRANSFER TO COLD LEG RECIRCULATION • TD AFW pump Low Flow Shutdown Criteria: <ul style="list-style-type: none"> • Maintain greater than or equal to 150 gpm total AFW flow when feeding two or less Steam Generators with the TD AFW Pump operating. • Methods that may be used to comply with this restriction: <ol style="list-style-type: none"> 1) Increasing total AFW flow to greater than 150 gpm. 2) Feeding ALL Steam Generators 3) Securing the TD AFW Pump <p>Note: Since stopping RCPs may cause an inadequate core cooling condition, RCPs should not be stopped even if normal RCP support conditions cannot be established.</p>
	RO	<p>1-FR-C.2 Actions (included if plant conditions warrant entry)</p> <p>1. VERIFY SI VALVE ALIGNMENT:</p> <ol style="list-style-type: none"> a) CHG pump suction from RWST MOVs - OPEN <ul style="list-style-type: none"> • 1-CH-MOV-1115B • 1-CH-MOV-1115D b) CHG pump suction from VCY MOVs - CLOSED <ul style="list-style-type: none"> • 1-CH-MOV-1115C • 1-CH-MOV-1115E c). CHG line isolation MOVs - CLOSED <ul style="list-style-type: none"> • 1-CH-MOV-1289A • 1-CH-MOV-1289B

FR-C.2 Actions

RO		<p>1-FR-C.2 Actions (included if plant conditions warrant entry)</p> <p>1. VERIFY SI VALVE ALIGNMENT (continued):</p> <p>d) HHSI to cold legs - OPEN</p> <ul style="list-style-type: none"> • 1-SI-MOV-1867C • 1-SI-MOV-1867D <p>e) LHSI suction from RWST - OPEN</p> <ul style="list-style-type: none"> • 1-SI-MOV-1862A • 1-SI-MOV-1862B <p>f) LHSI to cold legs - OPEN</p> <ul style="list-style-type: none"> • 1-SI-MOV-1864A • 1-SI-MOV-1864B
RO		<p>1-FR-C.2 Actions (included if plant conditions warrant entry)</p> <p>2. VERIFY SI FLOW IN ALL TRAINS:</p> <p>a) HHSI to cold legs – FLOW INDICATED</p> <p>b) LHSI flow - INDICATED</p>
RO		<p>1-FR-C.2 Actions (included if plant conditions warrant entry)</p> <p>3. CHECK RCS VENT PATHS:</p> <p>a) Power to PRZR PORV block valves - AVAILABLE</p> <p>b) PRZR PORVs - CLOSED</p> <p>c) PRZR PORV block valves – AT LEAST ONE OPEN</p> <p>d) Other RCS vent paths - CLOSED</p> <ul style="list-style-type: none"> • RX Head vent valves • PRZR vent valves

FR-C.2 Actions

	RO	<p>1-FR-C.2 Actions (included if plant conditions warrant entry)</p> <p>4. CHECK RCP STATUS:</p> <p>a) At least one RCP - RUNNING</p> <p>b) Support conditions for the operating RCP(s) - AVAILABLE</p> <ul style="list-style-type: none"> • Seal injection flow – 6 gpm – 10 gpm • Seal leakoff flow – GREATER THAN 0.2 GPM • RCP seal ΔP – GREATER THAN 200 PSID • CC flow to RCP thermal barrier, lube oil cooler flow and stator – AVAILABLE. <p>a) RNO – GO TO Step 7</p>
	RO	<p>1-FR-C.2 Actions (included if plant conditions warrant entry)</p> <p>7. CHECK CORE COOLING:</p> <p>a) RVLIS full range indication – GREATER THAN 46%</p> <p>b) CETCs – LESS THAN 700°F</p> <p>c) RETURN TO procedure and step in effect.</p> <p>If this procedure was entered, the team will re-enter 1-E-1.</p>

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*Simulator Setup*Initial Conditions:

Recall 100% IC and enter the following malfunctions or recall the IC 2564 **and implement TRIGGER #16 to activate all passive malfunctions. VERIFY Trigger #16 implemented.**

Open the monitor window and add the following points to it:

- TDLY29 = 600
- TDLY50 = 600
- TDLY292 = 600

Enter the following MALFUNCTIONS:

Malfunction	Delay	Ramp	Trigger	Value	Final	Trigger Type
MS1305 - Controlling 'B' SG pressure channel failure MS-PT-1485	15	30	1	0	1	Manual
NI1004 - PR NI N-44 fails high	15	0	3	0	1	Manual
TU1001 - Loss of EHC pump #1	15	0	5	False	True	Manual
RC04 - RCS leak in Containment	15	480	7	0	100	Manual
RC0101 - LBLOCA	15	0	9	0	50	Manual
SI2201 - 'A' LHSI pump trips	15	0	11	False	True	Manual
SI2202 - 'B' LHSI pump trips	15	0	13	False	True	Manual
TU1802 - EHC pump #2 fails to auto-start	0	0	16	False	True	Manual
TU1601 - Degradation of Turbine Bearing #1	0	30	30	0	50	Manual
TU1603 - Degradation of Turbine Bearing #3	0	30	30	0	50	Manual

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Malfunction	Delay	Ramp	Trigger	Value	Final	Trigger Type
TU1608 - Degradation of Turbine Bearing #8	0	30	30	0	75	Manual
TU1609 - Degradation of Turbine Bearing #9	0	30	30	0	75	Manual

Enter the following REMOTE FUNCTIONS:

Remote Function	Delay	Ramp	Trigger	Value	Final	Trigger Type (Auto or Manual)
DISA_SIP1A_ASTRT	0	0	16	Enable	Disable	Manual
DISA_SIP1B_ASTRT	0	0	16	Enable	Disable	Manual
DISA_CHP1A_ASTRT	0	0	16	Enable	Disable	Manual
DISA_CHP1B_ASTRT	0	0	16	Enable	Disable	Manual

Enter the following OVERRIDES:

Override	Delay	Ramp	Trigger	Value	Final	Trigger Type (Auto or Manual)
None.						

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TRIGGER	TYPE	DESCRIPTION
1	Manual	1-MS-PT-1485 Fails high.
3	Manual	N-44 fails high (rods step in at 72 steps per minute)
5	Manual	Loss of running EHC pumps with a failure of the standby pump to automatically start.
7	Manual	RCS Leak (SBLOCA – ramps up to 1200 gpm).
9	Manual	Large Break LOCK
11	Manual	Trips 1-SI-P-1A ('A' LHSI Pump)
13	Manual	Trips 1-SI-P-1B ('B' LHSI Pump)
16	Passive	Disable Auto start of 1-CH-P-1A, 1-CH-P-1B, 1-SI-P-1A and 1-SI-P-1B.
30	Manual	Only to be implemented if the MG is not tripped during E-0 immediate actions. It will be implemented approximately 90 seconds after the MG motoring alarm is received (1F-B2).

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Verify the following control room setup:

- Place the simulator in RUN and verify normal 100% power operation indications.
- Verify Red Magnets on the following components:

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Verify 1-RM-RI-112 aligned to A/B SG and 1-RM-RI-113 aligned to C SG (magnets).
- Verify Ovation System operating.
- Reset ICCMs.
- Verify Component Switch Flags.
- Verify Brass Caps properly placed.
- Verify SG PORVs set for 1035 psig.
- Verify Rod Control Group Step Counters indicate properly.
- Verify Ovation CRT display
- Advance Charts the following charts:

Master chart advance switch

- Verify Turbine Thumb Wheel Settings @120 rpm/min and Position 6
- Verify Containment Instrument Air Compressors are on Inside Suction (all RMs reset)
- Verify all ARPs have been cleaned
- Verify CLEAN copies of the following procedures are in place:

<input type="checkbox"/> AP-53.00 (2)	<input type="checkbox"/> AP-4.00	<input type="checkbox"/> AP-16.00	<input type="checkbox"/>
<input type="checkbox"/> E-0	<input type="checkbox"/> E-1	<input type="checkbox"/> ECA-1.1	<input type="checkbox"/>
<input type="checkbox"/> FR-P.1	<input type="checkbox"/> FR-C.2	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> OP-CH-007		<input type="checkbox"/> Reactivity Sheet	
<input type="checkbox"/> OP-ZZ-002		<input type="checkbox"/>	

- Marked up copy of 1-OPT-RX-005.**
- Verify Reactivity Placard is current.

Op-Test No.: Surry 2008**Scenario No.: 5****Page 64 of 77****SIMULATOR OPERATOR'S GUIDE****Brief**

This simulator performance scenario is performed in the EVALUATION MODE. You should not direct questions to the evaluators. Otherwise, you should perform as if you were in the MCR.

Your ability to maintain a log is not being graded, but maintaining a rough log is recommended to help during briefs.

If you need to communicate with the Unit 2 operator, verbally state, "Unit 2" and an instructor will locate to the Unit 2 area and respond to you as quickly as possible.

In the unlikely event that the simulator fails such that illogical indications result, the session will be terminated. In other words, respond to what you see. If there is a problem with the simulation, the session will be terminated or adjusted as appropriate based on the specific problem.

Assign operating positions.

Ask for and answer questions.

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Conduct shift turnover:

Provide normal shift turnover materials reflecting the below initial conditions:

The initial conditions have Unit #1 operating steady state at 100% power with a current boron concentration of 750 ppm. All Unit #1 systems and crossties are operable.

Unit #2 is at 100% power with all systems and crossties operable.

Shift orders are to complete 1-OPT-RX-005 (Control Rod Assembly Partial Movement) for 'C' Control Bank.

Upon completion of 1-OPT-RX-005 maintain pressurizer heaters energized (i.e. 1-OP-RC-019 should not be performed upon completion of the test).

The last shift performed two 50-gallon dilutions.

When the team has accepted the shift, proceed to the Session Conduct Section.

Op-Test No.: Surry 2008**Scenario No.: 5****Page 66 of 77****SIMULATOR OPERATOR'S GUIDE****Session Conduct:**

Ensure conditions in Simulator Set-up are established.

Ensure Trigger 16 is active prior to team entering the simulator.

Verify Exam Security has been established and ASP_AO_OFF = True.

EVENT 1 Performance of 1-OPT-RX-005

Operations Supervisor/Management:

- **If contacted**, will acknowledge the completion of 1-OPT-RX-005.

Maintenance:

- **If contacted**, will acknowledge the completion of 1-OPT-RX-005.

STA:

- **If contacted**, will acknowledge the completion of 1-OPT-RX-005.

Role play as other individuals as needed.

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EVENT 2 Selected Steam Pressure Channel Fails High on 'B' SG

When cued by examiner, implement Trigger #1.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of 1-MS-PT-1485. The individual(s) contacted will also acknowledge any TS LCOs and entry into AP-53.00.
- **If contacted**, will recommend to the team that channels remain as they are for now (i.e., do not perform 1-OP-RP-001 at this time).
- **If contacted**, will take responsibility for writing the WR and CR.

STA:

- **If contacted**, will acknowledge the failure of 1-MS-PT-1485. The individual(s) contacted will also acknowledge (but not confirm/deny) any TS LCOs.
- **If asked**, the STA will report that 1-MS-PT-1485 and 1-MS-FT-1485 are both Reg. Guide 1.97 components. The STA will also report that upon review of CEP 99-0029 that only one channel of SG steam flow is required per SG and only two channels of steam pressure are required per SG, so no actions for Reg. Guide 1.97 are required.
- **If asked**, the STA will review VPAP-2802 and TRM Section 3.3 and report that he has completed his review and this failure does not impact these documents.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

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Maintenance:

- **If contacted**, will acknowledge instrumentation failure and commence investigations and/or efforts to place the channel in trip.

Field Operators:

- **If contacted**, field operators will report no issues at the MFRVs.

Unit 2 Operator:

- If it appears that the SRO/RO will take action to perform 1-OPT-RX-007, the Unit 2 Operator will state that he will have the fourth RO perform 1-OPT-RX-007.

Role play as other individuals as needed.

Op-Test No.: Surry 2008**Scenario No.: 5****Page 69 of 77****SIMULATOR OPERATOR'S GUIDE****EVENT 3 Power Range Channel 4 failure (N-44 fails high)**

When cued by examiner, implement Trigger #3.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of N-44. The individual(s) contacted will also acknowledge any TS LCOs and entry into AP-53.00 and AP-4.00.
- **If asked** for the final position of Control Rods, state you would like them returned to the pre-event rod height (225 steps).
- **If contacted**, will take responsibility for writing the WR and CR.

STA:

- **If contacted**, will acknowledge the failure of N-44. The individual(s) contacted will also acknowledge (but not confirm/deny) any TS LCOs.
- **If contacted**, will take responsibility for writing the WR and CR.
- **If directed**, will contact reactor engineering.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

Maintenance:

- **If contacted**, will acknowledge instrumentation failure and commence investigations and/or efforts to place the channel in trip.

Role play as other individuals as needed.

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EVENT 4 **Loss of Running EHC Pump and Failure of Standby EHC Pump to Automatically Start.**

When cued by examiner, implement Trigger #5.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of MP-1 and the need to manually start MP-2 (as it did not automatically start).
- **If contacted**, will take responsibility for writing the WR and CR.

STA:

- **If contacted**, will acknowledge the failure of MP-1 and the need to manually start MP-2 (as it did not automatically start).
- **If contacted**, will take responsibility for writing the WR and CR.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal. He will also state that containment conditions and the electrical conditions are as you see them.

Maintenance:

- **If contacted**, will commence investigations and troubleshooting efforts.
- **If contacted**, will acknowledge that control rods stepped out past 230 steps.

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Field Operators:

If dispatched the following reports will be made (if information was requested):

- Local reports will state that leakage is NOT indicated.
- Personnel dispatched will report no movement on the Governor Valves and no flow indicated on 1-EH-FI-100 and 1-EH-FI-101.
- Personnel dispatched will report local pressure (if a pump is running) at 2000 psig.
- Personnel dispatched will report the standby pump is not rotating backwards.
- Personnel dispatched will report local strainer ΔP is 44 psid.

Role play as other individuals as needed.

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EVENT 5 RCS Leakage into Containment (ramps to 1200 gpm)

When cued by examiner, implement Trigger #7.

BOOTH: If the team does not open the MG Output breakers during E-0 immediate actions initiate Trigger #30 90 seconds after annunciator 1F-B2 is actuated. After the MG Output breakers are opens, delete the malfunction.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the fact that an RCS leak in excess of the capacity of a charging pump exists and that SI was initiated.
- **If asked** will take responsibility for performing EPIP actions (declarations and notifications).

Maintenance:

- **If contacted** will acknowledge the RCS leak and take appropriate actions.

Unit 2 Operator:

- **When the Radiation Alarms actuate** the Unit 2 Operator will silence the alarms and inform the Unit 1 SRO of the alarms.
- **If asked for a Trend** the Unit 2 Operator will provide the trend as indicated by the simulator (i.e. radiation levels are rising)
- **If directed** the Unit 2 Operator will perform the verifications associated with radiation monitors. He will not perform any actions. Place keeping in the ARP will indicate what verification steps he performed.

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STA:

- **If asked**, will attempt to calculate a leak rate (time permitting). He will not provide any additional information, but will report the leak rate that the team reports (i.e., “the RO stated the leak rate was...”).
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal with the exception of the containment radiation alarms. He will also state that containment conditions and the electrical conditions are as you see them.
- **If asked** will take confer with the shift manager on EPIP actions (declarations and notifications).

Role play as other individuals as needed.

Op-Test No.: Surry 2008**Scenario No.: 5****Page 75 of 77****SIMULATOR OPERATOR'S GUIDE****EVENT 7 Failure of LHSI and HHSI Pumps to Automatically Start**

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of the LHSI and HHSI pumps to start and the subsequent starting of that pump.

STA:

- **If contacted**, will acknowledge the failure of the LHSI and HHSI pumps to start and the subsequent starting of that pump.
- **If contacted**, the STA will simulate walking to the Unit 1 Computer Room and then report back that Annunciator 1E-F10 has not actuated.
- **If the team has a transient brief:** The STA will state that primary integrity is as the RO reported and that secondary integrity is as the BOP reported. The STA will state that radiological conditions are normal with the exception of the containment radiation alarms. He will also state that containment conditions and the electrical conditions are as you see them.

Field Operators:

- **If directed**, field operators will perform local manipulations.

Unit 2:

- **If asked**, state Unit 2 is at 100 % power.
- State that the Attachment 3 pressure indication readings outside the operator at the controls boundary area all indicate positive pressure.
- Unit 2 will also accept responsibility to complete Attachment 3 **if it is given to Unit 2** at the point where differential pressure indications are requested.
- If asked, 0-AP-50.00, Opposite Unit Emergency, has been initiated.

Op-Test No.: Surry 2008**Scenario No.: 5****Page 76 of 77****SIMULATOR OPERATOR'S GUIDE****EVENT 8 Large Break LOCA**

When cued by examiner, implement Trigger #9 (after RCS Subcooling is lost).

Operations Supervisor/Management:

- **If contacted**, will acknowledge the Large Break LOCA and the failure of the LHSI pumps. He will also acknowledge entry into ECA-1.1.

STA:

- **As the team transitions from 1-E-0, the STA will report a Red Path on FR-P.1.**
- Upon completion of FR-P.1, the STA will not report an Orange Path on FR-C.2 (depending on plant conditions).

Unit 2 Operator:

- Will silence and acknowledge RM alarms associated with the LB LOCA.

Op-Test No.: Surry 2008**Scenario No.: 5****Page 77 of 77****SIMULATOR OPERATOR'S GUIDE****EVENT 9 Large Break LOCA**

When cued by examiner and at Step 18b of 1-E-1, initiate Trigger 11 and Trigger 13 to trip 1-SI-P-1A and 1-SI-P-1B, respectively.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failures and the need to transition to ECA-1.1.
- **If contacted**, will take actions to make-up to Unit 1 RWST.

Field Operators:

- Will make preparations to make-up to Unit 1 RWST when directed.

The scenario will end upon direction to make-up to Unit 1 RWST.