

**Final Submittal**  
(Blue Paper)

**FINAL SIMULATOR SCENARIOS**

**SURRY JAN./FEB. 2006 EXAM**

**0500280/2006301 AND 0500281/2006301**

**JANUARY 23 - FEBRUARY 3, 2006**  
**FEBRUARY 8, 2006 (WRITTEN)**

**FINAL**

Facility:	Surry	Scenario No.:	1	Op-Test No.:	2006-301
Examiners:	_____	Operators:	_____		SRO
	_____		_____		RO
	_____		_____		BOP

Initial Conditions: Plant has been at 100% power for 4 days following unit trip from 100% due to dropped control rods. RCS activity is elevated due to suspected fuel leak following unit trip/startup. (PT-MS-475 selected as controlling 'A' SG steam flow channel; 'A' charging pump running, 'A' and 'C' CN pumps running).

Turnover: Rain/thunderstorms forecasted over next 4 hours. Chemistry is sampling the RCS every 4 hours due to elevated RCS activity (Action Level 2). 1B SG PORV isolated for I&C surveillance and is expected to be returned to service this shift. 'A' CC pump is OOS for oil change and is expected to be returned to service this shift.

'C' charging pump was taken OOS last shift for oil cooler cleaning. This results in a 7 day charging crosstie clock in accordance with TS 3.2.C.3.

PZR PORV 1455C failed its surveillance test. As a result, 1-RC-MOV-1536 is closed but power has been maintained to the valve (it is capable of being manually cycled) in accordance with TS 3.1.A.6.a.

Event No.	Event Type*	Event Description
1	BOP SRO (TS)	PT-MS-475 (A SG pressure) fails high.
2	RO SRO (TS)	1-RC-PT-1445 fails high, PORV 1456 fails to close.
3	RO SRO (TS)	'A' charging pump motor coupling fails (loss of charging flow)
4	All SRO (TS)	R - RO N - BOP RCS Total Specific Activity above Tech Spec 3.1.D limit requires shutdown/cooldown to below 500 °F within 6 hours.
5	BOP	C Trip of 'C' CN pump, standby CN pump 'B' fails to auto start.
6	All	M 'C' RCP Shaft Shear. Failure of RPS automatic trip. Failure of PORV 1455C block valve to reopen.
7	All	M 'A' SGTR (300 gpm) without pressurizer pressure control.

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

**Surry 2006-301 Scenario #1****Event 1**

1-PT-MS-1475 fails high causing A SG level to go up. BOP should take manual control of 'A' SG FRV. SRO should enter 0-AP-53.00, Loss of Vital Instrumentation / Controls, and direct BOP to select redundant steam flow channel and return A SG FRV to auto.

Verifiable Action: (BOP) take manual control of 'A' SG FRV.

**Event 2**

1-RC-PT-445 fails high, causing PORV 1456 to open. PORV 1456 fails to automatically close at 2000 psig decreasing and will not close from the MCB. RO should close PORV 1456 block valve. SRO should enter 1-AP-31.00, Increasing or Decreasing RCS Pressure.

Verifiable Action: (RO) close PORV 1456 block valve.

Technical Specification: 3.1.a.6.b (remove power from block valve), 3.12.F.1 (DNB) if PZR pressure less than 2205 psig.

**Event 3**

The 'A' charging pump to motor coupling fails as indicated by zero charging flow and reduced motor amps with no pump trip. VCT level will increase and pressurizer level will drop. If dispatched, local operator (booth) will reveal nature of failure. SRO should enter 1-AP-8.00, Loss of Normal Charging, and direct start of a standby charging pump.

Verifiable Action: (RO) start 'B' charging pump.

Technical Specification: LCO 3.3.A.3.

**Event 4**

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 Action: (All) power reduction. BOP will operate turbine and RO will operate control rods and boration controls.

Technical Specification: 3.1.D

Event 5

'C' condensate pump trips, standby pump 'B' fails to start. 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. SRO should direct BOP to start standby CN pump per ARPs if BOP does not do this independently.

Verifiable Action: (BOP) start standby condensate pump.

Event 6

'C' RCP Shaft Shear. Failure of RPS automatic trip. ECA-3.3 entry is required due to the 'C' RCP not running and the failure of the PORVs. (PORV 1455C block valve thermals). RO should manually trip the reactor. SRO should enter and direct actions of 1-E-0, 1-ES-0.1, until crew recognizes SGTR (Event 7). The crew should initiate AP-16.00 and determine a safety injection is required.

Verifiable Actions: (All) Manual reactor trip.

**Critical Task: Manual reactor trip within 1 minute.**

Event 7

1A SGTR (50 gpm to 300 gpm ramped over 5 minutes starting 1 minute after reactor trip). Crew should recognize SGTR based on 1A SG NR level and PZR level. Crew should initiate SI, go to 1-E-0, 1-E-3 (Cooldown will be via steam dumps), and then 1-ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL. Scenario terminates after terminating SI flow and verifying SI no longer required (step 10).

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

**Critical Tasks: Initiate RCS cooldown (1-E-3).**

SIMULATOR OPERATOR GUIDE

NRC EXAM - SCENARIO 1

Initial Conditions: IC #1 100%, MOL – Cycle 20. The unit has been at 100% power for 4 days.

Pre-load malfunctions:

- Failure of Automatic Reactor Trip.
- Failure of 'B' CN pump to auto start.
- Failure of PORV 1455C block valve to reopen (thermal).

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

- SG PORV 'B' Tagged Out.
- CC Pump 'A' Tagged Out.
- Charging Pump 'C' Tagged Out.
- PRZR PORV 1455C block valve closed.
- 'A' Charging Pump running.
- 'A' and 'C' CN Pumps running.
- 'A' SG steam flow channel selected so 1-PT-MS-1475 is controlling.

Turnover: Maintain full power operation. Unit 2 is at 100% power with all systems operable.

RCS activity is elevated due to suspected fuel leak following unit trip/startup. Chemistry is sampling the RCS every 4 hours due to elevated RCS activity (Action Level 2).

Rain/thunderstorms forecasted over next 2-4 hours. OC-21, Severe Weather OC, has been initiated.

1B SG PORV isolated for Instrument Maintenance surveillance and is expected to be returned to service this shift.

'A' CC pump is out of service for oil an change and is expected to be returned to service this shift.

'C' charging pump was taken OOS last shift for oil cooler cleaning. TS 3.2.C.3 is in effect. Expected return to service within 48 hours.

PZR PORV 1455C failed its surveillance test. As a result, 1-RC-MOV-1536 is closed but power has been maintained to the valve (the PORV is capable of being manually cycled) in accordance with TS 3.1.A.6.a.

Event	Malif. #'s	Severity	Instructor Notes and Required Feedback
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1	MS1302	N/A	1-PT-MS-1475 fails HIGH (0 to 100% over 1 minute).
2	RC4802	N/A	1-RC-PT-1445 fails HIGH (0 to 100% over 1 minute). PORV 1456 fails to close. <b>Remove power to PORV 1456 block valve when requested.</b>
3	CH0401	100%	'A' charging pump motor coupling fails.
4	None	N/A	RCS activity above Tech Spec limits. Failure of Automatic Rod Control
5	CN0103	N/A	Trip of 'C' CN pump. Failure of 'B' CN pump to auto start.
6	RC2603 RD18	N/A	Shaft Shear on 1-RC-P-1. Failure of RPS automatic trip.
7	RC2401	N/A	'A' SGTR (50 – 300 gpm ramped in over 5 minutes starting 1 minute after rx trip). PRZR PORV 1455C block valve will NOT reopen (trips thermals).
<b>END</b>			<b>After crew transitions to 1-ECA-3.3.</b>

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## SHIFT TURNOVER INFORMATION

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### OPERATING PLAN:

- The Unit has been at 100% power for 4 days following unit trip from 100% due to dropped control rods.
- RCS activity is elevated due to suspected fuel leak following unit trip/startup. Chemistry is sampling the RCS every 4 hours due to elevated RCS activity (Action Level 2).
- Rain/thunderstorms forecasted over next 4 hours. OC-21, Severe Weather OC, has been initiated.
- '1B' SG PORV isolated for an I&C surveillance and is expected to be returned to service this shift.
- 'A' CC pump is out of service for an oil change and is expected to be returned to service this shift.
- 'C' charging pump was taken out of service last shift for oil cooler cleaning. TS 3.2.C is in effect (7-day LCO) since charging crosstie from Unit 2 is not available. Expected return to service within 48 hours.
- PZR PORV 1455C failed its surveillance test. As a result, 1-RC-MOV-1536 is closed but power has been maintained to the valve in accordance with TS 3.1.A.6.a (the PORV is capable of being manually cycled).
- Unit 2 is at 100% Power with all systems operable.
- Maintain full power operation.

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 1

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Event Description: 1-PT-MS-1475 fails high causing A SG Ch III steam flow and A SG level to go up.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	<p>Identifies 'A' SG pressure transmitter PT-MS-475 failure:</p> <p>Alarms:</p> <ul style="list-style-type: none"> <li>• 1F-C7 STM GEN 1A CH 3 FW &lt; STM FLOW</li> <li>• 1F-D7 STM GEN 1A CH 4 FW &lt; STM FLOW</li> <li>• 1H-E5 STM GEN 1A FW &gt;&gt; STM FLOW</li> <li>• 1H-G5 STM GEN 1A LVL ERROR</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• 1-MS-FI-1474, CH-3 A STM Flow reads higher than unaffected steam flow channel.</li> <li>• 'A' SG NR level increasing.</li> </ul> <p>In accordance with the immediate actions of AP-53.00 the BOP will take manual control of 'A' SG FRV, 1-FW-FCV-1478, and reduce demand to return 'A' SG NR level to program level (per AP-53.00).</p>
	SRO	Enters 0-AP-53.00, Loss of Vital Instrumentation / Controls.
	BOP	<p>[ 1 ] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL</p> <p>Verifies 1-MS-FI-1475 CH 4, 'A' SG STM Flow, normal.</p>
	BOP	<p>[ 2 ] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION</p> <p>Verifies 'A' SG FRV controller, 1-FW-FCV-1478, in manual and 'A' SG NR level is returning to program level (44%, a band may be given).</p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 1

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Event Description: 1-PT-MS-1475 fails high causing A SG Ch III steam flow and A SG level to go up.

Cue: By Examiner.

	SRO	<p>3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS - AFFECTED</p> <ul style="list-style-type: none"> <li>• Nuclear Instrumentation</li> <li>• Pressurizer Pressure control</li> </ul> <p>RNO: GO TO Step 6.</p>
	BOP	<p>6. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS - NORMAL</p> <ul style="list-style-type: none"> <li>• Steam Pressure</li> <li>• Steam Flow</li> <li>• Feed Flow</li> <li>• Steam Generator Level</li> </ul> <p>Determines Steam Pressure instrument 1-MS-PI-1475 (Ch III) and steam flow 1-MS-FI-1474 are NOT normal.</p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 1

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Event Description: 1-PT-MS-1475 fails high causing A SG Ch III steam flow and A SG level to go up.

Cue: By Examiner.

	BOP	<p>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 'A' SG FRV controller, 1-FW-FCV-1478, in manual</p> <p>b) Control SG level at program level (44%, a band may be given).</p> <p>Verifies 'A' SG NR level is returning to program level.</p> <p>c) Select the redundant channel for affected SG(s)</p> <p>Selects Ch IV steam flow for 'A' SG using two-position selector switch on Vertical Board 1-2 (applicant may also place the associated Feed Flow channel in channel IV)</p> <p>d) WHEN SG level returned to normal, THEN place the Feed Reg Valve in AUTOMATIC.</p> <p>Places 'A' SG FRV controller, 1-FW-FCV-1478 in auto.</p>
	SRO	<p>6. RNO</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"> <li>• Table 3.7-1, 12 and 17</li> <li>• Table 3.7-2, 1.c, 1.e, and 3.a</li> <li>• Table 3.7-3, 2.a, and 3.a</li> </ul> <p>Determines Table 3.7-1 item 17, Table 3.7-2 items 1.c and 1.e, and Table 3.7-3 item 2.a 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>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 1

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Event Description: 1-PT-MS-1475 fails high causing A SG Ch III steam flow and A SG level to go up.

Cue: By Examiner.

		<p>12. CHECK FAILED INSTRUMENT - IS A REGULATORY GUIDE 1.97 VARIABLE</p> <p>Directs the STA to Evaluate. STA will provide correct Reg. Guide 1.97 information.</p>
		<p>14. REVIEW THE FOLLOWING:</p> <ul style="list-style-type: none"> <li>• Tech Spec 3.7</li> <li>• VPAP-2802, NOTIFICATIONS AND REPORTS</li> </ul> <p>SRO directs STA to review VPAP-2802</p> <ul style="list-style-type: none"> <li>• TRM SECTION 3.3, INSTRUMENTATION</li> </ul> <p>SRO directs STA to review the TRM</p>
	SS	<p>15. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"> <li>• Shift Supervision</li> <li>• OMOC</li> <li>• STA (PRA determination)</li> <li>• I&amp;C</li> </ul> <p>- END -</p>

END – Event 1

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 2

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Event Description: 1-RC-PT-445 fails high, causing PORV 1456 to open. PORV 1456 fails to automatically close at 2000 psig decreasing and will not fully close from the MCB.  
 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"> <li>• 1C-B8 PRZR LO PRESS</li> <li>• 1C-D7 PRZR PWR RELIEF LINE HI TEMP</li> <li>• 1C-F8 PRZR HI PRESS</li> <li>• 1C-D7 PRZR PWR RELIEF LINE HI TEMP</li> <li>• 1C-F7 PRZR RELIEF TK HI PRESS</li> <li>• 1D-H4 PRZR SFTY VV PWR RELIEF VV OPEN</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• Decreasing PRZR pressure</li> <li>• 1-RC-PCV-1456 open and closed lights BOTH ON</li> </ul> <p>The following actions will be taken in accordance with AP-53.00:</p> <ul style="list-style-type: none"> <li>• Verifies PRZR pressure is low.</li> <li>• Places c/s for 1-RC-PCV-1456 to CLOSE.</li> <li>• Observes open light still energized and the closed light is indicated as well (intermediate indication), pressure still dropping.</li> <li>• Places c/s for 1-RC-MOV-1535 (block valve) to CLOSE.</li> </ul>
	SRO	Enters 0-AP-53.00, Loss of Vital Instrumentation / Controls.

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 2

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Event Description: 1-RC-PT-445 fails high, causing PORV 1456 to open. PORV 1456 fails to automatically close at 2000 psig decreasing and will not fully close from the MCB.

Cue: By Examiner.

	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>
	RO	<p>[ 2 ] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION</p> <p>Closes the Pressurizer PORV.</p> <p>Identifies that the PORV did not close. Red and green light both indicating (intermediate indication).</p>
	RO	<p>[2] RNO c) IF PRZR PORV related failure, THEN close the PRZR PORV Block Valve.</p> <p>Verifies the associated block valve (1-RC-MOV-1535) is closed.</p>
	RO	<p>3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS - AFFECTED</p> <ul style="list-style-type: none"> <li>• Nuclear Instrumentation</li> <li>• Pressurizer Pressure control</li> </ul>
	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"> <li>• ( )-AP-31.00, Increasing or Decreasing RCS Pressure.</li> </ul>
	SRO	<p>Enters 1-AP-31.00, INCREASING OR DECREASING RCS PRESSURE</p>
	BOP	<p>1. CHECK TURBINE LOAD - STABLE</p>
	RO	<p>2. CHECK RCS PRESSURE - DECREASING</p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 2

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Event Description: 1-RC-PT-445 fails high, causing PORV 1456 to open. PORV 1456 fails to automatically close at 2000 psig decreasing and will not fully close from the MCB.

Cue: By Examiner.

	RO	<p>CAUTION: Decreasing RCS pressure will cause the OTΔT setpoint to decrease.</p> <p>NOTE: PRZR PORV 1-RC-PCV-1455C should be declared inoperable when the Master Controller is placed in Manual.</p> <p>3. STOP PRESSURE DECREASE</p> <p>a) Place 1-RC-PC-1444J, PRZR PRESS MASTER CNTRL, in MANUAL</p> <p>b) Decrease demand on PRZR PRESS MASTER CNTRL to raise RCS pressure</p>
	RO	<p>4. CHECK RCS PRESSURE – STILL DECREASING.</p> <p>NOTE: Depending on timing of PORV block valve closure, pressure may be increasing at this point and the team may go directly to step 17 or the team may continue to the next step with the belief that the block valve being closed was an action prior to prompt.</p>
	RO	<p>5. VERIFY NO PRESSURE LOSS THROUGH THE PRZR PORVs:</p> <p>a) Close or verify close PRZR PORVs</p> <p>b) Close Block MOV to isolate any PORV which will not close or is leaking</p>
	RO	6. TURN ON ALL PRZR HEATERS
	RO	7. VERIFY CLOSED OR CLOSE 1-CH-HCV-1311, AUX SPRAY ISOLATION
	SRO/RO	<p>8. CHECK AUX SPRAY LINE – LEAKAGE SUSPECTED</p> <p>RNO: GO TO Step 10.</p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 2

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Event Description: 1-RC-PT-445 fails high, causing PORV 1456 to open. PORV 1456 fails to automatically close at 2000 psig decreasing and will not fully close from the MCB.

Cue: By Examiner.

	RO	10. PLACE SPRAY VALVE CONTROLLERS IN MANUAL AND ADJUST DEMAND TO ZERO
	SRO/RO	11. CHECK EITHER OF THE FOLLOWING CONDITIONS <ul style="list-style-type: none"> <li>· Either Spray Valve will not close</li> </ul> <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <li>· Either Spray Valve is suspected of leaking</li> </ul> RNO: GO TO Step 13.
	RO	13. CHECK RCS PRESSURE - STABILIZING
	SRO	14. GO TO STEP 17
	SRO	17. NOTIFY THE FOLLOWING: <ul style="list-style-type: none"> <li>· OM on call</li> <li>· STA</li> <li>· Instrument Shop</li> </ul>
	SRO/BOP	18. MAINTAIN STABLE TURBINE LOAD UNTIL PRESSURE CONTROL SYSTEM IS RETURNED TO NORMAL
	SRO	Determines applicable Technical Specifications: <ul style="list-style-type: none"> <li>• LCO 3.12.F.2 if pressurizer pressure was less than 2205 psig.</li> <li>• LCO 3.1.A.6.b for PORV 1456 (remove block valve power w/in 1 hour).</li> </ul> <p><b>Booth:</b> IF requested, remove power to PORV 1456 block valve after 2 minutes.</p>

END – Event 2

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 3

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Event Description: The 'A' charging pump to motor coupling fails with no pump trip (loss of charging flow). VCT level will increase and pressurizer level will drop.

Cue: By Examiner.

Time	Position	Expected Action
	RO	<p>Diagnose loss of charging flow with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> <li>• 1D-E5 CHG PP TO REGEN HX HI-LO FLOW</li> <li>• 1C-D/E/F3 SHAFT SEAL WTR LO INJ FLOW</li> <li>• 1D-E5 CHG PP TO REGEN HX HI-LO FLOW</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• No charging flow, discharge pressure</li> <li>• Reduced amps on running 'A' charging pump motor</li> <li>• VCT level increasing</li> <li>• PRZR level decreasing</li> </ul> <p>Note: RO may isolate letdown (close 1-CH-LCV-1460A/B) as directed by 1D-F3 or 1D-F4 if letdown flashes during this event.</p> <p>IF TEAM ISOLATES LETDOWN see attached copy of 1-OP-CH-020 to restore letdown.</p>
	SRO	Enters 1-AP-8.00, LOSS OF NORMAL CHARGING FLOW.
	RO	<p>1. CHECK CHG PUMPS - AT LEAST ONE RUNNING</p> <p>Verifies that 'A' CH pump is running.</p> <p>The team may determine that 'A' CH pump is not meeting the intent of this step (not providing flow) and may enter the RNO and start the 'B' CH pump and then secure the 'A' CH pump.</p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 3

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Event Description: The 'A' charging pump to motor coupling fails with no pump trip (loss of charging flow). VCT level will increase and pressurizer level will drop.

Cue: By Examiner.

	SRO/RO	<p>2. CHECK CHG PUMP FOR GAS BINDING:</p> <ul style="list-style-type: none"> <li>• Running CHG pump suspected of gas Binding</li> </ul> <p>AND</p> <ul style="list-style-type: none"> <li>• One of the following conditions exists:             <ul style="list-style-type: none"> <li>• CHG pump discharge pressure – ERRATIC</li> <li>• Charging flow – ERRATIC</li> <li>• Motor amps – ERRATIC</li> </ul> </li> </ul> <p>RNO: IF any Unit 1 CHG pump available to provide flow, THEN GO TO Step 6.</p>
	SRO/RO	<p>6. CHECK CHG PUMPS - MANIPULATIONS IN PROGRESS</p> <ul style="list-style-type: none"> <li>• Swapping CHG pumps (OPTs, tagouts)</li> </ul> <p>RNO: IF Charging and Letdown systems intact, THEN do the following:</p> <p>Attempt to restore CHG flow IAW Shift Supervision direction. Start standby CHG pump.</p> <p>RO will start 1-CH-P-1B if not previously started.</p> <p>IF charging flow restored, THEN GO TO Step 35.</p>
	RO	<p>35. OPERATE 1-CH-FCV-1122 OR 1-CH-305 TO RETURN PRZR LEVEL TO NORMAL</p> <p>Places 1-CH-FCV-1122 in manual and raises demand.</p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 3

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Event Description: The 'A' charging pump to motor coupling fails with no pump trip (loss of charging flow). VCT level will increase and pressurizer level will drop.

Cue: By Examiner.

	RO	36. CHECK CC FLOW TO RCP THERMAL BARRIERS - NORMAL
	RO	37. ADJUST RCP SEAL INJECTION FLOW TO BETWEEN 6 GPM AND 13 GPM USING 1-CH-HCV-1186 AS NECESSARY
	RO	<p>38. VERIFY CH PUMP AND SYSTEM PARAMETERS – NORMAL</p> <ul style="list-style-type: none"> <li>• Header Pressure</li> <li>• Flow</li> <li>• Pump amps</li> <li>• PCS Temperatures</li> <li>• Local check of Lube oil flow and temperature</li> <li>• Vent Damper position</li> </ul> <p>RNO: Secure CHG pump as directed by Shift Supervision.</p> <p>The team will secure 1-CH-P-1A, if not previously secured.</p> <p>CUE – If local checks are requested by the team, the booth operator will report metallic sounds are heard from the pump.</p>
	RO	39. CHECK UNIT 1 CHARGING PUMPS – ONLY ONE RUNNING
	RO	40. CHECK UNIT 1 NORMAL CHARGING – IN SERVICE

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 3

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Event Description: The 'A' charging pump to motor coupling fails with no pump trip (loss of charging flow). VCT level will increase and pressurizer level will drop.

Cue: By Examiner.

	RO	41. CHECK CHARGING CROSSTIE – IN SERVICE  RNO: GO TO Step 43.
	RO	43. RETURN LETDOWN TO SERVICE AS NECESSARY  <ul style="list-style-type: none"> <li>• Normal letdown IAW 1-OP-CH-020, PLACING LETDOWN IN SERVICE FOLLOWING AUTO OR MANUAL ISOLATION</li> </ul>
	SRO	44. REVIEW THE FOLLOWING TECH SPECS  <ul style="list-style-type: none"> <li>• <b>TS 3.2, Chemical and Volume Control System</b></li> <li>• <b>TS 3.3, Safety Injection System</b></li> </ul> <p>SRO determines that TS 3.2 and TS 3.3.A.3 are not met (72 hour LCO)</p>
	SRO	45. PROVIDE NOTIFICATIONS AS NECESSARY:  <ul style="list-style-type: none"> <li>• OMOG</li> <li>• Maintenance Department</li> <li>• Shift Supervision</li> </ul>

END – Event 3

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 4

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Event Description: Chemistry reports RCS Total Specific Activity above Tech Spec limits. AP-23.00 Ramp with a failure of Automatic Rod Control.

Cue: Examiner cues booth (Chemistry) to call SRO

Time	Position	Applicant's Action or Behavior
	SRO	<p><b>Booth:</b> Chemistry reports E-BAR is 110% of the limit and Dose Equivalent I-131 is 2.5 <math>\mu\text{Ci/ml}</math></p> <ul style="list-style-type: none"> <li>• Refers to Tech Spec 3.1.D.1.</li> <li>• Determines 100/E exceeded.</li> <li>• Determines action statement requires shutdown/cooldown less than 500 F within 6 hours of detection.</li> <li>• Enters 0-AP-23.00, Rapid Load Reduction.</li> </ul> <p>SRO may choose to brief or review the following with the crew</p> <ul style="list-style-type: none"> <li>• 0-AP-23.00</li> <li>• DNOS-0202, Reactivity Management</li> <li>• DNAP-1410, Reactivity Management</li> </ul> <p>RO may refer to Operator Aid for expected reactivity changes.</p>

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Event Description: Chemistry reports RCS Total Specific Activity above Tech Spec limits.AP-23.00 Ramp with a failure of Automatic Rod Control.

Cue: Examiner cues booth (Chemistry) to call SRO

	TEAM	<p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>• Actions that can be completed independently of preceding steps may be performed out of sequence as directed by the SRO.</li> <li>• 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.</li> <li>• Tech Spec 3.12.F.1 should be reviewed if either parameter is exceeded.</li> <li>• I &amp; C should be contacted to provide assistance with adjusting IRPIs.</li> </ul> <p>1. INITIATE PLANT LOAD REDUCTION AT 5%/MINUTE OR LESS:</p> <p>BOP a) Verify turbine valve position - NOT ON LIMITER</p> <p>RO b) Insert control rods in MANUAL as necessary to maintain Tave and Tref matched</p> <p>RO may identify AUTO Rod control failure depending on Tave/Tref Deviation.</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> <p>BOP e) Adjust LOAD RATE %/MIN thumbwheel to desired ramp rate (1%/minute)</p> <p>BOP f) Initiate Turbine load reduction using OPERATOR AUTO (pushes the white GO button)</p> <p>BOP g) Reduce Turbine Valve Position Limiter as load decreases</p>
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Event Description: Chemistry reports RCS Total Specific Activity above Tech Spec limits.AP-23.00 Ramp with a failure of Automatic Rod Control.

Cue: Examiner cues booth (Chemistry) to call SRO

	RO	<p><b>NOTE:</b> Step 2 or Step 3 may be performed repeatedly to maintain Tref and Tave matched, <math>\Delta</math>Flux in band, and control rod position above the LO-LO insertion limit.</p> <p>2. 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 (normally 30-60 seconds)</p> <p>d) Monitor EMRG BORATE FLOW</p> <ul style="list-style-type: none"> <li>• ( )-CH-FI-( )110</li> </ul> <p>e) After required emergency boration, perform the following:</p> <ol style="list-style-type: none"> <li>1) Close ( )-CH-MOV-( )350</li> <li>2) Transfer the in-service BATP to AUTO</li> <li>3) Restore Charging flow control to normal</li> </ol>
	RO	<p>3. ESTABLISH A NORMAL BORATION TO MAINTAIN CONTROL ROD POSITION ABOVE THE LO-LO INSERTION LIMITS IAW ( )-OP-CH-007, BLENDER OPERATIONS</p>
	RO	<p>4. INCREASE SURVEILLANCE OF RCS PRESSURE</p> <p>a) Check all PRZR heaters – ENERGIZED (RNO: Energize heaters)</p> <p>b) Control ramp rate to maintain RCS pressure greater than 2205 psig</p>
	BOP	<p>5. MONITOR STEAM DUMPS FOR PROPER OPERATION</p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 4

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Event Description: Chemistry reports RCS Total Specific Activity above Tech Spec limits. AP-23.00 Ramp with a failure of Automatic Rod Control.

Cue: Examiner cues booth (Chemistry) to call SRO

	SRO	<p>6. NOTIFY THE FOLLOWING:</p> <ul style="list-style-type: none"> <li>• Energy Supply (MOC)</li> <li>• Polishing Building</li> <li>• Chemistry</li> <li>• OMOC</li> </ul>
	SRO	<p>7. EVALUATE THE FOLLOWING:</p> <ul style="list-style-type: none"> <li>• EPIP applicability</li> <li>• VPAP-2802, NOTIFICATIONS AND REPORTS, applicability</li> </ul> <p>SRO directs the STA to review VPAP-2802</p>
	SRO	<p>*8. CHECK ISOTOPIC ANALYSIS OF RCS – REQUIRED</p> <ul style="list-style-type: none"> <li>• Reactor power has decreased more than 15% in one hour</li> </ul>
	SRO	<p>9. HAVE CHEMISTRY PERFORM ISOTOPIC ANALYSIS OF RCS FOR IODINE WITHIN 2 TO 6 HOURS</p>

END – Event 4

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 5

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Event Description: 'C' condensate pump trips, standby 'B' CN pump fails to start.

Cue: By Examiner (after approximately 10% power reduction).

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"> <li>• 1J-G4 CN PPS DISCH HDR LO PRESS</li> <li>• 1K-D4 4KV BKR AUTO TRIP</li> <li>• 1J-B4 HP HTR DR RCVR TK HI-LO LVL</li> <li>• 1H-G5/6/7 STM GEN 1A(B)(C) LVL ERROR</li> <li>• 1H-D3 CN POLISHING BYPASS AOV OPEN</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• Abnormal MCB light indications for 'C' CN pump</li> <li>• Zero amps for 'C' CN pump</li> </ul> <p>BOP may independently start 'B' 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><b>NOTE:</b> The Main Feed Pumps will trip if suction pressure drops to 55 psig after a 15 second time delay.</p>
	SRO	<p>Direct actions of 1J-G4 or AP-21.00</p> <p>SRO may elect to stop the load reduction.</p>
	BOP	<p>NOTE: IF the team uses ARP 1J-G4, see pages 25, 26 and 27.</p> <p>[1] CHECK MAIN FEED PUMPS – ONLY ONE RUNNING</p> <p>The RO should identify that 2 MFPs are running.</p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 5

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Event Description: 'C' condensate pump trips, standby 'B' CN pump fails to start.

Cue: By Examiner (after approximately 10% power reduction).

	BOP	[1] RNO IF two Main Feed Pumps running, THEN GO TO step 4.
	BOP	[4] START A THIRD CONDENSATE PUMP The BOP should start the stand-by condensate pump
	BOP	[5] REDUCE TURBINE LOAD TO MATCH STEAM FLOW WITH FEED FLOW <ul style="list-style-type: none"> <li>Use Valve Position Limiter</li> </ul> The BOP may reduce turbine load, this may not be required, depending on the speed at which the standby condensate pump was started.
	BOP	6. CHECK CONDENSATE POLISHING BLDG BYPASS - REQUIRED <ul style="list-style-type: none"> <li>Main Feed Pump Suction Pressure – LESS THAN 400 PSIG</li> </ul> Check Suction Pressure less than 400 psig
	BOP	7. OPEN MOV-CP-100 Checks 1-CP-MOV-100 open
	BOP	8. VERIFY STEAM DUMP OPERATION – REDUCING TAVE/TREF MISMATCH BASED ON DEMAND SIGNAL Checks no Tave/Tref Deviation exists
	BOP	9. CHECKS CONTROL RODS – INSERTING AS NECESSARY Manually inserts rods as required. Ramp may be in progress

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 5

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Event Description: 'C' condensate pump trips, standby 'B' CN pump fails to start.

Cue: By Examiner (after approximately 10% power reduction).

	BOP	<p>10. VERIFY ANNUNCIATOR 1E-E3 <math>\Delta</math>FLUX 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 <math>\Delta</math>P – AT LEAST 50 PSID.</p> <p>Verifies SG pressures are within 50 psid of header pressure.</p>
	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"> <li>• Recirc valve position</li> <li>• Discharge MOV position</li> <li>• Pump Amps</li> </ul> <p>Verifies normal MFP parameters and alignment.</p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 5

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Event Description: 'C' condensate pump trips, standby 'B' CN pump fails to start.

Cue: By Examiner (after approximately 10% power reduction).

	RO	17. VERIFY REACTOR POWER CHANGE – LESS THAN 15% IN ONE HOUR  Verifies power change is greater than 15% and notifies chemistry
	SRO	18. NOTIFY THE FOLLOWING:  · OMO  Maintenance Foreman  - END -

Time	Position	Applicant's Action or Behavior
		NOTE: These pages (25, 26, 27) 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.
		NOTE:  · 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.

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 5

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Event Description: 'C' condensate pump trips, standby 'B' CN pump fails to start.

Cue: By Examiner (after approximately 10% power reduction).

	BOP	<p>3. CHECK MAIN CONDENSATE OR MAIN FEED RUPTURE - INDICATED</p> <ul style="list-style-type: none"> <li>· Amps on CN and MFW pumps – OSCILLATING</li> <li>· Hotwell level – DECREASING</li> <li>· Local report or audible indication</li> </ul> <p>RNO: GO TO Step 6.</p>
	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"> <li>· FW Header pressure</li> <li>· FW Pump Suction pressure</li> <li>· MFW flow</li> </ul> <p>IF standby CN pump required, THEN do the following:</p> <ol style="list-style-type: none"> <li>a) Start standby pump.</li> <li>b) GO TO Step 7.</li> </ol>
	BOP	7. LOCALLY CHECK BREAKER AND PUMP FOR ANY CN PUMP WHICH HAS TRIPPED
	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>· LI-CN-103</li> </ul>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 5

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Event Description: 'C' condensate pump trips, standby 'B' CN pump fails to start.

Cue: By Examiner (after approximately 10% power reduction).

	BOP	<p>NOTE:</p> <ul style="list-style-type: none"> <li>· Condensate recirculation valve flow greater than 3600 gpm could cause serious piping erosion/corrosion and valve damage.</li> <li>· The Condensate Recirc valve will fail open when Instrument Air or power is lost.</li> </ul> <p>10. __CHECK CONDENSATE RECIRC VALVE - CORRECT FOR CURRENT POWER LEVEL</p>
	BOP	<p>11. __LOCALLY CHECK CN PUMP SUCTION STRAINERS</p> <ul style="list-style-type: none"> <li>· Strainer DP - ALL LESS THAN OR EQUAL TO NORMAL</li> </ul>
	BOP	<p>12. __CHECK CP BUILDING DP – NORMAL</p>
	BOP	<p>13. __CHECK CAUSE OF LOW HEADER PRESSURE - CORRECTED</p> <p>Can not perform Step 14 to put 'C' CN pump in standby.</p>
	SRO	<p>15. __PROVIDE NOTIFICATIONS AS NECESSARY</p> <ul style="list-style-type: none"> <li>· OMO</li> <li>· STA</li> <li>· System Engineering</li> </ul> <p>- END -</p>

END – Event 5

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 6

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Event Description: 'C' RCP Shaft Shear. Failure of RPS automatic trip. Failure of PORV 1455C block valve to reopen.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	Team	<p>Diagnose the failure of the 'C' RCP (Shaft Shear) with a failure of the reactor to automatically trip:</p> <p>Alarms:</p> <ul style="list-style-type: none"> <li>• 1E-B10, LOSS OF COOL FLOW PWR &gt;P8</li> <li>• 1E-A4 (B4) (C4) RC LOOP 1C LO FLOW CH-1/2/3</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• 'C' RCP amps decrease.</li> <li>• 'C' RCS Loop Low Flow indicators decrease.</li> <li>• OT<math>\Delta</math>T and OP <math>\Delta</math>T changes .</li> </ul>
	RO Critical Task	<p>Trips reactor after recognizing first out alarm and failure of automatic trip.</p> <p>Informs SRO that reactor failed to automatically trip.</p> <p><b>Task Standard: Trip reactor within 1 minute of first out alarm.</b></p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 6

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Event Description: 'C' RCP Shaft Shear. Failure of RPS automatic trip. Failure of PORV 1455C block valve to reopen.

Cue: By Examiner.

	SRO	Enters 1-E-0, REACTOR TRIP OR SAFETY INJECTION
	RO	<p>[ 1 ] VERIFY REACTOR TRIP:</p> <p>a) Manually trip reactor</p> <p>b) Check the following:</p> <ul style="list-style-type: none"> <li>• All Rods On Bottom light – LIT</li> <li>• Reactor trip and bypass breakers – OPEN</li> <li>• Neutron flux - DECREASING</li> </ul>
	BOP	<p>[ 2 ] VERIFY TURBINE TRIP:</p> <p>a) Manually trip the turbine</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"> <li>• 1-MS-SOV-104</li> </ul> <p>d) Verify generator output breakers – OPEN (Time Delayed)</p>
	BOP	[ 3 ] VERIFY BOTH AC EMERGENCY BUSES - ENERGIZED

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Event Description: 'C' RCP Shaft Shear. Failure of RPS automatic trip. Failure of PORV 1455C block valve to reopen.

Cue: By Examiner.

	RO	<p>[ 4 ] CHECK IF SI INITIATED:</p> <p>a) Check if SI is actuated:</p> <ul style="list-style-type: none"> <li>• LHSI pumps – RUNNING</li> <li>• SI annunciators – LIT</li> <li>• A-F-3 SI INITIATED – TRAIN A</li> <li>• A-F-4 SI INITIATED – TRAIN B</li> </ul>
	RO	<p>Step 4 a) RNO</p> <p>a) Check if SI is required or imminent as indicated by any of the following:</p> <ul style="list-style-type: none"> <li>• Low PRZR pressure</li> <li>• High CTMT pressure</li> <li>• High steamline differential pressure</li> <li>• High steam flow with low Tave or low line pressure</li> </ul> <p>IF SI is required, THEN GO TO Step 4b.</p> <p>IF SI is NOT required, THEN GO TO either of the following:</p> <ul style="list-style-type: none"> <li>• 1-ES-0.1, REACTOR TRIP RESPONSE, if SG tube leak does NOT exist</li> </ul> <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <li>• 1-AP-24.01, LARGE STEAM GENERATOR TUBE LEAK, if SG Tube leak does exist</li> </ul> <p>Note: depending upon when crew recognizes SGTR (Event 7) they may continue in 1-E-0 after initiating manual SI or go to 1-ES-0.1 or 1-AP-24.01 and then return to 1-E-0 after initiating manual SI.</p>
	RO	<p>4. b) Manually initiate SI (may not based on timing of Event 7)</p>

END – Event 6

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 7

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	Team	<p>Diagnose the rupture in 'A' SG. The team may not be able to determine which SG is ruptured at first due to the loss of the 'C' RCP causing level in that SG to rise too. The team will identify an RCS inventory loss based on the following:</p> <p>Alarms:</p> <ul style="list-style-type: none"> <li>• 1C-B8 PRESSURIZER LOW PRESSURE</li> <li>• 1C-D8 PRESSURIZER LOW LEVEL</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• Pressurizer level decreasing.</li> <li>• Charging flow increasing.</li> <li>• RCS pressure decreasing.</li> </ul>
	SRO	<p>IF team did not SI on Step 4 of 1-E-0, THEN:</p> <p>Enters 1-AP-16.00, EXCESSIVE RCS LEAKAGE</p>
	RO	<p>[1] INCREASE CHG FLOW USING 1-CH-FCV-1122 IN MANUAL TO MAINTAIN PRZR LEVEL AT PROGRAM SETPOINT, AS NECESSARY.</p> <p>RO will shift charging flow to manual and raise charging flow.</p>
	RO	<p>[2] CHECK RCS LEAK RATE</p> <ul style="list-style-type: none"> <li>• Pressurizer level – DECREASING</li> <li style="text-align: center;">OR</li> <li>• Annunciator 1D-E5 – LIT</li> </ul> <p>RO (depending on timing and size of leak when AP-16.00 entered) will identify that pressurizer level continues to decrease and annunciator 1D-E5 is lit.</p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 7

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

**Cue: Ramped in over 5 minutes starting 1 minute after reactor trip**

	RO	<p>[3] VERIFY CLOSED OR CLOSE NORMAL AND EXCESS LETDOWN ISOLATIONS:</p> <ul style="list-style-type: none"> <li>• 1-CH-LCV-1460A</li> <li>• 1-CH-LCV-1460B</li> <li>• 1-RC-HCV-1557A</li> <li>• 1-RC-HCV-1557B</li> <li>• 1-RC-HCV-1557C</li> <li>• 1-RH-HCV-1142</li> </ul> <p>RO will close 1-CH-LCV-1460A/B (if not previously isolated)</p>
	RO	<p>[4] VERIFY THE FOLLOWING PARAMETERS – STABLE OR INCREASING</p> <ul style="list-style-type: none"> <li>• PRZR level</li> <li>• PRZR pressure</li> <li>• RCS subcooling</li> </ul> <p>RO will identify that PRZR level and pressure continue to decrease</p> <p>[4] RNO GO TO 1-E-0 REACTOR TRIP OR SAFETY INJECTION</p> <p>Team should decide to return to 1-E-0 (if left) and manually initiate safety injection.</p>
	SRO	Returns to 1-E-0, REACTOR TRIP OR SAFETY INJECTION
	RO	Verifies 1-E-0 immediate actions are complete.
	RO	4. b) Manually initiate SI

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	SRO	<p>When team identifies 'A' SG is ruptured based on increasing narrow range level, wide range level, and steam pressure. The SRO should provide the BOP with Attachment 10 (Ruptured SG Isolation and Feed Water Control). This is not required, as these are pre-emptive actions.</p> <p>Prior to identification of the ruptured SG the team may utilize Attachment 8 of E-0 to control AFW flow.</p>
	BOP	<p>ATTACHMENT 10 of 1-E-0</p> <p>1. Verify SI is in progress. If SI is not in progress, then 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"> <li>• Unexpected rise in any SG Narrow Range level</li> <li>• High radiation from any SG MS line monitor</li> <li>• High radiation from any SG Blowdown line</li> </ul> <p>BOP with SRO concurrence identifies 'A' SG as the ruptured SG</p>
	BOP	<p>ATTACHMENT 10 of 1-E-0</p> <p>3. Locally close steam supply valve to the TD AFW pump:</p> <ul style="list-style-type: none"> <li>• 1-MS-87</li> </ul> <p>BOP directs field operator to close 1-MS-87.</p>
	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"> <li>• SG A, 1-FW-MOV-151E and 1-FW-MOV-151F</li> </ul> <p>BOP closes 1-FW-MOV-151E/F when SG level is greater than 12% Narrow Range.</p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 7

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	BOP	<p>ATTACHMENT 10 of 1-E-0</p> <p>6. Control Feed Flow to the SG IAW the following requirements:</p> <ul style="list-style-type: none"> <li>• Minimum AFW flow is 350 gpm with SI initiated, until one SG Narrow Range level is greater than 12%</li> <li>• 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"> <li>○ SG B, 1-FW-MOV-151C and 1-FW-MOV-151D</li> <li>○ SG C, 1-FW-MOV-151A and 1-FW-MOV-151B</li> </ul> </li> </ul>
		<p>RETURN TO 1-E-0 PROCEDURE FLOW PATH WHICH SHOULD HAVE CONTINUED DURING THE PERFORMANCE OF ATTACHMENT 10</p>
	BOP	<p>5. VERIFY FW ISOLATION:</p> <ul style="list-style-type: none"> <li>• Feed pump discharge MOVs – CLOSED <ul style="list-style-type: none"> <li>• 1-FW-MOV-150A</li> <li>• 1-FW-MOV-150B</li> </ul> </li> <li>• MFW pumps – TRIPPED</li> <li>• Feed REG valves – CLOSED</li> <li>• SG FW bypass flow valves – DEMAND AT ZERO</li> <li>• SG blowdown TVs - CLOSED</li> </ul>
	RO	<p>6. VERIFY CTMT ISOLATION PHASE I:</p> <ul style="list-style-type: none"> <li>• Phase I TVs – CLOSED</li> <li>• 1-CH-MOV-1381 – CLOSED</li> <li>• 1-SV-TV-102A – CLOSED</li> <li>• PAM isolation valves – CLOSED <ul style="list-style-type: none"> <li>• 1-DA-TV-103A</li> <li>• 1-DA-TV-103B</li> </ul> </li> </ul>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 7

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	BOP	7. VERIFY AFW PUMPS RUNNING: <ul style="list-style-type: none"><li>a) MD AFW pumps – RUNNING (Time Delayed)</li><li>b) TD AFW pump - RUNNING IF NECESSARY</li></ul>
	RO	8. VERIFY SI PUMPS RUNNING: <ul style="list-style-type: none"><li>• CHG pumps – RUNNING</li><li>• LHSI pumps - RUNNING</li></ul>
	RO	9. CHECK CHG PUMP AUXILIARIES: <ul style="list-style-type: none"><li>• CHG pump CC pump – RUNNING</li><li>• CHG pump SW pump - RUNNING</li></ul>
	BOP	10. CHECK INTAKE CANAL: <ul style="list-style-type: none"><li>• Level - GREATER THAN 24 FT</li><li>• Level - BEING MAINTAINED BY CIRC WATER PUMPS</li></ul>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 7

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	BOP	<p>11. 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"> <li>• E-F-10 (High Steam Flow SI)</li> <li>• B-C-4 (Hi Hi CLS Train A)</li> <li>• B-C-5 (Hi Hi CLS Train B)</li> </ul> <p>Identifies annunciators not lit and goes to step 12.</p>
		<p>*12. 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 13.</p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 7

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	RO	<p>*13. BLOCK LOW PRZR PRESS SI SIGNAL:</p> <p>a) Check PRZR pressure – LESS THAN 2000 psig</p> <p>b) Turn both LO PRZR PRESS &amp; STM HDR/LINE ΔP switches to block</p> <p>c) Verify Permissive Status light C-2 - LIT</p>
	RO	<p>*14. 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 &amp; LO TAVG OR LP switches to block</p> <p>c) Verify Permissive Status light F-1 - LIT</p>
	RO	<p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>• CHG pumps should be run in the following order of priority: C, B, A.</li> <li>• Subsequent SI signals may be reset by reperforming Step 15.</li> </ul> <p>15.VERIFY SI FLOW:</p> <p>a) HHSI to cold legs - FLOW INDICATED</p> <ul style="list-style-type: none"> <li>• 1-SI-FI-1961 (NQ)</li> <li>• 1-SI-FI-1962 (NQ)</li> <li>• 1-SI-FI-1963 (NQ)</li> <li>• 1-SI-FI-1943 or 1-SI-FI-1943A</li> </ul> <p>b) Check CHG pumps - THREE RUNNING</p> <p>RNO: GO TO Step 15e.</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"> <li>1) Verify reset or reset SI.</li> <li>2) Stop one LHSI pump and put in AUTO.</li> <li>3) GO TO Step 16.</li> </ol>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 7

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	BOP	16. VERIFY TOTAL AFW FLOW - GREATER THAN 350 GPM [450 GPM]
	BOP	17. CHECK AFW MOVs - OPEN
	RO	18. VERIFY SI VALVE ALIGNMENT IAW ATTACHMENT 2 See attached copy of Attachment 2.
	BOP	19. VERIFY VENTILATION ALIGNMENT AND AC POWER ALIGNMENT IAW ATTACHMENT 3  See attached copy of Attachment 3:  <b>NOTE:</b> The timer should be set for 50 minutes, minus the number of minutes since Safety Injection initiation.  8. Set timer. WHEN SI has been in progress for 50 minutes (when timer goes off), THEN immediately perform Step 18 to start one Emergency Supply Fan.
	RO	*20. CHECK RCS AVERAGE TEMPERATURE  • STABLE AT 547°F  OR  • TRENDING TO 547°F

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 7

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	RO	<p>21. CHECK PRZR PORVs AND SPRAY VALVES:</p> <p>a) PRZR PORVs – CLOSED</p> <p>b) PRZR spray controls - DEMAND AT ZERO</p> <p>c) PORV block valves - AT LEAST ONE OPEN</p> <p>RNO: c) Open one PORV block valve unless it was closed to isolate an open PORV.</p> <p>Note: IF SRO directs reenergizing PORV 1455C block valve Breaker, it will immediately trip when c/s is placed to open.</p>
	RO	<p><b>NOTE:</b> Seal injection flow should be maintained to all RCPs.</p> <p>*22. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:</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>c) Stop all RCPs</p> <p>d) RCS pressure - LESS THAN 1275 psig [1475 PSIG]</p> <p>Note: RNO for steps a) – d) is to go to step 23</p> <p>e) Close CHG pump miniflow recirc valves:</p> <ul style="list-style-type: none"> <li>• 1-CH-MOV-1275A</li> <li>• 1-CH-MOV-1275B</li> <li>• 1-CH-MOV-1275C</li> </ul>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 7

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	BOP	<p>23. ___ CHECK IF SGs ARE NOT FAULTED:</p> <ul style="list-style-type: none"> <li>• Check pressures in all SGs – STABLE OR INCREASING</li> <li>• Check pressures in all SGs – GREATER THAN 100 PSIG</li> </ul>
	BOP	<p>24. ___ CHECK IF SG TUBES ARE NOT RUPTURED:</p> <ul style="list-style-type: none"> <li>• Condenser air ejector radiation – NORMAL</li> <li>• SG blowdown radiation – NORMAL</li> <li>• SG MS radiation – NORMAL</li> <li>• TD AFW pump exhaust radiation – NORMAL</li> <li>• SG NR Level - NOT INCREASING IN AN UNCONTROLLED MANNER</li> </ul> <p>BOP should observe 'A' SG NR level going up uncontrollably.</p> <p>RNO: GO TO 1-E-3, STEAM GENERATOR TUBE RUPTURE.</p>
	SRO	GO TO 1-E-3, STEAM GENERATOR TUBE RUPTURE.

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 7

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

Time	Position	Applicant's Action or Behavior
	RO	<p><b>NOTE:</b> 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>b) RCS subcooling - LESS THAN 30°F [85°F]</p> <p>c) Stop all RCPs</p> <p>d) RCS pressure - LESS THAN 1275 psig [1475 PSIG]</p> <p>Note: RNO for steps a) – d) is to go to step 2</p> <p>e) Close CHG pump miniflow recirc valves:</p> <ul style="list-style-type: none"> <li>• 1-CH-MOV-1275A</li> <li>• 1-CH-MOV-1275B</li> <li>• 1-CH-MOV-1275C</li> </ul>
	SRO	<p>2. IDENTIFY RUPTURED SG(s):</p> <ul style="list-style-type: none"> <li>· Unexpected rise in any SG narrow range level</li> <li>OR</li> <li>· High radiation from any SG MS line monitor</li> <li>OR</li> <li>· High radiation from any SG blowdown line</li> <li>OR</li> <li>· High radiation from any SG sample</li> </ul> <p>Crew should observe 'A' SG NR level going up unexpectedly</p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 7

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	BOP	<p>CAUTION:</p> <ul style="list-style-type: none"> <li>· 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.</li> <li>· At least one SG must be maintained available for RCS cooldown.</li> </ul> <p>3. ISOLATE RUPTURED SG(s):</p> <ol style="list-style-type: none"> <li>a) Adjust ruptured SG PORV controller setpoint to 1035 psig</li> <li>b) Check ruptured SG(s) PORV – CLOSED</li> <li>c) Verify blowdown TVs from ruptured SG(s) – CLOSED</li> <li>d) Locally close steam supply valve(s) to TD AFW pump: <ul style="list-style-type: none"> <li>· 1-MS-87 for SG A</li> </ul> </li> <li>e) Close ruptured SG(s) MSTV</li> </ol>
	BOP	<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"> <li>a) Narrow range level - GREATER THAN 12% [18%]</li> <li>b) Stop feed flow to ruptured SG(s)</li> </ol>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 7

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	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>* 5. CHECK PRZR PORVs AND BLOCK VALVES:</p> <p>a) Power to PRZR PORV block valves - AVAILABLE</p> <p>RNO: a) Locally close the following breakers:</p> <ul style="list-style-type: none"> <li>· 1H1-2S 6A for 1-RC-MOV-1535</li> <li>· 1J1-2W 8A for 1-RC-MOV-1536</li> </ul> <p>b) PRZR PORVs - CLOSED</p> <p>c) PRZR PORV block valves - AT LEAST ONE OPEN</p> <p>RNO: c) Open one block valve unless closed to isolate an open PORV.</p> <p>Booth: If requested, reenergize PRZR PORV 1455C after 2 minutes. Block valve thermals will trip (valve will not open) when c/s taken to Open.</p>
	BOP	<p>6. CHECK IF SGs ARE NOT FAULTED</p> <p>a) Check pressures in all SGs – STABLE OR INCREASING</p> <p>b) Check pressures in all SGs – GREATER THAN 100 PSIG</p>
	BOP	<p>* 7.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>
	RO	8. RESET BOTH TRAINS OF SI

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	RO	<p>9. RESET CLS:</p> <p>a) CTMT pressure - LESS THAN 14 PSIA</p> <p>b) Reset both trains of CLS if necessary</p>
	BOP	<p>10. 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> <p>c) Verify 1-IA-TV-100 - OPEN</p>
	BOP	<p>11. ALIGN CONDENSER AIR EJECTOR TO CTMT:</p> <p>a) Verify the following:</p> <ul style="list-style-type: none"> <li>· 1-SV-TV-102 – OPEN</li> <li>· 1-SV-TV-103 – CLOSED</li> </ul> <p>b) Open the following valve:</p> <ul style="list-style-type: none"> <li>· 1-SV-TV-102A</li> </ul>
	BOP SRO	*12. VERIFY ALL AC BUSES - ENERGIZED BY Initiate 1-AP-10.07, LOSS OF OFFSITE POWER UNIT 1 POWER.

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	RO	<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>13. CHECK IF LHSI PUMPS SHOULD BE STOPPED:</p> <p>a) RCS pressure - GREATER THAN 250 PSIG [400 PSIG]</p> <p>b) Stop LHSI pumps and put in AUTO</p>
	BOP	<p>14. CHECK RUPTURED SG(s) ISOLATED FROM AT LEAST ONE INTACT SG(s):</p> <p>a) Check MSTVs or NRVs - CLOSED</p> <ul style="list-style-type: none"> <li>· Ruptured SG(s)</li> <li>· Intact SG(s)</li> </ul> <p>b) Check ruptured SG(s) pressure - GREATER THAN 350 PSIG</p>
	RO	<p>*15. BLOCK LOW PRZR PRESS SI SIGNAL:</p> <p>a) Check PRZR pressure - LESS THAN 2000 PSIG</p> <p>b) Turn both LO PRZR PRESS &amp; STM HDR/LINE DP switches to block</p> <p>c) Verify Permissive Status light C-2 - LIT</p>
	TEAM	<p>*16. BLOCK LOW TAVE SI SIGNAL:</p> <p>a) Check RCS Tave - LESS THAN 543°F</p> <p>b) Turn both HI STM FLOW &amp; LO TAVG OR LP switches to block</p> <p>c) Verify Permissive Status light F-1 – LIT</p> <p>d) Hold the STM DUMP CNTRL switch in BYP INTLK</p> <p>e) Verify Bypass Status light D-2 - LIT</p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 7

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	TEAM	<p>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.</p> <p>NOTE: RCP trip criteria does NOT apply after initiation of an operator controlled cooldown.</p>																		
	<p>TEAM</p> <p><b>Critical Task</b></p>	<p>17. INITIATE RCS COOLDOWN:</p> <p><b>a) Determine required core exit temperature (ONE TIME):</b></p> <table border="1"> <thead> <tr> <th>LOWEST RUPTURED SG PRESSURE (PSIG)</th> <th>CORE EXIT TEMPERATURE (°F)</th> </tr> </thead> <tbody> <tr> <td>BETWEEN 1001 AND 1085</td> <td>495 [440]</td> </tr> <tr> <td>BETWEEN 901 AND 1000</td> <td>485 [430]</td> </tr> <tr> <td>BETWEEN 801 AND 900</td> <td>470 [415]</td> </tr> <tr> <td>BETWEEN 701 AND 800</td> <td>455 [400]</td> </tr> <tr> <td>BETWEEN 601 AND 700</td> <td>440 [385]</td> </tr> <tr> <td>BETWEEN 501 AND 600</td> <td>420 [365]</td> </tr> <tr> <td>BETWEEN 401 AND 500</td> <td>400 [345]</td> </tr> <tr> <td>BETWEEN 350 AND 400</td> <td>385 [335]</td> </tr> </tbody> </table> <p>b) Place Steam Dump Mode Select switch in Steam Pressure mode</p> <p>c) Dump steam to main condenser from from intact SG(s) at maximum rate</p> <p><b>RNO: c) Dump steam at maximum rate with intact SG(s) not to exceed 1E6 lbm/hr.:</b></p> <p style="padding-left: 40px;">· <b>Manually use SG Steam Dumps</b></p> <p>d) Check CETCs - LESS THAN REQUIRED TEMPERATURE</p> <p>e) Stop RCS cooldown</p> <p>f) Maintain CETCs - LESS THAN REQUIRED TEMPERATURE</p> <p><b>Task Standard: Establish RCS cooldown with steam dumps at least 25% demand (not to exceed 1E6 lbm/hr)</b></p>	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 350 AND 400	385 [335]																			

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 7

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	BOP	<p>CAUTION: RCS cooldown in Step 17 should be completed before beginning Step 18.</p> <p>18. CHECK RUPTURED SG(s) PRESSURE - STABLE OR INCREASING</p>
	RO	19. CHECK RCS SUBCOOLING BASED ON CETCs - GREATER THAN 50°F [105°F]
	RO	<p>20. DEPRESSURIZE RCS TO MINIMIZE BREAK FLOW AND REFILL PRZR:</p> <p>a) Check normal spray - AVAILABLE</p> <ul style="list-style-type: none"> <li>· Spray valves - BOTH AVAILABLE</li> </ul> <p>AND</p> <ul style="list-style-type: none"> <li>· RCPs A and C - RUNNING</li> </ul> <p>RNO: a) GO TO Step 21.</p>

Op-Test No.: Surry 2006 Scenario No.: 1 Event No.: 7

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Event Description: 1A SGTR (50 - 300 gpm) without pressurizer pressure control.

Cue: Ramped in over 5 minutes starting 1 minute after reactor trip

	RO	<p>CAUTION:</p> <ul style="list-style-type: none"> <li>· The PRT may rupture if a PRZR PORV is used for RCS depressurization. Rupturing the PRT may result in abnormal containment conditions.</li> <li>· Cycling of the PRZR PORV should be minimized.</li> </ul> <p>NOTE: During natural circulation, the upper head region may void during RCS depressurization. This will result in a rapidly increasing PRZR level.</p> <p>21. __DEPRESSURIZE RCS USING PRZR PORV TO MINIMIZE BREAK FLOW AND REFILL PRZR:</p> <p>a) PRZR PORV - AT LEAST ONE AVAILABLE PRESSURIZER</p> <p>a) GO TO 1-ECA-3.3, SGTR WITHOUT PRESSURE CONTROL.</p> <p>Note: Block valve thermals will trip (valve will not open) when c/s taken to Open.</p>
	SRO	<p>Go to 1-ECA-3.3</p> <p>Note: Pages 1-17 and Continuous Actions of 1-ECA-3.3 attached due to multiple possible procedure pathways.</p> <p>Scenario ends when crew reaches one of the following:</p> <ol style="list-style-type: none"> <li>1) Transitions to 1-ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT – SUBCOOLED RECOVERY.</li> <li>2) Transitions to 1-E-3, SGTR, following performance of step 19, DEPRESSURIZE RCS TO MINIMIZE BREAK FLOW AND REFILL PRZR.</li> <li>3) Goes to step 20 of 1-ECA-3.3.</li> </ol>

END – Event 7

END – Scenario 1

**FINAL**

Facility:	Surry	Scenario No.:	2	Op-Test No.:	2006-301
Examiners:	_____	Operators:	_____	SRO	
	_____		_____	RO	
	_____		_____	BOP	

Initial Conditions: Plant has been at 100% power for 4 days following unit trip due to dropped control rods. (FT-FW-476 selected as controlling A SG feed flow channel; 'A' charging pump running).

Turnover: Rain/thunderstorms forecasted over next 2-4 hours.

'A' CC pump is OOS for oil change and is expected to be returned to service this shift.

'C' charging pump was taken OOS last shift for oil cooler cleaning. This results in a 7 day charging crosstie clock in accordance with TS 3.2.C.3.

PZR PORV 1455C failed its surveillance test. As a result, 1-RC-MOV-1536 is closed but power has been maintained to the valve (it is capable of being manually cycled) in accordance with TS 3.1.A.6.a.

'B' SG has a 1.0 gpd tube leak.

Unit 2 is defueled for a refueling shutdown. The AFW cross ties are out of service for maintenance on Unit 2 AFW. As a result, Unit 1 is in a 72-hour AFW Crosstie clock in accordance with TS 3.6.G.2.

Event No.		Event Type*	Event Description
1	BOP SRO (TS)	I	1-CC-RM-105 fails / HCV-CC-100 fails to close
2	BOP SRO (TS)	I	'A' SG controlling level channel fails low
3	RO SRO (TS)	C	Overcurrent trip of 'A' charging pump with a failure of 'A' charging pump check valve
4	RO	N	Restoration of normal letdown flow
5	All BOP	R C	Trip of 'A' HP Heater Drain Pump
6	RO SRO (TS)	I	PRZR level channel I fails high
7	All	M	Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip
8	All	M	Loss of Heat Sink

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

**Surry 2006-301 Scenario #2****Event 1**

CC HX A Outlet Rad Monitor fails and CC Head Tank Vent valve, HCV-CC-100, fails to automatically close. BOP should close HCV-CC-100. SRO should enter Tech Spec 3.13.C.

Verifiable Action: (BOP) close HCV-CC-100

Technical Specification: Table 3.7-5.1 and LCO 3.13.C

**Event 2**

The 'A' SG controlling level channel fails low, causing actual SG level to go down. BOP should take manual control of 'A' SG FRV. SRO should enter 0-AP-53.00. 'A' SG level deviations will occur on subsequent failure of HP Heater Drain Pump (Event 5).

Verifiable Action: (BOP) place 'A' SG FRV in manual.

Technical Specification: Tables 3.7-1 #17, 3.7-2 #20, and 3.7-3 #20

**Event 3**

The 'A' charging pump trips on overcurrent and the discharge check valve on the 'A' charging pump fails open. The 'B' charging pump auto starts but with the 'A' charging pump's discharge check valve failed open results in low charging flows to various RCS components. PZR level will go down and VCT level will go up. SRO should enter 1-AP-8.00, Loss of Normal Charging Flow.

Verifiable Action: (RO) close normal and alternate discharge MOVs on 'A' charging pump.

Technical Specification: LCO 3.2.A. and 3.3.A.3

**Event 4**

Restoration of normal letdown flow following a loss during event 3. The RO performs 1-OP-CH-020 to return letdown to service.

Verifiable Action: (RO) opens CH-PCV-1145, CH-FCV-1122, CH-LCV-1460A and B, and CH-HCV-1200A and B or C.

Technical Specification:

Event 5

HP Heater Drain Pump trips above 75% power. SRO should enter 1-AP-18.00, Loss of HP Heater Drain Pump, and order a rapid load reduction to 75% power per 0-AP-23.00, Rapid Load Reduction.

Verifiable Action: RO operates control rods and boration controls. BOP operates turbine, starts third CN pump, operates 'A' SG FRV in manual.

Technical Specification: Table 4.1-2.B if greater than 15% power change in 1 hour.

Event 6

PRZR level channel 1 fails high, causing an increase in charging flow. RO should stabilize the plant by placing charging flow in Manual. SRO should enter 0-AP-53.00, Loss of Vital Instrumentation/Controls.

Verifiable Action: (RO) place charging flow in Manual.

Technical Specification: LCO Table 3.7-1 Action 2

Event 7

Uncontrolled depressurization of 'A' steam generator due to unisolable steam leak inside Main Steam Valve House with failures of the AFW pumps and failure of turbine to trip. SRO should enter 1-E-0 until transition to a red path on heat sink.

Verifiable Actions. (RO) Trip the reactor and close MSTVs.

**Critical Task: Close MSTVs before Tc decreases to less than 400°F.**

Event 8

Loss of heat sink due to blow down of 'A' SG and no AFW flow available ('A' MD AFW pump will fail to start automatically or manually, 'B' AFW pump starts but trips later due to harsh environment, and TD AFW pump starts but trips on over speeds) resulting in decrease SGs levels. SRO should transition to 1-FR-H.1. Scenario can be terminated once heat sink has been established with MFW pump flowing to intact SGs.

Verifiable Actions: (BOP) establish heat sink with main feedwater pump flowing to intact SGs.

**Critical Tasks: Establish heat sink with main feedwater pump flowing to intact SGs prior to two out of three SGs WR levels less than 7%.**

**SIMULATOR OPERATOR GUIDE**  
**HL-13 NRC EXAM - SCENARIO 2**

Initial Conditions: IC #1 100%, MOL – Cycle 20. The unit has been at 100% power for 4 days.

Pre-load malfunctions:

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

- CC Pump 'A' Tagged Out.
- Charging Pump 'C' Tagged Out.
- PRZR PORV 1455C block valve (1-RC-MOV-1536) closed due I&C PT failure.
- 'A' Charging Pump running.
- 'A' HP HTR Drain pump running.
- 'B' SG has a 1.0 gpd tube leak (MSRR193\_CHAN2 = 0.005)
- Disable 'A' AFW pump autostart and turn off start position on c/s.
- Disable auto closure of CC-HCV-100

Turnover: Maintain full power operation.

'A' CC pump is out of service for oil an change and is expected to be returned to service this shift.

'C' charging pump was taken OOS last shift for oil cooler cleaning. TS 3.2.C.3 is in effect. Expected return to service within 48 hours.

PZR PORV 1455C failed its surveillance test. As a result, 1-RC-MOV-1536 is closed but power has been maintained to the valve (the PORV is capable of being manually cycled) in accordance with TS 3.1.A.6.a.

'B' SG has a 1.0 gpd tube leak

Rain/thunderstorms forecasted over next 2-4 hours. OC-21, Severe Weather OC, has been initiated.

Unit 2 is defueled for a refueling shutdown. The AFW cross ties are out of service for maintenance on Unit 2 AFW. As a result Unit 1 is in a 72-hour AFW Crosstie clock in accordance with TS 3.6.G.2.

Event	Malf. #'s	Severity	Instructor Notes and Required Feedback
1	RM0209		1-CC-RM-105 fails / HCV-CC-100 fails to close.
2	FW1303		'A' SG controlling level channel fails low.
3	CH4201 CH0501		Failure of 'A' charging pump check valve. Overcurrent trip 'A' charging pump.
4	None		Restoration of normal letdown flow.
5	SD0201		Trip of 'A' HP Heater Drain Pump Local check of HD level control system reveals contractors working on wrong unit.
6	RC4901		PRZR level channel 1 fails high
7	MS0401 TU03/04		Uncontrolled depressurization of 'A' SG. Turbine fails to trip.
8	MS16 FW0702		Loss of Heat Sink
END			Restoration of heat sink with main feedwater flow.

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## SHIFT TURNOVER INFORMATION

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### OPERATING PLAN:

- The Unit has been at 100% power for 4 days following unit trip from 100% due to dropped control rods.
- Rain/thunderstorms forecasted over next 2-4 hours. OC-21, Severe Weather OC, has been initiated. No further action required by the shift at this time.
- 'A' CC pump is out of service for oil an change and is expected to be returned to service this shift.
- 'C' charging pump was taken out of service last shift for oil cooler cleaning. TS 3.2.C is in effect (7-day LCO) since charging crosstie from Unit 2 is not available. Expected return to service within 48 hours.
- PZR PORV 1455C failed its surveillance test. As a result, 1-RC-MOV-1536 is closed but power has been maintained to the valve (the PORV is capable of being manually cycled) in accordance with TS 3.1.A.6.a.
- Unit 2 is defueled
  - The AFW cross ties are out of service for maintenance on Unit 2 AFW. As a result, Unit 1 is in a 72-hour AFW Crosstie clock in accordance with TS 3.6.G.2.
  - Load shed switch is in OVRD Bypass.
- Maintain full power operation.

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 1

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Event Description: 1-CC-RM-105 failure and CC Head Tank Vent Valve fails to close.  
 Cue: By Examiner.

Time	Position	Expected Action
	BOP	<p>Diagnoses failure of 1-RM-CC-105 with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> <li>• 0-RM-L5 CC HX A/B OUT ALERT/FAILURE</li> <li>• 0-RM-M5 1-CC-RI-105 HIGH</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• 1-CC-RI-105 indicates all "EEEEEEs."</li> </ul>
	BOP	Refers to 0-RM-L5
	BOP	NOTE:
	BOP	· If a monitor fails, the automatic functions associated with that monitor must be verified or performed.
	BOP	· Upon failure of digital ratemeter with all EEEEEEs indicated on display, all automatic actions associated with radiation monitor failure will need to be verified as having occurred, the digital ratemeter reset, and a source check performed in accordance with 0-OPT-RM-001, Radiation Monitoring Equipment Check.
	SRO	· Tech Spec 3.13.C requires that HCV-CC-100 remain closed if either CC radiation monitor is inoperable.
	BOP	1. VERIFY ALARM - READING ON MONITOR GREATER THAN OR EQUAL TO ALERT SETPOINT OR RADIATION LEVEL HAS TRENDED UP
	BOP	<p>· 1-CC-RI-105, HDR A</p> <p>· 1-RM-RR-150C, Pen 1</p>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 1

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Event Description: 1-CC-RM-105 failure and CC Head Tank Vent Valve fails to close.  
 Cue: By Examiner.

	SRO/BOP	<p>RNO: Do the following:</p> <p>a) IF monitor failed, THEN do the following:</p> <ol style="list-style-type: none"> <li>1) Verify closed or close CC Head Tank Vent valve.           <ul style="list-style-type: none"> <li>· HCV-CC-100</li> </ul> </li> <li>2) Increase surveillance of the following monitor:           <ul style="list-style-type: none"> <li>· 1-CC-RI-106</li> </ul> </li> <li>3) Initiate a Work Request.</li> <li>4) GO TO Step 3.</li> </ol>
	BOP	<p>3. MONITOR CC HEAD TANK LEVEL AND CC TEMP FOR INCREASING LEAKAGE TO CC SYSTEM</p>
	SRO	<p>4. NOTIFY HP TO DO THE FOLLOWING:</p> <ul style="list-style-type: none"> <li>· Verify area evacuated as necessary</li> <li>· Control access as necessary</li> <li>· Investigate cause</li> <li>· Determine need for setpoint change</li> </ul>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 1

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Event Description: 1-CC-RM-105 failure and CC Head Tank Vent Valve fails to close.

Cue: By Examiner.

	SRO	<p>5. PERFORM (-)OPT-RC-10.0, REACTOR COOLANT LEAKAGE OR (-)AP-16.00, EXCESSIVE RCS LEAKAGE, AS NECESSARY</p> <p>6. DETERMINE LEAKAGE SOURCE BY SAMPLING AS NECESSARY</p> <p>7. ISOLATE LEAKAGE</p> <p>SRO should realize that these steps are not necessary.</p>
	SRO	<p>8. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"> <li>· Shift Supervisor</li> <li>· OMO</li> <li>· STA</li> <li>· Health Physics</li> <li>· Instrumentation Department</li> </ul> <p>- END -</p>
	SRO	<p>Refer to the following Tech Spec 3.7</p> <ul style="list-style-type: none"> <li>• Table 3.7-5, 1</li> </ul> <p>Determines that surge tank vent valve HCV-CC-100 required to be closed.</p>

END – Event 1

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 2

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Event Description: 'A' SG controlling level channel, LT-FW-476, fails low. Cue: By Examiner.

Time	Position	Expected Action
	BOP	Diagnoses channel failure with the following indications/alarms:  Alarms: <ul style="list-style-type: none"> <li>• 1H-G5 STM GEN 1A LVL ERROR</li> <li>• 1H-C5 STM GEN 1A Lo-Lo LVL</li> <li>• 1F-G7 STM GEN 1A Lo-Lo LVL CH3</li> </ul> Indications: <ul style="list-style-type: none"> <li>• 1-FW-FCV-1478 respond to level channel failure by opening in automatic</li> </ul>
	SRO	Enters 0-AP-53.00, LOSS OF VITAL INSTRUMENTATION / CONTROLS.
	BOP	[ 1 ] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - 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 FRV by depressing manual pushbutton and decreasing FW flow to restore level to program band (44%).
	RO	3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS - AFFECTED <ul style="list-style-type: none"> <li>• Nuclear Instrumentation</li> <li>• Pressurizer Pressure control</li> </ul> RNO: GO TO Step 6.

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 2

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Event Description: 'A' SG controlling level channel, LT-FW-476, fails low. **Cue: By Examiner.**

BOP	<p>6. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS – NORMAL</p> <ul style="list-style-type: none"> <li>• Steam Pressure</li> <li>• Steam Flow</li> <li>• Feed Flow</li> <li>• <b>Steam Generator Level</b></li> </ul>
SRO	<p>RNO IF SG Level Channel III has failed, THEN do the following:</p> <ol style="list-style-type: none"> <li>a) Place the associated Feed Reg Valve in MANUAL.</li> <li>b) IF manual control of Feedwater is inoperable, THEN do the following: (Not Applicable)             <ol style="list-style-type: none"> <li>1) Control SG level with Feedwater Isolation MOVs.</li> <li>2) Consult with the Shift Manager concerning the need to place the MFRV on the jack.</li> </ol> </li> <li>c) Control SG level at program level.</li> <li>d) Main Feed Reg Valve Bypass Valves may be used for fine control of SG level.</li> </ol> <p>Perform follow-up actions:</p> <ol style="list-style-type: none"> <li>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.</li> <li>b) Refer to the following Tech Spec 3.7 items:             <ul style="list-style-type: none"> <li>• Table 3.7-1, <b>12</b> and 17</li> <li>• Table 3.7-2, 1.c, 1.e, and <b>3.a</b></li> <li>• Table 3.7-3, 2.a, and <b>3.a</b></li> </ul> </li> </ol> <p>Determines TSSs bolded above - applicable (trip channel w/in 72 hours).  c) Refer to Attachment 1.  d) IF no other instrumentation failure exists, THEN GO TO Step 12.</p>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 2

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Event Description: 'A' SG controlling level channel, LT-FW-476, fails low. Cue: By Examiner.

	SRO	<p>12. CHECK FAILED INSTRUMENT - IS A REGULATORY GUIDE 1.97 VARIABLE</p> <p>RNO: Go to Step 14</p> <p>Directs the STA to Evaluate. STA will provide correct Reg. Guide 1.97 information.</p>
	SRO	<p>14. REVIEW THE FOLLOWING:</p> <ul style="list-style-type: none"> <li>• Tech Spec 3.7</li> <li>• VPAP-2802, NOTIFICATIONS AND REPORTS</li> </ul> <p>SRO directs STA to review VPAP-2802</p> <ul style="list-style-type: none"> <li>• TRM SECTION 3.3, INSTRUMENTATION</li> </ul> <p>SRO directs STA to review the TRM.</p>
	SRO	<p>15. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"> <li>• Shift Supervision</li> <li>• OMOG</li> <li>• STA (PRA determination)</li> <li>• I&amp;C</li> </ul> <p>- END -</p>

END of Event 2

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 3

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Event Description: Over-current trip of 'A' charging pump and 'A' charging pump discharge check valve fails open. **Cue: By Examiner.**

Time	Position	Applicant's Action or Behavior
	RO	<p>Identifies: 1-CH-P-1A trips</p> <p>Alarms:</p> <ul style="list-style-type: none"> <li>• 1D-E5 CHG PP TO REGEN HX HI-LO FLOW</li> <li>• 1D-E6 CHG PP 1A 15H5 LOCKOUT</li> <li>• 1D-F5 CHG PP TO REGEN HX LO PRESS</li> <li>• 1D-F3 REGEN HX LETDOWN LINE HI TEMP</li> <li>• 1C-D/E/F3 RCP 1A/B/C SHAFT SEAL WTR LO INJ FLOW</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• PRZR level decreasing.</li> <li>• High amps on 1-CH-P-1B</li> <li>• Low pump discharge pressure</li> <li>• Low seal injection flow</li> </ul> <p>Letdown may isolate automatically (close 1-CH-LCV-1460A/B).</p>
	SRO	Enters 1-AP-8.00, LOSS OF NORMAL CHARGING FLOW.
	RO	<p><b>NOTE:</b> If CHG pump suction source is lost, the non-running CHG pump(s) must be placed in PTL.</p> <ol style="list-style-type: none"> <li>1. CHECK CHG PUMPS - AT LEAST ONE RUNNING</li> </ol>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 3

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Event Description: Over-current trip of 'A' charging pump and 'A' charging pump discharge check valve fails open. **Cue: By Examiner.**

		<p>2. CHECK CHG PUMP FOR GAS BINDING:</p> <ul style="list-style-type: none"> <li>• Running CHG pump suspected of gas binding</li> </ul> <p style="text-align: center;">AND</p> <p>One of the following conditions exists:</p> <ul style="list-style-type: none"> <li>• CHG pump discharge pressure – ERRATIC</li> <li>• Charging flow – ERRATIC</li> <li>• Motor amps - ERRATIC</li> </ul> <p>RNO: IF any Unit 1 CHG pump available to provide flow, THEN GO TO Step 6.</p>
	SRO/RO	<p>6. CHECK CHG PUMPS - MANIPULATIONS IN PROGRESS</p> <ul style="list-style-type: none"> <li>• Swapping CHG pumps (OPTs, tagouts)</li> </ul> <p>RNO: IF Charging and Letdown systems intact, THEN do the following:</p> <ol style="list-style-type: none"> <li>a) IF CHG pump check valve failure suspected, THEN GO TO Step 7.</li> </ol> <p>Booth: If local operator is dispatched, report charging and letdown intact, can hear/feel flow at discharge of 'B' charging pump.</p>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 3

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Event Description: Over-current trip of 'A' charging pump and 'A' charging pump discharge check valve fails open. **Cue: By Examiner.**

	RO	7. CHECK FOR CHG PUMP CHECK VALVE FAILURE: a) Close normal and alternate discharge MOVs on one standby CHG pump  • 1-CH-MOV-1286A, B, or C  • 1-CH-MOV-1287A, B, or C  b) Verify running or start lead CHG pump  c) Check Charging flow and pressure - RETURNED TO NORMAL
	SRO	Determines that charging flow and pressure return to normal with 'A' charging pump discharge MOVs closed.  d) Initiate a Work Request on failed check valve  e) GO TO Step 35
	RO	35. OPERATE 1-CH-FCV-1122 OR 1-CH-305 TO RETURN PRZR LEVEL TO NORMAL
	RO	36. CHECK CC FLOW TO RCP THERMAL BARRIERS - NORMAL
	RO	37. ADJUST RCP SEAL INJECTION FLOW TO BETWEEN 6 GPM AND 13 GPM USING 1-CH-HCV-1186 AS NECESSARY
	RO	38. VERIFY CH PUMP AND SYSTEM PARAMETERS - NORMAL • Header Pressure  • Flow  • Pump amps  • PCS Temperatures  • Local check of Lube oil flow and temperature  • Vent Damper position

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 3

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Event Description: Over-current trip of 'A' charging pump and 'A' charging pump discharge check valve fails open. **Cue: By Examiner.**

	RO	39. CHECK UNIT 1 CHARGING PUMPS – ONLY ONE RUNNING
	RO	40. CHECK UNIT 1 NORMAL CHARGING – IN SERVICE
	SRO/RO	41. CHECK CHARGING CROSSTIE – IN SERVICE RNO GO TO STEP 43
	RO	43. RETURN LETDOWN TO SERVICE AS NECESSARY  • Normal letdown IAW 1-OP-CH-020, PLACING LETDOWN IN SERVICE FOLLOWING AUTO OR MANUAL ISOLATION.  1-OP-CH-020 is attached to the back of the scenario.
	SRO	44. REVIEW THE FOLLOWING TECH SPECS  • TS 3.2, Chemical and Volume Control System  • TS 3.3, Safety Injection System  Determines <b>3.2.A</b> and <b>3.3.A.3</b> (72 hour LCO) is applicable.
		45. PROVIDE NOTIFICATIONS AS NECESSARY:  • OMOC  • Maintenance Department  • Shift Supervision  - END -

END – Event 3

**Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 4****Page 16 of 42**

Event Description: Restore Normal Letdown in accordance with 1-OP-CH-020.

<b>Time</b>	<b>Position</b>	<b>Applicant's Action or Behavior</b>
	RO	See attached procedure for restoration of letdown. RO restores Letdown in accordance with 1-OP-CH-020.

END – Event 4

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 5

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Event Description: 'A' HP Heater Drain Pump trips above 75% power due to low HP Heater Drain Tank Level. **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"> <li>• 1J-C3 HP HTR DR TK LO LVL TRIP</li> <li>• 1K-D4 4KV BKR AUTO TRIP</li> <li>• 1H-D3 CN POLISHING BYPASS AOV OPEN</li> <li>• 1J-B4 HP HTR DR RCVR TK HI-LO LVL</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• MCB c/s trip light lit.</li> <li>• Zero pump amps.</li> </ul> <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"> <li>• Check HP Heater Drain Pump – TRIPPED</li> </ul> <p>Identifies 'A' HP HTR Drain Pump - TRIPPED</p> <ul style="list-style-type: none"> <li>• Place pump control switch in PTL</li> </ul> <p>Places 'A' HP HTR Drain Pump Control Switch in PTL</p> <ul style="list-style-type: none"> <li>• Continue with Step 2.</li> </ul>
		2. CHECK REACTOR POWER – GREATER THAN OR EQUAL TO 75%
	BOP	3. START THIRD CONDENSATE PUMP AS REQUIRED BY PLANT CONDITIONS

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 5

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Event Description: 'A' HP Heater Drain Pump trips above 75% power due to low HP Heater Drain Tank Level. **Cue: By Examiner.**

	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 MWe.</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>AP-23.00 actions are contained on pages: 20 - 22</p>
	RO	<p>6. USE CONTROL RODS AND BLENDER TO MAINTAIN delta FLUX IN BAND</p>
	BOP	<p>7. MONITOR MAIN FEED REG VALVE RESPONSE - MAINTAINING SG LEVEL IN BAND</p> <p>RNO: Manually control Main Feed Reg Valves to maintain SG level in band.</p> <p>BOP must control 'A' FRV in manual to maintain 'A' SG NR level in band.</p>
	BOP	<p>8. CHECK CP BUILDING – BYPASSED</p>
		<p>9. CHECK HP HEATER DRAIN PUMP TRIP – CAUSED BY NETWORK 90 FAILURE</p> <p>RNO GO TO Step 11.</p>
	SRO	<p>11. NOTIFY THE FOLLOWING:</p> <ul style="list-style-type: none"> <li>· CP Building</li> <li>· Energy Supply (MOC)</li> <li>· Chemistry</li> <li>· STA</li> </ul>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 5

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Event Description: 'A' HP Heater Drain Pump trips above 75% power due to low HP Heater Drain Tank Level. **Cue: By Examiner.**

	BOP/RO	12. SECURE RAMP WHEN REACTOR POWER LESS THAN 75%
	BOP	<p>13. CHECK FOLLOWING PARAMETERS:</p> <ul style="list-style-type: none"> <li>· Feed Pump suction pressure - APPROXIMATELY 375 PSIG OR GREATER</li> <li>· Feed Header pressure to Steam Generator pressure DP – APPROXIMATELY 100 PSID OR GREATER</li> </ul> <p>RNO: Do the following if required:</p> <ul style="list-style-type: none"> <li>a) Reduce Turbine load.</li> <li>b) WHEN parameters met, THEN perform Step 11.</li> </ul>
	BOP/RO	<p>14. STABILIZE UNIT CONDITIONS</p> <ul style="list-style-type: none"> <li>a) Maintain Reactor power – LESS THAN 75%</li> <li>b) Verify Turbine Limiter - APPROXIMATELY 2 TO 3 PERCENT ABOVE STEADY STATE POWER LEVEL</li> <li>c) Borate or dilute as necessary to achieve the desired Tave and Delta Flux</li> <li>d) Use either IMP IN or IMP OUT as necessary to assist in stabilizing the Turbine</li> <li>e) Check CP Building - IN SERVICE</li> <li>f) Provide notifications as necessary: <ul style="list-style-type: none"> <li>• OMOC</li> <li>• Maintenance Department</li> </ul> </li> </ul>

Event Description: 'A' HP Heater Drain Pump trips above 75% power due to low HP Heater Drain Tank Level. **Cue: By Examiner.**

	TEAM	<p><b>0-AP-23.00, RAPID LOAD REDUCTION</b></p> <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>• Actions that can be completed independently of preceding steps may be performed out of sequence as directed by the SRO.</li> <li>• 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.</li> <li>• Tech Spec 3.12.F.1 should be reviewed if either parameter is exceeded.</li> <li>• I &amp; C should be contacted to provide assistance with adjusting IRPIs.</li> </ul> <p>1. INITIATE PLANT LOAD REDUCTION AT 5%/MINUTE OR LESS:</p> <p>BOP a) Verify turbine valve position - NOT ON LIMITER</p> <p>BOP Ramp the turbine off the limiter. This may be done at various ramp rates.</p> <p>RO b) Insert control rods in 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> <p>BOP e) Adjust LOAD RATE %/MIN thumbwheel to desired ramp rate (1%/minute)</p> <p>BOP f) Initiate Turbine load reduction using OPERATOR AUTO (pushes the white GO button)</p> <p>BOP g) Reduce Turbine Valve Position Limiter as load decreases</p>
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Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 5

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Event Description: 'A' HP Heater Drain Pump trips above 75% power due to low HP Heater Drain Tank Level. Cue: By Examiner.

	RO	<p><b>NOTE:</b> Step 2 or Step 3 may be performed repeatedly to maintain Tref and Tave matched, <math>\Delta</math>Flux in band, and control rod position above the LO-LO insertion limit.</p> <p>2. 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 (normally 30-60 seconds)</p> <p>d) Monitor EMRG BORATE FLOW</p> <ul style="list-style-type: none"> <li>• ( )-CH-FI-( )110</li> </ul> <p>e) After required emergency boration, perform the following:</p> <ol style="list-style-type: none"> <li>1) Close ( )-CH-MOV-( )350</li> <li>2) Transfer the in-service BATP to AUTO</li> <li>3) Restore Charging flow control to normal</li> </ol>
	RO	<p>3. ESTABLISH A NORMAL BORATION TO MAINTAIN CONTROL ROD POSITION ABOVE THE LO-LO INSERTION LIMITS IAW ( )-OP-CH-007, BLENDER OPERATIONS</p>
	RO	<p>4. INCREASE SURVEILLANCE OF RCS PRESSURE</p> <p>a) Check all PRZR heaters – ENERGIZED (RNO: Energize heaters)</p> <p>b) Control ramp rate to maintain RCS pressure greater than 2205 psig</p>
	BOP	<p>5. MONITOR STEAM DUMPS FOR PROPER OPERATION</p>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 5

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Event Description: 'A' HP Heater Drain Pump trips above 75% power due to low HP Heater Drain Tank Level. **Cue: By Examiner.**

	SRO	<p>6. NOTIFY THE FOLLOWING:</p> <ul style="list-style-type: none"> <li>• Energy Supply (MOC)</li> <li>• Polishing Building</li> <li>• Chemistry</li> <li>• OMOC</li> </ul>
	SRO	<p>7. EVALUATE THE FOLLOWING:</p> <ul style="list-style-type: none"> <li>• EPIP applicability</li> <li>• VPAP-2802, NOTIFICATIONS AND REPORTS, applicability</li> </ul> <p>SRO directs STA to review VPAP-2802</p>
	SRO	<p>*8. CHECK ISOTOPIC ANALYSIS OF RCS – REQUIRED</p> <ul style="list-style-type: none"> <li>• Reactor power has decreased more than 15% in one hour</li> </ul>
	SRO	<p>9. HAVE CHEMISTRY PERFORM ISOTOPIC ANALYSIS OF RCS FOR IODINE WITHIN 2 TO 6 HOURS</p>

END – Event 5

Event Description: Pressurizer level channel 1 (1459) fails high. Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		<p>Diagnoses failure of 1-RC-LI-1459 with the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> <li>• 1C-C8 PRZR HI LVL HTRS ON</li> <li>• 1E-F3 RX TRIP CH 1 PRZR HI LVL</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• Charging flow will decrease</li> <li>• VCT level will increase</li> <li>• Pressurizer level (CH 2 and CH 3) will decrease</li> </ul> <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-1460, Pressurizer Level Channel 2, and 1-RC-LI-1461, Pressurizer Level Channel 3 are NORMAL.</p>
	RO	<p>[ 2 ] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION</p> <p>Verifies 1-CH-FV-1122 in manual and Pressurizer level is returning to program level.</p>
	SRO	<p>3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS - AFFECTED</p> <ul style="list-style-type: none"> <li>• Nuclear Instrumentation</li> <li>• Pressurizer Pressure control</li> </ul> <p>RNO: GO TO Step 6.</p>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 6

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Event Description: Pressurizer level channel 1 (1459) fails high. Cue: By Examiner.

	BOP	<p>6. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS – NORMAL</p> <ul style="list-style-type: none"> <li>• Steam Pressure</li> <li>• Steam Flow</li> <li>• Feed Flow</li> <li>• Steam Generator Level</li> </ul> <p>Determines all SG parameters are normal for this event. Discussions may occur concerning the fact that a SG Level 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.
	BOP	<p>8. CHECK LOOP/MEDIAN <math>\Delta T/T_{ave}</math> - NORMAL</p> <ul style="list-style-type: none"> <li>a) Median Tave - NORMAL</li> <li>b) Loop Tave / <math>\Delta T</math> - NORMAL</li> </ul>
	BOP	9. CHECK TURBINE LOAD REFERENCE COUNTER – STABLE
	RO	<p>10. CHECK PRZR LEVEL CONTROL CHANNELS - NORMAL</p> <ul style="list-style-type: none"> <li>a) Check PRZR LVL Instrumentation - NORMAL</li> </ul>

Event Description: Pressurizer level channel 1 (1459) fails high. Cue: By Examiner.

	RO	<p>RNO Step 10.a:</p> <p>Do the following:</p> <ol style="list-style-type: none"> <li>1) Place either of the following in MANUAL: <ul style="list-style-type: none"> <li>• 1-CH-FCV-1122, CHG FLOW CNTRL or</li> <li>• 1-CH-LC-1459G, PRZR LEVEL CNTRL</li> </ul> </li> <li>2) Control PRZR level at program level.</li> <li>3) Move PRZR LVL –CH SEL switch to defeat the failed channel.</li> <li>4) Move 1-RC-LR-1459, PRZR Level Rec Select switch, to an operable channel.</li> <li>5) Refer to Tech Spec 3.1.A.5 (if Pressurizer heaters de-energized and Table 3.7-1 Item 9)</li> </ol> <p>SRO determines that TS Table 3.7.1, Item 9 is applicable (72-hours to place the channel in trip)</p> <ol style="list-style-type: none"> <li>6) Refer to Attachment 3.</li> </ol>
	RO	10.b Check letdown – IN SERVICE
	RO	<p>10.c Check PRZR level control – IN AUTOMATIC</p> <p>RNO – 1) Verify PRZR level restored to program</p> <ol style="list-style-type: none"> <li>2) Unsaturate 1-CH-LC-1459G, PRZR LEVEL CNTRL, as required.</li> <li>3) Return 1-CH-FCV-1122 to AUTOMATIC by verifying or placing the following in AUTOMATIC: <ul style="list-style-type: none"> <li>• 1-CH-FCV-1122, CHG FLOW CNTRL or</li> <li>• 1-CH-LC-1459G, PRZR LEVEL CNTRL</li> </ul> </li> </ol>
	RO	10.d Verify Pressurizer Heaters - ENERGIZED

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 6

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Event Description: Pressurizer level channel 1 (1459) fails high. Cue: By Examiner.

		11 CHECK PROPER OPERATION OF THE FOLLOWING INSTRUMENTS
	BOP	a) Turbine Monitoring Lights – NOT LIT
	BOP/RO	b) Reactor Coolant Flow Instrumentation – NORMAL
	RO	c) PRZR Pressure Protection Instrumentation – NORMAL
	RO	d) CTMT Pressure Instrumentation – NORMAL
	RO	e) RWST Level Instrumentation – NORMAL
	RO	f) VCT Level Instrumentation – NORMAL
	BOP/RO	g) Underground Fuel Oil Storage Tank Level Instrumentation – NORMAL
	RO	h) Chemical Addition Tank Level Instrumentation – NORMAL
	BOP/RO	i) Emergency Condensate Makeup Tank Level Instrumentation – NORMAL
	BOP/RO	j) Fire Protection and Domestic Water Tank Level Instrumentation – NORMAL
		12. CHECK FAILED INSTRUMENT - IS A REGULATORY GUIDE 1.97 VARIABLE
		Directs the STA to Evaluate. STA will provide correct Reg. Guide 1.97 information.

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 6

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Event Description: Pressurizer level channel 1 (1459) fails high. Cue: By Examiner.

		<p>14. REVIEW THE FOLLOWING:</p> <ul style="list-style-type: none"><li>• Tech Spec 3.7</li><li>• VPAP-2802, NOTIFICATIONS AND REPORTS</li></ul> <p>SRO directs STA to review VPAP-2802</p> <ul style="list-style-type: none"><li>• TRM SECTION 3.3, INSTRUMENTATION</li></ul> <p>SRO directs STA to review the TRM</p>
	SRO	<p>15. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"><li>• Shift Supervision</li><li>• OMOC</li><li>• STA (PRA determination)</li><li>• I&amp;C</li></ul>

END – Event 6

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 7 and 8 Page 28 of 42

Event Description: Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip AND a loss of Heat Sink.

Cue: By Examiner.

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

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 7 and 8 Page 29 of 42

Event Description: Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip AND a loss of Heat Sink.

Cue: By Examiner.

	RO	<p>[ 2 ] VERIFY TURBINE TRIP:</p> <p>a) Manually trip the turbine</p> <p>b) Verify all turbine stop valves – CLOSED</p> <p>RO identifies that STOP valves and #1/#3 GOVERNOR valves are not closed.</p> <p>RNO: b) IF turbine will NOT trip, THEN close MSTVs.</p> <p>Closes MSTVs</p> <p>c) Isolate reheaters by closing MSR steam supply SOV</p> <ul style="list-style-type: none"> <li>• 1-MS-SOV-104</li> </ul> <p>d) Verify generator output breakers – OPEN (Time Delayed)</p>
	BOP	<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"> <li>• LHSI pumps – RUNNING</li> <li>• SI annunciators – LIT <ul style="list-style-type: none"> <li>• A-F-3</li> <li>• A-F-4</li> </ul> </li> </ul> <p>b) Manually initiate SI</p>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 7 and 8 Page 30 of 42

Event Description: Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip AND a loss of Heat Sink.

Cue: By Examiner.

		<p>NOTE: SRO may provide the BOP with Attachment 9 of 1-E-0. This attachment can be initiated at any time following the completion of the E-0 immediate Actions. This attachment will isolate the faulted SG. High level steps are listed below: (Attachment 9 is located at the back of the scenario guide)</p> <ul style="list-style-type: none"> <li>• Close - 1-MS-TV-101A</li> <li>• Close AFW MOVs - 1-FW-MOV-151E and 1-FW-MOV-151F</li> <li>• Close SG MFW Isolation MOV – 1-FW-MOV-154A</li> <li>• Control AFW to intact SGs</li> <li>• When 'A' SG has blown dry, then adjust intact SG PORVs to maintain CETCs.</li> </ul>
	BOP	<p>5. VERIFY FW ISOLATION:</p> <ul style="list-style-type: none"> <li>• Feed pump discharge MOVs – CLOSED <ul style="list-style-type: none"> <li>• 1-FW-MOV-150A</li> <li>• 1-FW-MOV-150B</li> </ul> </li> <li>• MFW pumps – TRIPPED</li> <li>• Feed REG valves – CLOSED</li> <li>• SG FW bypass flow valves – DEMAND AT ZERO</li> <li>• SG blowdown TVs - CLOSED</li> </ul>
		<p>6. VERIFY CTMT ISOLATION PHASE I:</p> <ul style="list-style-type: none"> <li>• Phase I TVs – CLOSED</li> <li>• 1-CH-MOV-1381 – CLOSED</li> <li>• 1-SV-TV-102A – CLOSED</li> <li>• PAM isolation valves – CLOSED <ul style="list-style-type: none"> <li>• 1-DA-TV-103A</li> <li>• 1-DA-TV-103B</li> </ul> </li> </ul>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 7 and 8 Page 31 of 42

Event Description: Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip AND a loss of Heat Sink.

Cue: By Examiner.

	BOP	<p>7. VERIFY AFW PUMPS RUNNING:</p> <p>a) MD AFW pumps – RUNNING (Time Delayed)</p> <p>RNO: a) Manually start pumps. Note: If crew attempts to start 'A' MD AFW pump, it will not start.</p> <p>Will identify that 'B' MD AFW pump has tripped and is LOCKED OUT.</p> <p>b) TD AFW pump - RUNNING IF NECESSARY</p> <p>Will identify that the TD AFW Pump will not start</p>
	RO	<p>8. VERIFY SI PUMPS RUNNING:</p> <ul style="list-style-type: none"> <li>• CHG pumps – RUNNING</li> <li>• LHSI pumps - RUNNING</li> </ul>
	RO	<p>9. CHECK CHG PUMP AUXILIARIES:</p> <ul style="list-style-type: none"> <li>• CHG pump CC pump – RUNNING</li> <li>• CHG pump SW pump - RUNNING</li> </ul>
	BOP	<p>10. CHECK INTAKE CANAL:</p> <ul style="list-style-type: none"> <li>• Level - GREATER THAN 24 FT</li> <li>• Level - BEING MAINTAINED BY CIRC WATER PUMPS</li> </ul>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 7 and 8 Page 32 of 42

Event Description: Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip AND a loss of Heat Sink.

Cue: By Examiner.

BOP	<p>11. 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"> <li>• E-F-10 (High Steam Flow SI)</li> <li>• B-C-4 (Hi Hi CLS Train A)</li> <li>• B-C-5 (Hi Hi CLS Train B)</li> </ul> <p>a) RNO IF 1E-H10 NOT LIT then GO TO Step 11 d)</p> <p>d) Verify RWST crosstie valves – OPEN</p> <ul style="list-style-type: none"> <li>• 1-SI-TV-102A</li> <li>• 1-SI-TV-102B</li> <li>• 2-SI-TV-202A</li> <li>• 2-SI-TV-202B</li> </ul>
RO	<p>e) Check RCS pressure – LESS THAN 185 PSIG</p> <p>RNO: e) Put BOTH RMT mode transfer switches in REFUEL.</p>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 7 and 8 Page 33 of 42

Event Description: Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip AND a loss of Heat Sink.

Cue: By Examiner.

	RO	<p>*12. CHECK IF CS REQUIRED:</p> <p>a) CTMT pressure – HAS EXCEEDED 23 PSIA</p> <p>RNO checks CTMT pressure – HAS NOT EXCEEDED 17.7 PSIA and GOES TO step 13.</p>
	RO	<p>*13. BLOCK LOW PRZR PRESS SI SIGNAL:</p> <p>a) Check PRZR pressure – LESS THAN 2000 psig.</p> <p>b) Turn both LO PRZR PRESS &amp; STM HDR/LINE dP switches to block</p> <p>c) Verify Permissive Status light C-2 - LIT</p>
	RO	<p>*14. BLOCK LOW TAVE SI SIGNAL:</p> <p>a) Check RCS Tave - LESS THAN 543°</p> <p>b) Turn both HI STM FLOW &amp; LO TAVG OR LP switches to block</p> <p>c) Verify Permissive Status light F-1 - LIT</p>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 7 and 8 Page 34 of 42

Event Description: Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip AND a loss of Heat Sink.

Cue: By Examiner.

		<p><b>NOTE:</b></p> <ul style="list-style-type: none"><li>• CHG pumps should be run in the following order of priority: C, B, A.</li><li>• Subsequent SI signals may be reset by reperforming Step 15.</li></ul> <p>15. VERIFY SI FLOW:</p> <p>a) HHSI to cold legs - FLOW INDICATED</p> <ul style="list-style-type: none"><li>• 1-SI-FI-1961 (NQ)</li><li>• 1-SI-FI-1962 (NQ)</li><li>• 1-SI-FI-1963 (NQ)</li><li>• 1-SI-FI-1943 or 1-SI-FI-1943A</li></ul> <p>b) Check CHG pumps - THREE RUNNING</p> <p>RNO: b) GO TO Step 15e.</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"><li>1) Verify reset or reset SI.</li><li>2) Stop one LHSI pump and put in AUTO.</li><li>3) GO TO Step 16.</li></ol>
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Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 7 and 8 Page 35 of 42

Event Description: Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip AND a loss of Heat Sink.

Cue: By Examiner.

	BOP	<p>16. VERIFY TOTAL AFW FLOW - GREATER THAN 350 GPM [450 GPM]</p> <p>RNO IF AFW flow greater than 350 GPM can NOT be established, THEN GO TO 1-FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK</p>
	SRO	GO TO 1-FR-H.1
	RO	<p><b>CAUTION:</b></p> <ul style="list-style-type: none"> <li>• If total feed flow is less than 350 gpm [450 gpm] due to operator action, this procedure should NOT be performed.</li> <li>• Feed flow should NOT be reestablished to any faulted SG if a non-faulted SG is available.</li> </ul> <p>1. CHECK IF SECONDARY HEAT SINK IS REQUIRED:</p> <p>a) RCS pressure - GREATER THAN ANY NON-FAULTED SG PRESSURE</p> <p>b) RCS hot leg temperature – GREATER THAN 350°F</p>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 7 and 8 Page 36 of 42

Event Description: Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip AND a loss of Heat Sink.

Cue: By Examiner.

	BOP	<p><b>CAUTION:</b> 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> <p>2. TRY TO ESTABLISH AFW FLOW TO AT LEAST ONE SG:</p> <p>a) Check SG blowdown TVs – CLOSED</p> <p>b) Verify AFW MOVs – OPEN</p> <p>c) Check ECST – AVAILABLE</p> <p>d) Check AFW - AVAILABLE</p> <p>RNO: d) IF minimum feed flow NOT established, THEN do the following:</p> <p>1) Stop ALL RCPs.</p> <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>3) Have Unit 2 operator close Unit 2 AFW MOVs.</p> <p>Booth: If asked, Unit 2 AFW MOVs are out of service closed.</p> <p>4) Have Unit 2 operator open the following valves:</p> <ul style="list-style-type: none"> <li>• 1-FW-MOV-160A</li> <li>• 1-FW-MOV-160B</li> </ul> <p>Booth: If asked, Unit 2 x-connect MOVs are out of service closed.</p> <p>7) IF minimum AFW flow NOT established, THEN try to locally restore AFW flow AND GO TO Step 3.</p>
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Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 7 and 8 Page 37 of 42

Event Description: Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip AND a loss of Heat Sink.

Cue: By Examiner.

		<p>3. TRY TO ESTABLISH MFW FLOW TO AT LEAST ONE SG:</p> <p>a) Check CN system - IN SERVICE AND INTACT</p> <p>b) Check MFW system – INTACT</p> <p>c) Reset FW isolation signal:</p> <ol style="list-style-type: none"> <li>1) Reset both trains of SI if required</li> <li>2) Push both FW isolation reset pushbuttons</li> </ol> <p>d) Establish MFW flow:</p> <ol style="list-style-type: none"> <li>1) Start one MFW pump</li> <li>2) Manually or locally open appropriate feed pump discharge MOV</li> <li>3) Control flow with SG FW bypass flow valve(s) OR feed REG valve(s) locally</li> </ol> <p>Booth: Acknowledge and carry out MCR requests regarding local operation of FW bypass and/or REG valves after waiting 2 minutes.</p>
		<p>4. CHECK SG LEVELS:</p> <p>a) Narrow range level in at least one SG - GREATER THAN 12% [18%]</p> <p>RNO: a) IF feed flow to at least one SG verified, THEN maintain flow to restore narrow range level to greater than 12% [18%]. IF flow NOT verified, THEN GO TO Step 5.</p> <p>b) RETURN TO procedure and step in effect (1-E-0).</p>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 7 and 8 Page 38 of 42

Event Description: Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip AND a loss of Heat Sink.

Cue: By Examiner.

		<p>Note:</p> <ul style="list-style-type: none"> <li>Expected procedure pathway is for crew to restore heat sink using MFW.</li> <li>A copy of 1-FR-H.1, Steps 1-18 (through establishing RCS feed and bleed) is included behind this page in the event the crew chooses another course of action.</li> </ul> <p>SCENARIO MAY BE TERMINATED WHEN CREW ESTABLISHES HEAT SINK OR RCS FEED / BLEED.</p> <p><b>Task Standard: Establish heat sink with MFW pump before 2 out of 3 SG wide range level is less than 7%.</b></p>
	BOP	<p>17. CHECK AFW MOVs - OPEN</p> <p>RNO: Manually align valves as necessary.</p>
		<p>18. VERIFY SI VALVE ALIGNMENT IAW ATTACHMENT 2</p> <p>Note: Attachment 2, Step 3, verify running or start at least two charging pumps, will not be met.</p>
	BOP	<p>19. VERIFY VENTILATION ALIGNMENT AND AC POWER ALIGNMENT IAW ATTACHMENT 3</p>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 7 and 8 Page 39 of 42

Event Description: Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip AND a loss of Heat Sink.

Cue: By Examiner.

	RO	<p>*20. CHECK RCS AVERAGE TEMPERATURE</p> <ul style="list-style-type: none"> <li>• STABLE AT 547°F</li> </ul> <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <li>• TRENDING TO 547°F</li> </ul> <p>RNO: IF temperature less than 547°F AND decreasing, THEN do the following:</p> <ul style="list-style-type: none"> <li>a) Stop dumping steam.</li> <li>b) IF cooldown continues, THEN 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.</li> <li>c) IF cooldown continues, THEN close MSTVs.</li> </ul>
	RO	<p>21. CHECK PRZR PORVs AND SPRAY VALVES:</p> <ul style="list-style-type: none"> <li>a) PRZR PORVs – CLOSED</li> <li>b) PRZR spray controls - DEMAND AT ZERO</li> <li>c) PORV block valves - AT LEAST ONE OPEN</li> </ul>
	RO	<p><b>NOTE:</b> Seal injection flow should be maintained to all RCPs.</p> <p>22. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:</p> <ul style="list-style-type: none"> <li>a) Charging Pumps – AT LEAST ONE RUNNING AND FLOWING TO THE RCS</li> <li>b) RCS subcooling – LESS THAN 30°F [85°F]</li> </ul> <p>RNO: b) GO TO Step 23.</p>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 7 and 8 Page 40 of 42

Event Description: Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip AND a loss of Heat Sink.

Cue: By Examiner.

	BOP	<p>23. CHECK IF SGs ARE NOT FAULTED:</p> <ul style="list-style-type: none"> <li>• Check pressures in all SGs – STABLE OR INCREASING</li> <li>• Check pressures in all SGs – GREATER THAN 100 PSIG</li> </ul> <p>RNO: IF any SG pressure decreasing in an uncontrolled manner OR is completely depressurized, THEN GO TO 1-E-2, FAULTED STEAM GENERATOR ISOLATION.</p>
	SRO	<p>Goes to 1-E-2, FAULTED STEAM GENERATOR ISOLATION.</p> <p>Note: 1-E-2 does NOT contain any Continuous Actions</p>
	BOP	<p>CAUTION:</p> <ul style="list-style-type: none"> <li>• At least one SG must be maintained available for RCS cooldown.</li> <li>• Any faulted SG or secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown.</li> </ul> <p>1. CHECK MSTV AND BYPASS VALVE ON AFFECTED SG(s) - CLOSED</p>
	BOP	<p>2. CHECK IF ANY SG SECONDARY SIDE IS INTACT:</p> <ul style="list-style-type: none"> <li>• Check pressures in all SGs - ANY · STABLE OR INCREASING</li> </ul>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 7 and 8 Page 41 of 42

Event Description: Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip AND a loss of Heat Sink.

Cue: By Examiner.

	BOP	<p>3. IDENTIFY FAULTED SG(s)</p> <ul style="list-style-type: none"> <li>• ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER</li> </ul> <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <li>• ANY SG COMPLETELY DEPRESSURIZED</li> </ul>
	BOP	<p>CAUTION: 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</p> <p>4. ISOLATE THE FAULTED SG(s)</p> <ul style="list-style-type: none"> <li>• Isolate AFW MOV(s)</li> <li>• Isolate MFW Line <ul style="list-style-type: none"> <li>a) Close SG FW isolation MOV(s)</li> <li>b) Locally close feed REG bypass valve manual isolation valve(s) <ul style="list-style-type: none"> <li>• 1-FW-26</li> </ul> </li> </ul> </li> <li>• Locally close steam supply valve(s) to TD AFW pump: <ul style="list-style-type: none"> <li>• 1-MS-87</li> </ul> </li> <li>• Close or verify close SG PORV(s)</li> <li>• Close or verify closed SG blowdown TVs</li> </ul>
	BOP	<p>5. CHECK ECST LEVEL – GREATER THAN 20%</p>

Op-Test No.: Surry 2006 Scenario No.: 2 Event No.: 7 and 8 Page 42 of 42

Event Description: Uncontrolled depressurization of 'A' SG with a failure of the turbine to trip AND a loss of Heat Sink.

Cue: By Examiner.

	BOP	<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>b) Initiate periodic activity sampling of INTACT SGs IAW Attachment 1</p> <p>c) Check unisolated secondary radiation monitors:</p> <ul style="list-style-type: none"> <li>• Main Steamline</li> <li>• TD AFW pump exhaust</li> <li>• Condenser air ejector</li> </ul> <p>d) Secondary Radiation – NORMAL</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>b) Adjust intact SG PORVs pressure setting</p> <p>c) Stabilize RCS temperature by controlling SG PORV pressure setting</p>
	SRO	8. GO TO 1-E-1, LOSS OF REACTOR OR SECONDARY COOLANT

END – Scenario 2

**FINAL**

Facility:	Surry	Scenario No.:	3	Op-Test No.:	2006-301
Examiners:	_____	Operators:	_____	CRS	
	_____		_____	RO	
	_____		_____	PO	

Initial Conditions: Plant has been at 100% power for 356 days.  
'A' and 'B' Condensate Pumps running.

Turnover: Record hot/humid weather and potential for record system load forecasted over next 2-3 days.  
'C' SG PORV isolated for I&C surveillance and is expected to be returned to service this shift.  
'A' CC pump is OOS for oil change and is expected to be returned to service this shift.

Event No.		Event Type*	Event Description
1	RO SRO (TS)	I	PRNI N-44 lower detector fails high.
2	RO	I	1-CH-LT-1115 fails high.
3	BOP	C	Trip of running EHC pump with failure of standby EHC pump to automatically start
4	SRO (TS) R - RO N - BOP	R	Trip of Gen Leads Clr Ph C Fan – unit power reduction.
5	BOP SRO (TS)	I	'B' SG controlling feed flow channel III (FT-1487) fails low
6	All	M	Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open
7	All	M	'C' SGTR following blowdown

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

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SIMULATOR OPERATOR GUIDE  
NRC EXAM - SCENARIO 3

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**Surry 2006-301 Scenario #3**

**Event 1**

PRNI N-44 lower detector fails high, causing control rods to insert. RO should stabilize the plant by placing control rods in Manual. SRO should enter 0-AP-53.00 and 1-AP-4.00, Nuclear Instrumentation Malfunction.

Verifiable Action: (RO) place control rods in Manual.

Technical Specification: LCO Table 3.7-1 Action 2

**Event 2**

VCT level channel 1-CH-LT-1115 fails high causing a VCT high level alarm and causing letdown to divert to the PDT. 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) place divert valve 1-CH-LCV-1115A to Norm

Technical Specification: None

**Event 3**

1-EH-P-MP1 trips due to a breaker fault. The standby pump, 1-EH-P-MP2, will not automatically start. Annunciator TS-D2, EHC Low Pressure, will alarm 100 psi prior to the autostart set point of the EHC pumps. The team will review the associated ARP and start 1-EP-MP-2.

Verifiable Action: (BOP) Start 1-EH-P-MP2.

Technical Specification: None

**Event 4**

Iso phase bus duct cooling fan (phase C) trips and cannot be restarted. Per ARP, this requires a unit ramp to 78% @ 1% per minute. SRO should direct ramp per 0-AP-23.00, Rapid Load Reduction.

Verifiable Action: RO operates control rods and boration controls. BOP operates turbine.

Technical Specification: Table 4.1-2.B for RCS samples (15% power change in 1 hour)

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SIMULATOR OPERATOR GUIDE  
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Event 5

1-FW-FT-1487 fails low causing B SG level to go up ('B' MFRV opens). BOP should take manual control of 'B' SG FRV. SRO should enter 0-AP-53.00, Loss of Vital Instrumentation / Controls, and direct BOP to select redundant feed flow channel and return 'B' SG FRV to auto.

Verifiable Action: (BOP) take manual control of 'B' SG FRV.

Technical Specification: Tables 3.7-1 #17.

Event 6

The main generator trips due to a differential lockout. A first out annunciator will alarm; however, the turbine will fail to automatically trip. The reactor will not manually trip and the crew should perform 1-FR-S.1 (reactor trips 2 minutes after operator dispatched). The turbine will manually trip. 'C' SG safety sticks open following the turbine trip.

Verifiable Actions: RO performs immediate actions of FR-S.1. BOP isolate 'C' SG.

**Critical Task: Isolate 'C' SG in accordance with 1-E-2.**

Event 7

'C' SG (gpm sized to maintain 30 F RCS subcooling) tube rupture while 'C' SG blows down during Event 6. Crew should recognize change in pressurizer level trend, RCS pressure, RCS loop temperature, and 'C' SG pressure/WR level. SRO should transition to 1-E-3 and then 1-ECA-3.1.

Verifiable Actions: BOP initiate RCS cooldown less than 100 F/hr. RO depressurize RCS to refill pressurizer. RO depressurize RCS to minimize RCS subcooling.

**Critical Task: Isolate 'C' SG in accordance with 1-E-3.**

**SIMULATOR OPERATOR GUIDE**  
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Initial Conditions: IC #1 100%, MOL – Cycle 20. The unit has been at 100% power for 356 days.

Pre-load malfunctions:

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

- 'A', 'B' CN Pumps running
- 'A' Voltage Regulator in service

Turnover: Record hot/humid weather and potential for record system load forecasted over next 2-3 days.

'C' SG PORV isolated for I&C surveillance and is expected to be returned to service this shift.

'A' CC pump is OOS for oil change and is expected to be returned to service this shift. .

Event	Malf. #'s	Severity	Instructor Notes and Required Feedback
1	NI0904	1	PRNI N-44 lower detector fails high
2	CH2102	1	VCT level transmitter LT-1115 fails high
3	TU1001	N/A	Trip of running EHC pump with failure of standby EHC pump to automatically start.
4	V2GE5	N/A	Trip of Gen Leads Clr Ph C Fan.
5	FW1803	-1	'B' SG controlling feed flow channel III (FT-1487) fails low
6	RD2101 RD2102 RD18 TU03 MS1203	N/A	Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open
7	RC4703	60%	'C' SGTR occurs while 'C' SG is blowing down.
<b>END</b>			

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## SHIFT TURNOVER INFORMATION

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### **OPERATING PLAN:**

- The Unit has been at 100% power for 356 days following the last refueling outage.
- Record hot/humid weather and potential for record system load forecasted over next 2-3 days.
- 'C' SG PORV isolated for I&C surveillance and is expected to be returned to service this shift.
- 'A' CC pump is OOS for oil change and is expected to be returned to service this shift.
- Maintain full power operation.

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Event Description: PRNI N-44 lower detector fails high.

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"> <li>• 1G-G1 NIS PWR RNG HI FLUX ROD STOP</li> <li>• 1G-E4 NIS PWR RNG CH AVG FLUX DEVIATION</li> <li>• 1G-D4 LOWER ION CHAMBER DEVIATION OR AUTO DEFEAT &lt; 50%</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• Lower detector amps reads high</li> <li>• Delta flux indication is large negative value</li> <li>• PR average flux reads high</li> </ul> <p>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.</p>
	SRO	Enters 0-AP-53.00, LOSS OF VITAL INSTRUMENTATION / CONTROLS
	RO	<p>[ 1 ] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION – NORMAL</p> <ul style="list-style-type: none"> <li>• N-41, 42, 43 are indicating normal</li> </ul>
	RO	<p>[ 2 ] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION</p> <ul style="list-style-type: none"> <li>• Places Rod Control in Manual</li> </ul>

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Event Description: PRNI N-44 lower detector fails high.  
 Cue: By Examiner.

	RO	3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS – AFFECTED
	SRO	<ul style="list-style-type: none"> <li>• Nuclear Instrumentation</li> <li>• Pressurizer Pressure control</li> </ul>
		GOES TO AP-4.00
	SRO	Enters 1-AP-4.00, NUCLEAR INSTRUMENTATION MALFUNCTION
	RO	1. CHECK NI MALFUNCTION – POWER RANGE FAILURE
	RO/BOP	2. STABILIZE UNIT CONDITIONS
	RO	3. CHECK N-44 - FAILED
	RO	4. VERIFY ROD CONTROL - IN MANUAL
		5. PLACE 1-MS-43-N16, REACTOR POWER SOURCE, IN THE N43 POSITION (SWITCH LOCATED ON NI PROTECTION CHNL III CABINET)
	RO	6. CHECK N-43 - FAILED RNO: GO TO Step 8.
	RO	8. CHECK POWER RANGE CHANNELS - ONLY ONE FAILED

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Event Description: PRNI N-44 lower detector fails high.

Cue: By Examiner.

	SRO	<p><b>NOTE:</b> Performance of Attachment 1 to place the failed Power Range Channel in trip requires I&amp;C assistance for N-41, N-42, or N-43.</p> <p>9. INITIATE ATTACHMENT 1 TO PLACE FAILED CHANNEL IN TRIP WITHIN 72 HOURS</p> <p>Note: Applicable actions from Attachment 1 are included beginning on the following page.</p>
	RO	<p>10. CHECK NI MALFUNCTION – INTERMEDIATE RANGE FAILURE</p> <p>RNO: GO TO Step 18.</p>
	RO	<p>18. CHECK NI MALFUNCTION – SOURCE RANGE FAILURE</p> <p>RNO: GO TO Step 37.</p>
	SRO	<p>37. NOTIFY THE FOLLOWING</p> <ul style="list-style-type: none"> <li>• Instrument Shop</li> <li>• OM on call</li> </ul> <p>- END -</p>

Op-Test No.: Surry 2006 Scenario No.: 3 Event No.: 1

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Event Description: PRNI N-44 lower detector fails high.

Cue: By Examiner.

		<p><u>Attachment 1</u></p> <p>ONE POWER RANGE CHANNEL INOPERABLE</p> <p>1. Perform the following at the NIS panel within 72 hours.</p> <ul style="list-style-type: none"> <li>• Comparator and Rate Drawer <ul style="list-style-type: none"> <li>a. Select the failed channel on the COMPARATOR CHANNEL DEFEAT switch.</li> <li>b. Verify annunciator 1G-E4, NIS PWR RANGE CH AVG FLUX DEVIATION - NOT LIT.</li> </ul> </li> <li>• Miscellaneous Control and Indication Panel <ul style="list-style-type: none"> <li>a. Select the failed channel on the ROD STOP BYPASS switch.</li> <li>b. Verify annunciator 1G-G1, NIS PWR RNG HI FLUX ROD STOP – NOT LIT.</li> <li>c. Select the failed channel on the UPPER SECTION defeat switch.</li> <li>d. Verify annunciator 1G-C4, UPPER ION CHAMBER DEVIATION OR AUTO DEFEAT &lt; 50% - NOT LIT.</li> <li>e. Select the failed channel on the LOWER SECTION defeat switch.</li> <li>f. Verify annunciator 1G-D4, LOWER ION CHAMBER DEVIATION OR AUTO DEFEAT &lt; 50% - NOT LIT.</li> </ul> </li> </ul>
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Event Description: PRNI N-44 lower detector fails high.

Cue: By Examiner.

		<p><b>NOTE:</b> 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 &gt; 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"> <li>At the Power Range drawer, remove the INSTRUMENT POWER fuses.</li> <li>At the Power Range drawer, put the POWER RANGE TEST switch in the TEST position.</li> <li>Verify annunciator 1G-H1; NIS DROPPED ROD FLUX DECREASE &gt; 5% PER 2 SEC - LIT.</li> <li>Verify annunciator 1G-C3, NIS PWR RNG LOSS OF DET VOLT - LIT.</li> </ol>
	RO	<p>3. Remove the following PCS points for the failed channel from scan:</p> <ul style="list-style-type: none"> <li>N-44, N0047A and N0048A</li> </ul>
		<p>Note: Step 4 is not applicable for N-44, Step 5 is for reactor power greater than 75%. Reactor power should be less than 75% following Event 3.</p>
	SRO	<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>
		<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>
		<p>8. Refer to Tech Spec 3.12.D.</p>

END – Event 1

Event Description: Failure (high) of VCT level transmitter LT-1115.

Cue: By Examiner.

Time	Position	Expected Action
	RO	Diagnoses failure of 1-CH-LT-1115 with the following indications/alarms: Alarms: <ul style="list-style-type: none"> <li>• 1D-G1 VCT HI-LO LVL</li> </ul> Indications: <ul style="list-style-type: none"> <li>• Step change in 1-CH-LI-1115 with no change in redundant level instrument 1-CH-LI-1112</li> <li>• LETDOWN FLOW - DIVERTED TO BORON RECOVERY SYSTEM</li> </ul>
	SRO	Enters 0-AP-53.00, LOSS OF VITAL INSTRUMENTATION / CONTROLS
	RO	[ 1 ] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION – NORMAL <ul style="list-style-type: none"> <li>• Step change in 1-CH-LI-1115 with no change in redundant level instrument 1-CH-LI-1112</li> </ul>
	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-1112BX lowers to less than 13%, 1D-H1, VCT LO-LO LVL, will annunciate.

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Event Description: Failure (high) of VCT level transmitter LT-1115.

Cue: By Examiner.

	RO  SRO	<p>3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS – AFFECTED</p> <ul style="list-style-type: none"> <li>• Nuclear Instrumentation</li> <li>• Pressurizer Pressure control</li> </ul> <p>RNO: GO TO Step 6.</p>
	BOP	<p>6. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS – NORMAL</p> <ul style="list-style-type: none"> <li>• Steam Pressure</li> <li>• Steam Flow</li> <li>• Feed Flow</li> <li>• Steam Generator Level</li> </ul>
	BOP	<p>7. CHECK TURBINE FIRST STAGE PRESSURE CHANNELS - NORMAL</p>
	RO	<p>8. CHECK LOOP/MEDIAN <math>\Delta T/T_{AVE}</math> – NORMAL</p> <ul style="list-style-type: none"> <li>a) Median <math>T_{AVE}</math> – NORMAL</li> <li>b) Loop <math>T_{AVE} / \Delta T</math> - NORMAL</li> </ul>
	BOP	<p>9. CHECK TURBINE LOAD REFERENCE COUNTER - STABLE</p>
	RO	<p>10. CHECK PRZR LEVEL CONTROL CHANNELS – NORMAL</p> <ul style="list-style-type: none"> <li>a) Check PRZR LVL Instrumentation-NORMAL</li> <li>b) Check letdown - IN SERVICE</li> <li>c) Check PRZR level control – IN AUTOMATIC</li> <li>d) Verify Pressurizer Heaters - ENERGIZED</li> </ul>

Op-Test No.: Surry 2006 Scenario No.: 3 Event No.: 2

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Event Description: Failure (high) of VCT level transmitter LT-1115.

Cue: By Examiner.

	RO	<p>11. ___ CHECK PROPER OPERATION OF THE FOLLOWING INSTRUMENTS:</p> <ul style="list-style-type: none"> <li>a) Turbine Monitoring Lights - NOT LIT</li> <li>b) Reactor Coolant Flow instrumentation – NORMAL</li> <li>c) PRZR Pressure Protection instrumentation – NORMAL</li> <li>d) CTMT pressure instrumentation – NORMAL</li> <li>e) RWST level instrumentation – NORMAL</li> <li>f) VCT level instrumentation – NORMAL</li> </ul> <p>RNO: f) Refer to Attachment 6.</p>
	RO	<p><u>Attachment 6</u></p> <p>( )-CH-LT-( )115</p> <ul style="list-style-type: none"> <li>• If ( )-CH-LT-( )115 fails high, ( )-CH-LCV-( )115A will open. <b>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.</b></li> <li>• ( )-CH-LT-( )115 provides input to the following: <ul style="list-style-type: none"> <li>a. VCT High level divert of ( )-CH-LCV-( )115A to PDT at 85%</li> <li>b. VCT High level alarm at 82%</li> <li>c. Auto makeup to VCT stop at 34%</li> <li>d. Auto makeup to VCT start at 27%</li> <li>e. VCT Low level alarm at 24%</li> <li>f. CHG pump suction swap over to the RWST at 13% (2/2)</li> </ul> </li> </ul>

Op-Test No.: Surry 2006 Scenario No.: 3 Event No.: 2

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Event Description: Failure (high) of VCT level transmitter LT-1115.

Cue: By Examiner.

	BOP	<p>11. CHECK PROPER OPERATION OF THE FOLLOWING INSTRUMENTS: (Continued)</p> <p>g) Underground Fuel Oil Storage Tank level instrumentation – NORMAL</p> <p>h) Chemical Addition Tank level instrumentation – NORMAL</p> <p>i) Emergency Condensate Makeup Tank level instrumentation – NORMAL</p> <p>j) Fire Protection and Domestic Water Tank level instrumentation – NORMAL</p>
	SRO	<p>12. CHECK FAILED INSTRUMENT - IS A REGULATORY GUIDE 1.97 VARIABLE</p> <p>SRO directs STA to review Reg. Guide 1.97. STA to provide correct Reg. Guide 1.97 information.</p> <p>RNO: GO TO Step 14.</p>
	SRO	<p>13. REVIEW CEP 99-0029, REG GUIDE 1.97 OPERABILITY, REPORTABILITY, AND ALTERNATE INDICATIONS.</p>

Op-Test No.: Surry 2006 Scenario No.: 3 Event No.: 2

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Event Description: Failure (high) of VCT level transmitter LT-1115.

Cue: By Examiner.

		<p>14. REVIEW THE FOLLOWING:</p> <ul style="list-style-type: none"> <li>• Tech Spec 3.7</li> </ul> <p>Not Applicable</p> <ul style="list-style-type: none"> <li>• VPAP-2802, NOTIFICATIONS AND REPORTS</li> </ul> <p>SRO directs STA to review VPAP-2802</p> <ul style="list-style-type: none"> <li>• TRM SECTION 3.3, INSTRUMENTATION</li> </ul> <p>SRO directs STA to review TRM (Not Applicable)</p>
		<p>15. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"> <li>• Shift Supervision</li> <li>• OMOG</li> <li>• STA (PRA determination)</li> <li>• I&amp;C</li> </ul> <p>- END -</p>

END of Event 2

Op-Test No.: Surry 2006 Scenario No.: 3 Event No.: 3

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Event Description: Trip of running EHC pump with failure of standby EHC pump to automatically start. **Cue: By Examiner.**

Time	Position	Expected Action
	BOP	Diagnoses the loss of EHC Fluid with failure of standby EHC pump to automatically start based on the following indications/alarms: Alarms: <ul style="list-style-type: none"> <li>• 1TS-D2 EH FLUID LO PRESS</li> </ul> Indications: <ul style="list-style-type: none"> <li>• 1-EH-P-MP1 not running (red and green light out)</li> </ul>
	SRO/BOP	Direct / Perform actions of 1TS-D2 EH FLUID LO PRESS
	SRO  BOP	NOTE: The EH fluid low-pressure alarm is set to actuate at 1550 psig. Actuation between 1500 – 1600 psig is acceptable. 1. CHECK STANDBY EH PUMP AUTO STARTED: <ul style="list-style-type: none"> <li>• MP2</li> </ul> Team may manually start this pump prior to procedural prompt. Determines the stand-by pump did not automatically start and goes to Step 1 RNO
	BOP	Step 1 RNO. LOCALLY CHECK EH SYSTEM FOR LEAKAGE Operator should be dispatched to investigate EH system. Report from the field will be that no leakage is indicated.

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Event Description: Trip of running EHC pump with failure of standby EHC pump to automatically start. **Cue: By Examiner.**

	BOP	<p>1. RNO</p> <p>IF ASKED – A field operator reports EHC pressure is 1400 psig and slowly decreasing prior to starting the stand-by EHC pump. Pressure returns to normal after the stand-by pump is started.</p> <ul style="list-style-type: none"> <li>• Start 1-EH-P-MP2</li> </ul> <p>GO TO Step 4</p>
	BOP	<p>NOTE:</p> <p>EHC Pump discharge flow indicators reading greater than 5 gpm (total flow) indicates possible flow through a Governor Moog Servo valve.</p> <p>If the other pump is started, all local parameters indicate normal.</p> <p>4. CHECK FOR LEAKAGE THROUGH GOVERNOR MOOG SERVO VALVES.</p> <ul style="list-style-type: none"> <li>• 1-EH-FI-100 for 1-EH-P-MP1</li> <li>• 1-EH-FI-101 for 1-EH-P-MP2</li> <li>• Erratic movement on Turbine governor valve(s)</li> </ul> <p>If the other pump is started, all local parameters indicate normal.</p>
	BOP	<p>5. CHECK EH PUMPS – ONLY ONE RUNNING</p>
	BOP	<p>NOTE:</p> <p>The EH relief valve is set at 2300 psig.</p> <p>6. LOCALLY CHECK EH PRESSURE – BETWEEN 1925 TO 2075 PSIG.</p> <p>Local pressure indicates 2000 psig.</p>

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Event Description: Trip of running EHC pump with failure of standby EHC pump to automatically start. **Cue: By Examiner.**

		<p>7. CHECK STANDBY EH PUMP – NOT TURNING BACKWARDS</p> <p>Pump is not rotating backwards</p>
		<p>NOTE:</p> <p>The EH pump discharge strainers are located at the top of the EH control block. Strainer <math>\Delta P</math> can be determined by the difference between System Pressure and running pump pressure (MP-1 or MP-2). Normal strainer <math>\Delta P</math> is 40 – 50 psid.</p> <p>8. CHECK EH PUMP DISCHARGE STRAINER <math>\Delta P</math> – LESS THAN 50 PSID.</p> <p>Booth (cue): Strainer <math>\Delta P</math> is 42 psid.</p>
	SRO	<p>9. SUBMIT WORK REQUEST ON ANNUNCIATOR OR INSTRUMENTATION AS NECESSARY.</p> <p>Team determines a WR is warranted.</p>
	BOP	<p>10. NOTIFY THE FOLLOWING:</p> <ul style="list-style-type: none"> <li>· OMOC</li> <li>· STA</li> </ul>

END – Event 3

Op-Test No.: Surry 2006 Scenario No.: 3 Event No.: 4

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Event Description: Trip of Gen Leads Clr Ph C Fan – unit power reduction.

Cue: By Examiner.

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

Op-Test No.: Surry 2006 Scenario No.: 3 Event No.: 4

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Event Description: Trip of Gen Leads Clr Ph C Fan – unit power reduction.

Cue: By Examiner.

		<p>CAUTION:</p> <ul style="list-style-type: none"> <li>· If one or more fan is inoperable, a unit ramp down to the self cooled rating of 14,250 amps should be initiated immediately.</li> <li>· 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.</li> </ul>
	SRO	<p>4. ATTEMPT TO RESTART FAN:</p> <p>a) Locally check circuit breakers:</p> <ul style="list-style-type: none"> <li>· MCC 1A2-2-1B, GEN LEADS CLR PH A FAN</li> <li>· MCC 1C2-2-1D, GEN LEADS CLR PH C FAN</li> </ul> <p>b) Try to start fan</p> <p>c) Check fan running (check ammeters on breakers)</p> <p>Booth (cue) IF directed, report thermal O/L reset and attempted start of 'C' IBDC fan with zero amps indicated on breaker (failed to start).</p> <p>RNO: d) Do the following</p> <ol style="list-style-type: none"> <li>1) Initiate a ramp down to reduce generator amps to 14,250 amps in Accordance with 0-AP-23.00, RAPID LOAD REDUCTION.</li> </ol> <p><b>Per previous caution, SRO should immediately initiate a ramp to 78% power at 1%/min per 0-AP-23.00.</b></p> <ol style="list-style-type: none"> <li>2) GO TO Step 8.</li> </ol> <p>8. __ INITIATE A WORK REQUEST TO REPAIR ANNUNCIATOR</p> <p>9. __ NOTIFY SHIFT SUPERVISOR</p> <p>- END ARP – AP-23.00 CONTINUES</p>

Op-Test No.: Surry 2006 Scenario No.: 3 Event No.: 4

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Event Description: Trip of Gen Leads Clr Ph C Fan – unit power reduction.

Cue: By Examiner.

	SRO	SRO initiates AP-23.00.
	TEAM	<p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>• Actions that can be completed independently of preceding steps may be performed out of sequence as directed by the SRO.</li> <li>• 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.</li> <li>• Tech Spec 3.12.F.1 should be reviewed if either parameter is exceeded.</li> <li>• I &amp; C should be contacted to provide assistance with adjusting IRPIs.</li> </ul> <p>1. INITIATE PLANT LOAD REDUCTION AT 5%/MINUTE OR LESS:</p> <p>BOP a) Verify turbine valve position - NOT ON LIMITER</p> <p>RO b) Insert control rods in MANUAL as necessary to maintain Tave and Tref matched</p> <p>RO may identify AUTO Rod control failure depending on Tave/Tref Deviation.</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> <p>BOP e) Adjust LOAD RATE %/MIN thumbwheel to desired ramp rate (1%/minute)</p> <p>BOP f) Initiate Turbine load reduction using OPERATOR AUTO (pushes the white GO button)</p> <p>BOP g) Reduce Turbine Valve Position Limiter as load decreases</p>

Op-Test No.: Surry 2006 Scenario No.: 3 Event No.: 4

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Event Description: Trip of Gen Leads Clr Ph C Fan – unit power reduction.

Cue: By Examiner.

	RO	<p><b>NOTE:</b> Step 2 or Step 3 may be performed repeatedly to maintain Tref and Tave matched, <math>\Delta</math>Flux in band, and control rod position above the LO-LO insertion limit.</p> <p>2. 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 B ATP to FAST</p> <p>c) Open ( )-CH-MOV-( )350 (normally 30-60 seconds)</p> <p>d) Monitor EMRG BORATE FLOW</p> <ul style="list-style-type: none"> <li>• ( )-CH-FI-( )110</li> </ul> <p>e) After required emergency boration, perform the following:</p> <ol style="list-style-type: none"> <li>1) Close ( )-CH-MOV-( )350</li> <li>2) Transfer the in-service B ATP to AUTO</li> <li>3) Restore Charging flow control to normal</li> </ol>
	RO	<p>3. ESTABLISH A NORMAL BORATION TO MAINTAIN CONTROL ROD POSITION ABOVE THE LO-LO INSERTION LIMITS IAW ( )-OP-CH-007, BLENDER OPERATIONS</p>
	RO	<p>4. INCREASE SURVEILLANCE OF RCS PRESSURE</p> <p>a) Check all PRZR heaters – ENERGIZED (RNO: Energize heaters)</p> <p>b) Control ramp rate to maintain RCS pressure greater than 2205 psig</p>
	BOP	<p>5. MONITOR STEAM DUMPS FOR PROPER OPERATION</p>

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Event Description: Trip of Gen Leads Clr Ph C Fan – unit power reduction.

Cue: By Examiner.

	SRO	<p>6. NOTIFY THE FOLLOWING:</p> <ul style="list-style-type: none"> <li>• Energy Supply (MOC)</li> <li>• Polishing Building</li> <li>• Chemistry</li> <li>• OMOC</li> </ul>
	SRO	<p>7. EVALUATE THE FOLLOWING:</p> <ul style="list-style-type: none"> <li>• EPIP applicability</li> <li>• VPAP-2802, NOTIFICATIONS AND REPORTS, applicability</li> </ul> <p>SRO directs the STA to review VPAP-2802</p>
	SRO	<p>*8. CHECK ISOTOPIC ANALYSIS OF RCS – REQUIRED</p> <ul style="list-style-type: none"> <li>• Reactor power has decreased more than 15% in one hour</li> </ul>
	SRO	<p>9. HAVE CHEMISTRY PERFORM ISOTOPIC ANALYSIS OF RCS FOR IODINE WITHIN 2 TO 6 HOURS</p>

END – Event 4

Op-Test No.: Surry 2006 Scenario No.: 3 Event No.: 5

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Event Description: 'B' SG controlling feed flow channel III (FT-1487) fails low  
 Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	Diagnoses failure FT-487 with the following indications/alarms: Alarms: <ul style="list-style-type: none"> <li>• 1H-E6 STM GEN 1B FW &gt;&lt; STM FLOW</li> <li>• 1F-C8 STM GEN 1B CH 3 FW &lt; STM FLOW</li> <li>• 1H-G6 STM GEN 1B LVL ERROR.</li> </ul> Indications: <ul style="list-style-type: none"> <li>• Step decrease in 1B SG Feed Flow indication CH-3</li> <li>• Increasing level on 'B' SG.</li> </ul>
	SRO	Enters 0-AP-53.00 LOSS OF VITAL INSTRUMENTATION / CONTROLS
	BOP	[ 1 ] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL
	BOP	[ 2 ] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION  BOP takes manual control of 'B' SG feed reg valve and decreases demand (FF < SF) to restore level to program.
	RO	3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS - AFFECTED <ul style="list-style-type: none"> <li>• Nuclear Instrumentation</li> <li>• Pressurizer Pressure control</li> </ul> RNO: GO TO Step 6.

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Event Description: 'B' SG controlling feed flow channel III (FT-1487) fails low  
 Cue: By Examiner.

BOP	<p>6. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS – NORMAL</p> <ul style="list-style-type: none"> <li>• Steam Pressure</li> <li>• Steam Flow</li> <li>• <b>Feed Flow</b></li> </ul>
BOP	<ul style="list-style-type: none"> <li>• Steam Generator Level</li> </ul> <p>Determines CH III Feed flow instrumentation for 'B' SG is NOT normal.</p> <p>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	<ul style="list-style-type: none"> <li>a) Place the associated Feed Reg Valve in MANUAL.</li> </ul> <p>Verifies 'B' SG FRV controller, 1-FW-FCV-1488, in manual</p> <ul style="list-style-type: none"> <li>b) Control SG level at program level (44%, a band may be given).</li> </ul> <p>Verifies 'B' SG NR level is returning to program level.</p> <ul style="list-style-type: none"> <li>c) Select the redundant channel for affected SG(s)</li> </ul> <p>Selects Ch 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> <ul style="list-style-type: none"> <li>d) WHEN SG level returned to normal, THEN place the Feed Reg Valve in AUTOMATIC.</li> </ul> <p>Places 'B' SG FRV controller, 1-FW-FCV-1488 in auto.</p>

Op-Test No.: Surry 2006 Scenario No.: 3 Event No.: 5

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Event Description: 'B' SG controlling feed flow channel III (FT-1487) fails low  
 Cue: By Examiner.

	<p>SRO</p> <p>SRO</p>	<p>6. RNO</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"> <li>• Table 3.7-1, 12 and 17</li> <li>• Table 3.7-2, 1.c, 1.e, and 3.a</li> <li>• Table 3.7-3, 2.a, and 3.a</li> </ul> <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. CHECK FAILED INSTRUMENT - IS A REGULATORY GUIDE 1.97 VARIABLE (Go to Step 14 if not Reg. Guide 1.97)</p> <p>SRO directs STA to review Reg. Guide 1.97, STA will provide correct Reg. Guide 1.97 information.</p>

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Event Description: 'B' SG controlling feed flow channel III (FT-1487) fails low  
 Cue: By Examiner.

	SRO	13. REVIEW CEP 99-0029, REG GUIDE 1.97 OPERABILITY, REPORTABILITY, AND ALTERNATE INDICATIONS
	SRO	<p>14. REVIEW THE FOLLOWING:</p> <ul style="list-style-type: none"> <li>• Tech Spec 3.7</li> <li>• VPAP-2802, NOTIFICATIONS AND REPORTS</li> </ul> <p>SRO directs STA to review VPAP-2802</p> <ul style="list-style-type: none"> <li>• TRM SECTION 3.3, INSTRUMENTATION</li> </ul> <p>SRO directs STA to review TRM</p>
	SRO	<p>15. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"> <li>• Shift Supervision</li> <li>• OMOG</li> <li>• STA (PRA determination)</li> <li>• I&amp;C</li> </ul> <p>- END -</p>

END – Event 5

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Event Description: Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open **Cue: By Examiner.**

Time	Position	Applicant's Action or Behavior
	Crew	<p>Recognizes reactor trip signal and diagnoses ATWS using the following indications/alarms:</p> <p>Alarms:</p> <ul style="list-style-type: none"> <li>• 1F-D1 GEN DIFF LOCKOUT REL TRIP</li> </ul>
	RO	<p>Note: The team should attempt to trip the reactor from E-0 and then transition to 1-FR-S.1</p> <p>[ 1 ] VERIFY REACTOR TRIP:</p> <p>a) Manually trip reactor</p> <p>b) Check the following:</p> <ul style="list-style-type: none"> <li>• All Rods On Bottom light – LIT</li> <li>• Reactor trip and bypass breakers – OPEN</li> <li>• Neutron flux – DECREASING</li> </ul> <p>RNO: IF reactor will NOT trip, THEN GO TO 1-FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS.</p>
	RO	<p><b>1-FR-S.1</b></p> <p>[ 1 ] VERIFY REACTOR TRIP:</p> <p>a) Manually trip Reactor</p> <p>b) Check the following:</p> <ul style="list-style-type: none"> <li>• All Rods On Bottom light – LIT</li> <li>• Reactor Trip and Bypass Breakers – OPEN</li> <li>• Neutron Flux - DECREASING</li> </ul> <p>RNO: Verify or place control rods in Auto.</p> <p>Team may not put rod control in automatic due to previous N-44 failure.</p>

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Event Description: Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open **Cue: By Examiner.**

	RO	<p>[ 2 ] MANUALLY TRIP THE TURBINE:</p> <ul style="list-style-type: none"> <li>• Verify all turbine stop valves – CLOSED</li> </ul> <p>Operator will manually trip the turbine.</p>
	RO	<p>[ 3 ] VERIFY CONTROL RODS – INSERTING IN AUTO AT GREATER THAN 48 STEPS / MINUTE</p> <p>RNO: Manually insert control rods (when less than 48 steps).</p>
	BOP	<p>4. VERIFY AFW PUMPS RUNNING:</p> <ul style="list-style-type: none"> <li>a) MD AFW pumps – RUNNING</li> <li>b) TD AFW pump - RUNNING IF NECESSARY</li> </ul> <p>BOP will manually start pumps per the RNO, if they have not already started.</p> <p>Team may dispatch personnel to open Unit 1 Reactor Trip Breakers.</p>
	RO	<p>5. INITIATE EMERGENCY BORATION OF RCS:</p> <ul style="list-style-type: none"> <li>a) Verify CHG flow – GREATER THAN 75 GPM</li> <li>b) Align boration path: <ul style="list-style-type: none"> <li>1) Put BATP in FAST</li> <li>2) Open 1-CH-MOV-1350</li> <li>3) Verify emergency borate flow</li> </ul> </li> <li>c) Check PRZR pressure – LESS THAN 2335 PSIG</li> </ul>



Event Description: Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open **Cue: By Examiner.**

	BOP	<p><b>CAUTION:</b> Alternate water sources for AFW pumps will be necessary if ECST level decreases to less than 20%.</p> <p>9. CHECK SG LEVELS:</p> <p>a) Check narrow range level in at least one SG - GREATER THAN 12% [18%]</p> <p>b) Control feed flow to maintain narrow range level between 22% and 50%</p>
	RO	<p>10. ___ VERIFY ALL DILUTION PATHS ISOLATED:</p> <p>a) Put PG pump control switches to OFF</p> <p>b) Close PG to Blender Flow Control Valve</p> <ul style="list-style-type: none"> <li>• 1-CH-FCV-1114A</li> </ul> <p>c) Verify PRT PG outside TV – CLOSED</p> <ul style="list-style-type: none"> <li>• 1-RC-TV-1519A</li> </ul> <p>d) Initiate Attachment 3</p>
	RO BOP	<p>11. CHECK FOR REACTIVITY INSERTION FROM UNCONTROLLED RCS COOLDOWN:</p> <ul style="list-style-type: none"> <li>• RCS temperatures - DECREASING IN AN UNCONTROLLED MANNER</li> </ul> <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <li>• Any SG pressure - DECREASING IN AN UNCONTROLLED MANNER</li> </ul> <p>Note: 'C' SG SV opened after the turbine trip and is stuck open.</p>
	BOP	<p>12. CHECK MSTVS - CLOSED</p> <p>RNO: Manually close MSTVs</p>

Event Description: Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open **Cue: By Examiner.**

	BOP	<p>13. IDENTIFY FAULTED SG(s):</p> <p>a) Check pressures in all SGs:</p> <ul style="list-style-type: none"> <li>• ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER</li> </ul> <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <li>• ANY SG COMPLETELY DEPRESSURIZED</li> </ul> <p>Note: The 'C' SG Safety Valve is stuck open</p>
	BOP	<p><b>CAUTION:</b></p> <ul style="list-style-type: none"> <li>• At least one SG must be maintained available for RCS cooldown.</li> <li>• If all SGs are faulted, at least 60 gpm [100 gpm] feed flow should be maintained to each SG.</li> <li>• 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.</li> </ul> <p>14. ISOLATE FAULTED SG(s):</p> <p>a) Isolate MFW line:</p> <ol style="list-style-type: none"> <li>1) Close SG FW isolation MOV(s)</li> <li>2) Locally close feed REG bypass valve manual isolation valve(s): <ul style="list-style-type: none"> <li>• <b>1-FW-88 for SG C</b></li> </ul> </li> </ol> <p>b) Isolate AFW MOV(s)</p> <p>c) Locally close steam supply valve(s) to TD AFW pump: <ul style="list-style-type: none"> <li>• <b>1-MS-158 for SG C</b></li> </ul> </p> <p>d) Close or verify closed SG PORV(s)</p> <p>RNO: d) Locally close block valve.</p> <p>e) Close or verify closed SG blowdown TVs</p>

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Event Description: Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open **Cue: By Examiner.**

	RO	15. CHECK CETCs - LESS THAN 1200°F
	RO	<p><b>NOTE:</b> If adverse CTMT conditions have been exceeded, the Gamma-Metrics Excore Neutron Monitor system (Source and Wide Ranges) should be used to monitor neutron flux for the duration of the event.</p> <p>16. VERIFY REACTOR SUBCRITICAL:</p> <p>a) Check power range channels – LESS THAN 5% [Gamma-Metrics Wide Range Power - LESS THAN 5%]</p> <p>b) Check the following:</p> <ul style="list-style-type: none"> <li>• Intermediate range channels - NEGATIVE STARTUP RATE [Gamma-Metrics Wide Range Power - DECREASING]</li> </ul> <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <li>• Shutdown margin IAW 1-OP-RX-002, SHUTDOWN MARGIN (CALCULATED AT ZERO POWER) - GREATER THAN 1.77%</li> </ul>
	SRO	<p><b>CAUTION:</b> Boration should be continued to obtain adequate shutdown margin during subsequent actions.</p> <p>17. RETURN TO PROCEDURE AND STEP IN EFFECT</p> <p>SRO should return to 1-E-0</p> <p>- END -</p>

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Event Description: Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open **Cue: By Examiner.**

	RO	<p><b>1-E-0</b></p> <p>[ 1 ] VERIFY REACTOR TRIP:</p> <p>a) Manually trip reactor</p> <p>b) Check the following:</p> <ul style="list-style-type: none"> <li>• All Rods On Bottom light – LIT</li> <li>• Reactor trip and bypass breakers – OPEN</li> <li>• Neutron flux - DECREASING</li> </ul>
	BOP	<p>2 ] VERIFY TURBINE TRIP:</p> <p>a) Manually trip the turbine</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"> <li>• 1-MS-SOV-104</li> </ul> <p>d) Verify generator output breakers – OPEN (Time Delayed)</p>
	BOP	<p>[ 3 ] VERIFY BOTH AC EMERGENCY BUSES - ENERGIZED</p>

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Event Description: Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open **Cue: By Examiner.**

	RO	<p>[ 4 ] ___ CHECK IF SI INITIATED:</p> <p>a) Check if SI is actuated:</p> <ul style="list-style-type: none"> <li>• LHSI pumps – RUNNING</li> <li>• SI annunciators – LIT</li> <li>• A-F-3</li> <li>• A-F-4</li> </ul> <p>b) Manually initiate SI</p>
	SRO	SRO may direct BOP to perform Attachment 9 of 1-E-0 to isolate the Faulted SG. Attachment 9 is attached at the end of the scenario guide.
	BOP	<p>5. VERIFY FW ISOLATION:</p> <ul style="list-style-type: none"> <li>• Feed pump discharge MOVs – CLOSED <ul style="list-style-type: none"> <li>• 1-FW-MOV-150A</li> <li>• 1-FW-MOV-150B</li> </ul> </li> <li>• MFW pumps – TRIPPED</li> <li>• Feed REG valves – CLOSED</li> <li>• SG FW bypass flow valves – DEMAND AT ZERO</li> <li>• SG blowdown TVs - CLOSED</li> </ul>
	RO	<p>6. VERIFY CTMT ISOLATION PHASE I:</p> <ul style="list-style-type: none"> <li>• Phase I TVs – CLOSED</li> <li>• 1-CH-MOV-1381 – CLOSED</li> <li>• 1-SV-TV-102A – CLOSED</li> <li>• PAM isolation valves – CLOSED <ul style="list-style-type: none"> <li>• 1-DA-TV-103A</li> <li>• 1-DA-TV-103B</li> </ul> </li> </ul>

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Event Description: Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open  
 Cue: **By Examiner.**

	BOP	<p>7. VERIFY AFW PUMPS RUNNING:</p> <ul style="list-style-type: none"> <li>a) MD AFW pumps – RUNNING (Time Delayed)</li> <li>b) TD AFW pump - RUNNING</li> </ul>
	RO	<p>8. VERIFY SI PUMPS RUNNING:</p> <ul style="list-style-type: none"> <li>• CHG pumps – RUNNING</li> <li>• LHSI pumps - RUNNING</li> </ul>
	RO	<p>9. CHECK CHG PUMP AUXILIARIES:</p> <ul style="list-style-type: none"> <li>• CHG pump CC pump – RUNNING</li> <li>• CHG pump SW pump - RUNNING</li> </ul>
	BOP	<p>10. CHECK INTAKE CANAL:</p> <ul style="list-style-type: none"> <li>• Level - GREATER THAN 24 FT</li> <li>• Level - BEING MAINTAINED BY CIRC WATER PUMPS</li> </ul>
	BOP/RO	<p>11. CHECK IF MAIN STEAMLINES SHOULD BE ISOLATED:</p> <ul style="list-style-type: none"> <li>a) Check if ANY of the following annunciators - HAVE BEEN LIT           <ul style="list-style-type: none"> <li>• E-F-10 (High Steam Flow SI)</li> <li>• B-C-4 (Hi Hi CLS Train A)</li> <li>• B-C-5 (Hi Hi CLS Train B)</li> </ul> </li> <li>b) Check MSTVs – CLOSED</li> <li>c) Check either of the following – ACTUATED           <ul style="list-style-type: none"> <li>• Hi steam flow SI</li> </ul> <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <li>• Header to line SI</li> </ul> </li> </ul>

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Event Description: Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open Cue: By Examiner.

	<p>d) Verify RWST crosstie valves – OPEN</p> <ul style="list-style-type: none"> <li>• 1-SI-TV-102A</li> <li>• 1-SI-TV-102B</li> <li>• 2-SI-TV-202A</li> <li>• 2-SI-TV-202B</li> </ul> <p>e) Check RCS pressure – LESS THAN 185 PSIG</p> <p>RNO: e) Put BOTH RMT mode transfer switches in REFUEL.</p>
	<p>*12. CHECK IF CS REQUIRED:</p> <p>a) CTMT pressure – HAS EXCEEDED 23 PSIA</p> <p>RNO: a) Do the following:</p> <p>1) IF CTMT pressure has exceeded 17.7 psia, THEN verify or align the following valves:</p> <ul style="list-style-type: none"> <li>• 1-RM-TV-100A – CLOSED</li> <li>• 1-RM-TV-100B – CLOSED</li> <li>• 1-RM-TV-100C – CLOSED</li> <li>• 1-SV-TV-102 – CLOSED</li> <li>• 1-IA-TV-101A – CLOSED</li> <li>• 1-IA-TV-101B – CLOSED</li> <li>• 1-IA-AOV-103 – OPEN</li> </ul> <p>2) GO TO Step 13.</p>

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Event Description: Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open **Cue: By Examiner.**

	RO	<p>*13. BLOCK LOW PRZR PRESS SI SIGNAL:</p> <p>a) Check PRZR pressure – LESS THAN 2000 psig</p> <p>RNO: a) GO TO Step 14. WHEN PRZR pressure less than 2000 psig, THEN perform Steps 13b and 13c.</p> <p>b) Turn both LO PRZR PRESS &amp; STM HDR/LINE ΔP switches to block</p> <p>c) Verify Permissive Status light C-2 - LIT</p>
	RO	<p>*14. BLOCK LOW TAVE SI SIGNAL:</p> <p>a) Check RCS Tave - LESS THAN 543°F</p> <p>RNO: a) GO TO Step 15. WHEN Tave less than 543°F, THEN perform Steps 14b and 14c.</p> <p>b) Turn both HI STM FLOW &amp; LO TAVG OR LP switches to block</p> <p>c) Verify Permissive Status light F-1 - LIT</p>

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Event Description: Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open  
 Cue: By Examiner.

	RO	<p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>• CHG pumps should be run in the following order of priority: C, B, A.</li> <li>• Subsequent SI signals may be reset by reperforming Step 15.</li> </ul> <p>15. VERIFY SI FLOW:</p> <p>a) HHSI to cold legs - FLOW INDICATED</p> <ul style="list-style-type: none"> <li>• 1-SI-FI-1961 (NQ)</li> <li>• 1-SI-FI-1962 (NQ)</li> <li>• 1-SI-FI-1963 (NQ)</li> <li>• 1-SI-FI-1943 or 1-SI-FI-1943A</li> </ul> <p>b) Check CHG pumps - THREE RUNNING</p> <p>c) Reset Si</p> <p>d) Stop one CHG pump and put in AUTO</p> <p>e) RCS pressure - LESS THAN 185 PSIG</p> <p>f) LHSI flow – INDICATED</p> <p>RNO Stop 1 LHSI pump and place in AUTOMATIC</p>
	BOP	16. VERIFY TOTAL AFW FLOW - GREATER THAN 350 GPM [450 GPM]
	BOP	17. CHECK AFW MOVs - OPEN
	RO	18. VERIFY SI VALVE ALIGNMENT IAW ATTACHMENT 2
	BOP	19. VERIFY VENTILATION ALIGNMENT AND AC POWER ALIGNMENT IAW ATTACHMENT 3

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Event Description: Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open Cue: By Examiner.

	RO	<p>*20. CHECK RCS AVERAGE TEMPERATURE</p> <ul style="list-style-type: none"> <li>• STABLE AT 547°F</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• TRENDING TO 547°F</li> </ul> <p>RNO: IF temperature less than 547°F AND decreasing, THEN do the following:</p> <ul style="list-style-type: none"> <li>a) Stop dumping steam.</li> <li>b) IF cooldown continues, THEN 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.</li> <li>c) IF cooldown continues, THEN close MSTVs.</li> </ul>
	RO	<p>21. CHECK PRZR PORVs AND SPRAY VALVES:</p> <ul style="list-style-type: none"> <li>a) PRZR PORVs – CLOSED</li> <li>b) PRZR spray controls - DEMAND AT ZERO</li> <li>c) PORV block valves - AT LEAST ONE OPEN</li> </ul>
	SRO	<p>Depending on timing of SGTR (Event 7) implementation the team may use Attachment 10 of 1-E-0 to isolate the SG. Attachment 10 is attached at the end of the scenario guide.</p>

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Event Description: Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open  
 Cue: By Examiner.

	RO	<p><b>NOTE:</b> Seal injection flow should be maintained to all RCPs.</p> <p>*22. CHECK RCP TRIP AND MINIFLOWRECIRC CRITERIA:</p> <p>a) Charging Pumps – AT LEAST ONE RUNNING AND FLOWING TO THE RCS.</p> <p>b) RCS subcooling - LESS THAN 30°F [85°F]</p> <p>c) Stop all RCPs</p> <p>d) RCS pressure - LESS THAN 1275 psig [1475 PSIG]</p> <p>e) Close CHG pump miniflow recirc valves:</p> <ul style="list-style-type: none"> <li>• 1-CH-MOV-1275A</li> <li>• 1-CH-MOV-1275B</li> <li>• 1-CH-MOV-1275C</li> </ul>
	BOP	<p>23. CHECK IF SGs ARE NOT FAULTED:</p> <ul style="list-style-type: none"> <li>• Check pressures in all SGs – STABLE OR INCREASING</li> <li>• Check pressures in all SGs – GREATER THAN 100 PSIG</li> </ul> <p>RNO: IF any SG pressure decreasing in an uncontrolled manner OR is completely depressurized, THEN GO TO 1-E-2, FAULTED STEAM GENERATOR ISOLATION</p>
	SRO	<p>Goes to 1-E-2, FAULTED STEAM GENERATOR ISOLATION.</p> <p>Note: 1-E-2 does NOT contain any Continuous Actions</p>

Event Description: Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open Cue: By Examiner.

	BOP	<p>CAUTION:</p> <ul style="list-style-type: none"> <li>· At least one SG must be maintained available for RCS cooldown.</li> <li>· Any faulted SG or secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown.</li> </ul> <p>1. CHECK MSTV AND BYPASS VALVE ON AFFECTED SG(s) - CLOSED</p>
	BOP	<p>2. CHECK IF ANY SG SECONDARY SIDE IS INTACT:</p> <ul style="list-style-type: none"> <li>· Check pressures in all SGs - ANY · STABLE OR INCREASING</li> </ul>
	BOP	<p>3. IDENTIFY FAULTED SG(s)</p> <ul style="list-style-type: none"> <li>• ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER</li> <li style="text-align: center;">OR</li> <li>• ANY SG COMPLETELY DEPRESSURIZED</li> </ul>
	BOP	<p>CAUTION: 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</p> <p>4. ISOLATE THE FAULTED SG(s)</p> <ul style="list-style-type: none"> <li>• Isolate AFW MOV(s)</li> <li>• Isolated MFW Line <ul style="list-style-type: none"> <li>a) Close SG FW isolation MOV(s)</li> <li>b) Locally close feed REG bypass valve manual isolation valve(s) <ul style="list-style-type: none"> <li>• 1-FW-88</li> </ul> </li> </ul> </li> <li>• Locally close steam supply valve(s) to TD AFW pump: <ul style="list-style-type: none"> <li>• 1-MS-158</li> </ul> </li> <li>• Close or verify closed SG PORV(s)</li> <li>• Close or verify closed SG blowdown TVs</li> </ul>

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Event Description: Gen Diff Lockout/ATWS/Failure of auto turbine to trip/'C' SG safety sticks open **Cue: By Examiner.**

	BOP	5. CHECK ECST LEVEL – GREATER THAN 20%
	BOP	<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>b) Initiate periodic activity sampling of INTACT SGs IAW Attachment 1</p> <p>c) Check unisolated secondary radiation monitors:</p> <ul style="list-style-type: none"> <li>• Main Steamline</li> <li>• TD AFW pump exhaust</li> <li>• Condenser air ejector</li> </ul> <p>d) Secondary Radiation – NORMAL</p> <p>Booth (cue) report HP is detecting radioactivity from steam release out the top of Unit 1 Safeguards.</p>
	SRO	Goes to 1-E-3

End – Event 6

Op-Test No.: Surry 2006 Scenario No.: 3 Event No.: 7

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Event Description: 'C' SGTR during faulted 'C' SG in Event 6.

Cue: Following pressurizer level recovery (~22% level) .

Time	Position	Applicant's Action or Behavior
	RO	<p><b>NOTE:</b> Seal injection flow should be maintained to all RCPs.</p> <p>*1. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:</p> <ul style="list-style-type: none"> <li>a) Charging Pumps – AT LEAST ONE RUNNING AND FLOWING TO RCS</li> <li>b) RCS subcooling - LESS THAN 30°F [85°F]</li> <li>c) Stop all RCPs</li> <li>d) RCS pressure - LESS THAN 1275 psig [1475 PSIG]</li> </ul> <p>Note: RNO for steps a) – d) is to go to step 2</p> <ul style="list-style-type: none"> <li>e) Close CHG pump miniflow recirc valves: <ul style="list-style-type: none"> <li>• 1-CH-MOV-1275A</li> <li>• 1-CH-MOV-1275B</li> <li>• 1-CH-MOV-1275C</li> </ul> </li> </ul>
	SRO	<p>2. IDENTIFY RUPTURED SG(s):</p> <ul style="list-style-type: none"> <li>· Unexpected rise in any SG narrow range level</li> <li>OR</li> <li>· High radiation from any SG MS line monitor</li> <li>OR</li> <li>· High radiation from any SG blowdown line</li> <li>OR</li> <li>· High radiation from any SG sample</li> </ul>

Op-Test No.: Surry 2006 Scenario No.: 3 Event No.: 7

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Event Description: 'C' SGTR during faulted 'C' SG in Event 6.

Cue: **Following pressurizer level recovery (~22% level) .**

	BOP	<p>CAUTION:</p> <ul style="list-style-type: none"> <li>· 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.</li> <li>· At least one SG must be maintained available for RCS cooldown.</li> </ul> <p>3. ISOLATE RUPTURED SG(s):</p> <ol style="list-style-type: none"> <li>a) Adjust ruptured SG PORV controller setpoint to 1035 psig</li> <li>b) Check ruptured SG(s) PORV – CLOSED</li> <li>c) Verify blowdown TVs from ruptured SG(s) – CLOSED</li> <li>d) Locally close steam supply valve(s) to TD AFW pump: <ul style="list-style-type: none"> <li>· 1-MS-158 for SG C</li> </ul> </li> <li>e) Close ruptured SG(s) MSTV</li> </ol>
	BOP	<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"> <li>a) Narrow range level - GREATER THAN 12% [18%]</li> <li>b) Stop feed flow to ruptured SG(s)</li> </ol>
	Critical Tasks	<p>Note: Copy of 1-E-3 through Step 28, Verify SI Flow Not Required, is attached.</p> <p><b>Critical tasks from 1-E-3 include:</b></p> <p><b>1) Isolate 'C' SG per Step 3 (may be complete per event 6).</b></p> <p>Scenario ends when crew isolates 'C' SG in accordance with E-0 or E-2 or transitions to 1-E-3 per Examiner.</p>

END – Scenario 3

**FINAL**

Facility:	Surry	Scenario No.:	4	Op-Test No.:	2006-301
Examiners:	_____	Operators:	_____	CRS	
	_____		_____	RO	
	_____		_____	PO	
Initial Conditions: Plant has been on-line at 27% power for 6 hours. Control rods in auto, at-power electrical lineup.					
Turnover: The reactor was shutdown to allow emergent work inside containment. The maintenance was completed and the reactor has been placed back on line and is currently at 27% full power. Chemistry has just released the unit to increase power, following a planned hold point.					
Increase power to 40% in accordance with 1-GOP-1.5. Stabilize power at 40%, as a final tour through containment is planned at that power level to verify the emergent work item does not require additional work.					
All personnel have exited containment.					
'A' CC pump OOS for oil change – expected return to service this shift.					
Event No.		Event Type*	Event Description		
1	All	RO - R BOP - N	Increase power to 40% per 1-GOP-1.5		
2	BOP SRO (TS)	I	Controlling 'C' SG level channel fails low.		
3	RO	I	Median Tave fails high and can be recovered.		
4	BOP	C	'B' SG PORV fails open.		
5	RO (SRO TS)	C	RCP 'A' thermal barrier tube leak (Greater than 50 GPM)		
6	All	M	Normal offsite supply to J bus trips, 15J9 stub bus supply trips on overcurrent and cannot be reclosed (loss of CC).		
7	All	M	Large break LOCA/ Failure of auto SI/Failure of 'B' LHSI pump.		
8	All	M	Loss of Emergency Coolant Recirculation		

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

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SIMULATOR OPERATOR GUIDE  
NRC EXAM - SCENARIO 4

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**Surry 2006-301 Scenario #4**

**Event 1**

Increase power to 40% per 1-GOP-1.5

Verifiable Action: RO will operate control rods and boration controls. BOP will operate turbine.

**Event 2**

Controlling 'C' SG level channel fails low, causing actual 'C' SG level to increase. BOP should take manual control of 'C' SG FRV. SRO should enter 0-AP-53.00

Verifiable Action: BOP takes manual control of 'C' SG FRV.

Technical Specifications: Tables 3.7-1, 2, 3.

**Event 3**

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

Verifiable Action: RO take manual control of control rods. RO take manual control of charging flow.

Technical Specification: None.

**Event 4**

'B' SG PORV fails open in auto, causing Tave drop with control rods in manual. BOP should manually close 'B' SG PORV.

Verifiable Action: BOP close 'B' SG PORV.

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Event 5

RCP 'A' thermal barrier tube leak. This leak rate is higher than the automatic isolation setpoint for CC to the thermal barrier, but 1-CC-TV-120A will fail to automatically close. The failure will cause a thermal barrier CC high temperature alarm as well as increasing CC surge tank level and decreasing pressurizer level. RO should follow actions of ARP 1C-A3 (high temp). SRO should enter 1-AP-16.00, Excessive RCS Leakage and 1-AP-9.00, RCP Abnormal Conditions.

Verifiable Action: RO close 1-CC-TV-120A, -140A, -140B

Technical Specification: 3.1.C

Event 6

Normal offsite supply to 4160 ESF bus J trips concurrent with trip of 15J9 stub bus supply breaker to 'B' CC and RH pumps. J bus is reenergized by EDG. Crew should recognize loss of Unit 1 CC. SRO should enter 1-AP-15.00, Loss of Component Cooling, and direct RO to trip unit 1, secure RCPs, and isolate letdown and charging.

Verifiable Actions: RO trip unit 1. RO secure RCPs and isolate letdown and charging.

Event 7

Large break LOCA occurs two minutes after the reactor trip. Automatic safety injection fails to actuate. 'B' LHSI pump will trip at approximately 25% RWST level and it will not be able to be re-started. SRO should re-perform 1-E-0, transition to 1-E-1 and 1-ES-1.3.

Verifiable Actions: RO initiate manual SI.

**Critical Tasks: RO initiate manual SI.**

Event 8

After transitioning to 1-ES-1.3, 'A' LHSI pump cavitates and trips following Phase 2 swapover to containment sumps. SRO should transition to 1-ECA-1.1, Loss of Emergency Coolant Recirculation. Crew should stop unnecessary CS pumps and initiate makeup to the RWST.

Verifiable Actions: Stop unnecessary pumps and initiate makeup to the RWST/establish an alternate charging flow path..

**Critical Tasks: Establish alternate charging flow path.**

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Verifiable Actions: BOP initiate RCS cooldown less than 100 F/hr. RO depressurize RCS to

Initial Conditions: IC #1 100%, EOL – Cycle 20. The unit has been at 27% power for 6 hours.

Pre-load malfunctions:

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

- o **'B' CC Pump is running**
- o **Unit is in a normal configuration for 27% power and preparing for power ascension.**

Turnover: The reactor was shutdown to allow emergent work inside containment. The maintenance was completed and the reactor has been placed back on line and is currently at 27% full power. Chemistry has just released the unit to increase power, following a planned hold point.

Increase power to 40% in accordance with 1-GOP-1.5. Stabilize power at 40%, as a final tour through containment is planned at that power level to verify the emergent work item does not require additional work.

All personnel have exited containment.

'A' CC pump OOS for oil change – expected return to service this shift.

Event	Malf. #'s	Severity	Instructor Notes and Required Feedback
1	N/A	N/A	Increase power to 40% per 1-GOP-1.5
2	FW1309	-1	Controlling 'C' SG level channel fails low.
3	RC0801	1	Median Tave fails high and can be recovered.
4	MS1502	1	'B' SG PORV fails open.
5	CC0501	0.8	RCP 'A' thermal barrier tube leak (Greater than 50 GPM)
6	EL4902	N/A	Normal offsite supply to J bus trips, 15J9 stub bus supply trips on overcurrent and cannot be reclosed (loss of CC).
7	RD3 SI0902	N/A	Large break LOCA/ Failure of auto SI/Failure of 'B' LHSI pump.
8	SI1001 SI0901	100 N/A	Loss of Emergency Coolant Recirculation/Failure of 'A' LHSI pump
<b>END</b>			

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## SHIFT TURNOVER INFORMATION

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### OPERATING PLAN:

- The reactor was shutdown to allow emergent work inside containment. The maintenance was completed and the reactor has been placed back on line and is currently at 27% full power. Chemistry has just released the unit to increase power, following a planned hold point.
- The unit has been at 27% power for 6 hours.
- All personnel have exited containment
- 'A' CC pump is OOS for oil change and is expected to be returned to service this shift.
- Increase power to 40% in accordance with 1-GOP-1.5. Stabilize power at 40%, as a final tour through containment is planned at that power level to verify the emergent work item does not require additional work

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 1

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Event Description: Increase reactor power to 40%.

Cue: By Examiner.

Time	Position	Expected Action
	TEAM	<p>Prior to the entering the simulator the team should brief on 1-GOP-1.5 and discuss how they will raise reactor power from 27% to 40%. This discussion should include the following:</p> <ul style="list-style-type: none"> <li>• Review of 1-GOP-1.5 up to section 5.5 (previously completed)</li> <li>• Review of 1-GOP-1.5, section 5.5</li> <li>• Review of 1-GOP-1.5, Attachment 1</li> <li>• Reactivity management plan (to include chemical shim and rod motion)</li> <li>• Xenon transients</li> <li>• Expected actions to be carried out by RO/BOP</li> </ul>
	SRO	Team will have a focus brief on the impending ramp.
	SRO	Contact personnel outside the MCR to inform them of the ramp.
	SRO	<p>GOP Section 5.5</p> <p>Step 5.5.1 Contact Chemistry to verify that Secondary Chemistry is satisfactory for exceeding 30% power.</p> <p>Chemistry will report that secondary chemistry is satisfactory.</p>
	SRO/BOP	<p>Step 5.5.2 Verify that the Auxiliary Oil Pump for the shutdown Main Feed Pump is running and oil flow is indicated in the sight port.</p> <p>When contacted the field operator will report that the Aux. Oil Pump is running and oil flow is indicated in the sight port.</p>
	SRO	<p>CAUTION: Dealing with Ramp Rates and Turbine Stall Flutter.</p> <p>SRO may remind RO/BOP that to prevent turbine stall flutter main condenser vacuum must be maintained greater than 24.5 inches of HG when reactor power is greater than 30%</p>

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Event Description: Increase reactor power to 40%.

Cue: By Examiner.

	SRO	<p>Step 5.5.3 Review Attachment 1</p> <p>SRO may review Attachment 1 with the team at this time (or state that this was done at the pre-job brief).</p>
	SRO	<p>NOTE:</p> <p>Maximum Allowable Power should be defined as the maximum operational steady state power level, based on existing plant conditions, up to and including 100 percent power.</p> <p>Alternate indications of Reactor Power, such as Core <math>\Delta T</math>, 1<sup>st</sup> Stage Pressure, Condensate and Feedwater performance parameters, and Electrical Output should be reviewed and compared during power escalation.</p>
	SRO	<p>Step 5.5.4 Evaluate secondary plant readiness (MSRs, HP Heater Drains, MFW pump) and determine acceptable power level hold to maintain adequate MFW flow.</p> <p>Secondary plant is ready for power escalation to 40%.</p>
	SRO/BOP	<p>Step 5.5.5 Commence the power increase at the prescribed ramp rate. (Normal ramp rate is 155 MW/hr using position 6 on the load rate dial.)</p> <p>SRO directs BOP to verify load rate dial is set on position 6.</p> <p>BOP verifies that the load rate dial is set to position 6.</p> <p>SRO directs BOP to increase the turbine setter to approximately 40%.</p> <p>BOP raises the turbine setter to approximately 40%.</p> <p>SRO directs BOP to commence the ramp.</p>
	RO	<p>Step 5.5.6 Borate or dilute as required to maintain Tave approximately matched with Tref.</p>

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 1

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Event Description: Increase reactor power to 40%.

Cue: By Examiner.

	RO	Step 5.5.7 Insert or withdraw control rods to maintain $\Delta\Phi$ within the operating limits
	BOP	NOTE: The turbine control valves should not run up against the Turbine Load Limiter
	BOP	Step 5.5.8 Increase the Turbine Load Limiter and maintain the limiter as close as reasonably possible above the actual turbine load during power escalation.
	SRO	<p>Step 5.5.9 When reactor power exceeds 35%, then do the following:</p> <ul style="list-style-type: none"> <li>• Notify I&amp;C to rescale NIs</li> </ul> <p>SRO may contact I&amp;C who should respond that NI rescaling is not required.</p> <ul style="list-style-type: none"> <li>• Notify I&amp;C to raise High Flux Trip setpoint to 85% and Rod Stop to 81%. Enter N/A if this ramp is not following a refueling outage.</li> </ul> <p>SRO should N/A this step.</p>
	SRO/RO	<p>Step 5.5.10 When the reactor power level passes through 35% the perform the following substeps:</p> <ol style="list-style-type: none"> <li>a. Verify the following P-8 Trip Status Lights are LIT <ol style="list-style-type: none"> <li>1. Trip Status Light E2, NIS PWR RGE P-8 CH-1</li> <li>2. Trip Status Light F2, NIS PWR RGE P-8 CH-2</li> <li>3. Trip Status Light G2, NIS PWR RGE P-8 CH-3</li> <li>4. Trip Status Light H2, NIS PWR RGE P-8 CH-4</li> </ol> </li> <li>b. Verify that P-8 Perm Status Light A2, NIS PWR RGE &lt;35% is NOT LIT.</li> <li>c. Verify that the following Trip Status Lights are LIT. <ol style="list-style-type: none"> <li>1. Trip Status Light C1, NIS INT RGE RX TRIP CH-1</li> <li>2. Trip Status Light D1, NIS INT RGE RX TRIP CH-2</li> </ol> </li> </ol>

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 1

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Event Description: Increase reactor power to 40%.

Cue: By Examiner.

	SRO/BOP	<p>Step 5.5.11 When the reactor power level approaches 37% the perform the following substeps:</p> <ol style="list-style-type: none"> <li>a. Place the AMSAC BYPASS switch to NORMAL before exceeding 37% power.</li> <li>b. Verify Bypass Status Light J-2, AMSAC MAN BYP, is NOT LIT.</li> <li>c. WHEN Turbine Power passes through 37%, THEN verify Bypass Status Light K-2, AMSAC OPERATIONAL BYP, is NOT LIT</li> </ol>
	SRO	<p>NOTE:</p> <p>The MSRs must be placed in service as expeditiously as possible or placing the HP Heater Drain system in service will be delayed.</p> <p>Step 5.5.12 Notify Chemistry and place the Moisture Separator Reheaters in service.</p>
	SRO/BOP	<p>NOTE:</p> <p>The 1-SD-P-2A and 1-SD-P-2B, LP HTR DRN PPS, should be run on recirculation for 10 to 15 minutes to flush the system to the hotwell before pumping to the condensate system</p> <p>Step 5.5.13 WHEN directed by Shift Supervision, THEN place the LP Heater Drain Pumps in service by performing the following.</p> <ol style="list-style-type: none"> <li>a. Notify Chemistry of the imminent start of 1-SD-P-2A and 1-SD-P-2B, LP HTR DRN PPS.</li> <li>b. Place 1-SD-P-2A and 1-SD-P-2B in service in accordance with 1-OP-SD-001, LP Heater Drain Pump Operation <ol style="list-style-type: none"> <li>1. Place 1-SD-P-2A in service.</li> <li>2. Place 1-SD-P-2B in service.</li> </ol> </li> </ol>

END of Event 1

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 2

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Event Description: 'C' SG controlling level channel III (LT-496) fails low  
 Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	Diagnoses failure LT-496 with the following indications/alarms: Alarms: <ul style="list-style-type: none"> <li>• 1F-G9 STM GEN 1C LO-LO LVL CH-3</li> <li>• 1H-C7 STM GEN 1C LO-LO LVL CH-3</li> <li>• 1H-E7 STM GEN 1C FW &gt;&lt; STM FLOW</li> <li>• 1H-G7 STM GEN 1C LVL ERROR</li> </ul> Indications: <ul style="list-style-type: none"> <li>• Step decrease in 1C SG NR level CH-3</li> <li>• Increasing level on 1-FW-LI-494 CH-1 and 1-FW-LI-495 CH-2</li> </ul>
	SRO	Enters 0-AP-53.00 LOSS OF VITAL INSTRUMENTATION / CONTROLS
	BOP	[ 1 ] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - 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 increases demand (FF > SF) to restore level to program.
	RO	3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS - AFFECTED <ul style="list-style-type: none"> <li>• Nuclear Instrumentation</li> <li>• Pressurizer Pressure control</li> </ul> RNO: GO TO Step 6.

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 2

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Event Description: 'C' SG controlling level channel III (LT-496) fails low  
 Cue: By Examiner.

	BOP	<p>6. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS – NORMAL</p> <ul style="list-style-type: none"> <li>• Steam Pressure</li> <li>• Steam Flow</li> <li>• Feed Flow</li> <li>• <b>Steam Generator Level</b></li> </ul>
	BOP	<p>RNO</p> <p>IF SG Level Channel III has failed, THEN do the following:</p> <p>a) Place the associated Feed Reg Valve in MANUAL.</p> <p>b) IF manual control of Feedwater is inoperable, THEN do the following: (Not Applicable)</p>
	SRO	<p>1) Control SG level with Feedwater Isolation MOVs.</p> <p>2) Consult with the Shift Manager concerning the need to place the MFRV on the jack.</p> <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 2006 Scenario No.: 4 Event No.: 2

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Event Description: 'C' SG controlling level channel III (LT-496) fails low  
 Cue: By Examiner.

		<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"> <li>• Table 3.7-1, 12 and 17</li> </ul> <p><b>Action 6 – trip w/in 72 hours</b></p> <ul style="list-style-type: none"> <li>• Table 3.7-2, 1.c, 1.e, and 3.a</li> </ul> <p><b>Item 3.a – Action 20 – trip w/in 72 hours</b></p> <ul style="list-style-type: none"> <li>• Table 3.7-3, 2.a, and 3.a</li> </ul> <p><b>Item 3.a – Action 20 – trip w/in 72 hours</b></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. CHECK FAILED INSTRUMENT - IS A REGULATORY GUIDE 1.97 VARIABLE</p> <p>GO TO Step 14.</p> <p>STA will determine if the component is a Reg. Guide 1.97 component and report as necessary to the SRO.</p>

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 2

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Event Description: 'C' SG controlling level channel III (LT-496) fails low  
 Cue: By Examiner.

	SRO	13. REVIEW CEP 99-0029, REG GUIDE 1.97 OPERABILITY, REPORTABILITY, AND ALTERNATE INDICATIONS
	SRO	14. REVIEW THE FOLLOWING: <ul style="list-style-type: none"> <li>• Tech Spec 3.7</li> <li>• VPAP-2802, NOTIFICATIONS AND REPORTS</li> <li>• TRM SECTION 3.3, INSTRUMENTATION</li> </ul> STA will review TRM and VPAP-2802, when directed.
	SRO	15. ___ PROVIDE NOTIFICATIONS AS NECESSARY: <ul style="list-style-type: none"> <li>• Shift Supervision</li> <li>• OMOG</li> <li>• STA (PRA determination)</li> <li>• I&amp;C</li> </ul> - END -

END – Event 2

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 3

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Event Description: Median Tave Fails High.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	Crew	Diagnoses failure of median Tave with the following indications/alarms:  Alarms: <ul style="list-style-type: none"> <li>• 1H-A4 Tavg &gt;&lt;Tref DEVIATION</li> <li>• 1H-H7 STM DUMP V V TRIP OPEN</li> <li>• 1C-B8 PRZR LO PRESS</li> </ul> Indications: <ul style="list-style-type: none"> <li>• Median Tave (recorder and indicator) off-scale high</li> <li>• Individual Loop Taves indicating NORMAL</li> <li>• Pressurizer pressure decreasing</li> <li>• Pressurizer level increasing</li> <li>• Reactor Power decreasing</li> </ul>
	SRO	Enters 0-AP-53.00 LOSS OF VITAL INSTRUMENTATION / CONTROLS
	BOP	[ 1 ] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL
	BOP	[ 2 ] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION  RO takes manual control of the control rods to stop the inward rod motion and also takes manual control pressurizer level control (1-CH-FCV-1122) to maintain pressurizer level at program.

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Event Description: Median Tave Fails High.

Cue: By Examiner.

	RO  SRO	<p>3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS – AFFECTED</p> <ul style="list-style-type: none"> <li>• Nuclear Instrumentation</li> <li>• Pressurizer Pressure control</li> </ul> <p>RNO: GO TO Step 6.</p>
	BOP	<p>6. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS – NORMAL</p> <ul style="list-style-type: none"> <li>• Steam Pressure</li> <li>• Steam Flow</li> <li>• Feed Flow</li> <li>• Steam Generator Level</li> </ul>
	BOP	<p>7. CHECK TURBINE FIRST STAGE PRESSURE CHANNELS - NORMAL</p>
	RO	<p>8. CHECK LOOP/MEDIAN <math>\Delta T/T_{AVE}</math> – NORMAL</p> <p>a) Median TAVE – NORMAL</p> <p>RNO Do the following:</p> <ol style="list-style-type: none"> <li>1) Place ROD CONT MODE SEL switch in MANUAL, as required.</li> <li>2) Take manual control of charging, as necessary to maintain pressurizer level at program.</li> <li>3) Refer to Attachment 4 (Describes Tave control system)</li> <li>4) If no other instrumentation failure exists, then go to step 12.</li> </ol> <p>Goes to Step 12</p>

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 3

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Event Description: Median Tave Fails High.

Cue: By Examiner.

	SRO	<p>12. CHECK FAILED INSTRUMENT - IS A REGULATORY GUIDE 1.97 VARIABLE</p> <p>STA will determine that this is not a Reg. Guide 1.97 variable, when directed.</p> <p>RNO: GO TO Step 14.</p>
	SRO	<p>14. REVIEW THE FOLLOWING:</p> <ul style="list-style-type: none"> <li>• Tech Spec 3.7</li> </ul> <p>Not Applicable</p> <ul style="list-style-type: none"> <li>• VPAP-2802, NOTIFICATIONS AND REPORTS</li> <li>• TRM SECTION 3.3, INSTRUMENTATION</li> </ul> <p>STA will review TRM and VPAP-2802, when directed.</p>
	SRO	<p>15. PROVIDE NOTIFICATIONS AS NECESSARY:</p> <ul style="list-style-type: none"> <li>• Shift Supervision</li> <li>• OMOG</li> <li>• STA (PRA determination)</li> <li>• I&amp;C</li> </ul> <p>- END -</p>
		<p>BOOTH:</p> <p>IF CONTACTED by the crew to attempt to restore Tave, then allow a time compression to occur. Inform the crew that Tave has been restored (and post maintenance testing is complete) and Tave has been returned to operable.</p>

END – Event 3

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 4

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Event Description: 'B' SG PORV Fails Open.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	Crew	<p>Diagnoses failure of 'B' SG PORV (open)</p> <p>Indications:</p> <ul style="list-style-type: none"> <li>• Median Tave (recorder and indicator) decreasing (if restored)</li> <li>• Individual Loop Taves decreasing</li> <li>• Pressurizer pressure decreasing</li> <li>• Pressurizer level increasing</li> <li>• Reactor Power increasing with MWe decreasing</li> </ul> <p>When team identifies PORV failed open, they will take manual control of the SG PORV and close the valve. This can be done in accordance with AP-53.00. AP-53.00 is listed below for reference.</p>
	SRO	Enters 0-AP-53.00, LOSS OF VITAL INSTRUMENTATION / CONTROLS
	BOP	<p>[ 1 ] VERIFY REDUNDANT INSTRUMENT CHANNEL(S) INDICATION – NORMAL</p> <ul style="list-style-type: none"> <li>• Steam Generator Pressures are less than 1035 psig (PORV setpoint)</li> </ul>
	BOP	<p>[ 2 ] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION</p> <p>Places 'B' PORV in Manual and closes valve.</p>

Event Description: 'B' SG PORV Fails Open.

Cue: By Examiner.

	RO	3. CHECK THE FOLLOWING INSTRUMENTS/CONTROLS – AFFECTED
	SRO	<ul style="list-style-type: none"> <li>• Nuclear Instrumentation</li> <li>• Pressurizer Pressure control</li> </ul>
		RNO: GO TO Step 6.
	BOP	6. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS – NORMAL
		<ul style="list-style-type: none"> <li>• Steam Pressure</li> <li>• Steam Flow</li> <li>• Feed Flow</li> <li>• Steam Generator Level</li> </ul>
	BOP	7. CHECK TURBINE FIRST STAGE PRESSURE CHANNELS - NORMAL
	RO	8. CHECK LOOP/MEDIAN $\Delta T/T_{AVE}$ – NORMAL
		<ul style="list-style-type: none"> <li>a) Median <math>T_{AVE}</math> – NORMAL</li> <li>b) Loop <math>T_{AVE} / \Delta T</math> - NORMAL</li> </ul>
	BOP	9. CHECK TURBINE LOAD REFERENCE COUNTER - STABLE
	RO	10. CHECK PRZR LEVEL CONTROL CHANNELS – NORMAL
		<ul style="list-style-type: none"> <li>a) Check PRZR LVL Instrumentation-NORMAL</li> <li>b) Check letdown - IN SERVICE</li> <li>c) Check PRZR level control – IN AUTOMATIC</li> <li>d) Verify Pressurizer Heaters - ENERGIZED</li> </ul>

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 4

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Event Description: 'B' SG PORV Fails Open.

Cue: By Examiner.

	RO	<p>11. CHECK PROPER OPERATION OF THE FOLLOWING INSTRUMENTS:</p> <ul style="list-style-type: none"> <li>a) Turbine Monitoring Lights - NOT LIT</li> <li>b) Reactor Coolant Flow instrumentation – NORMAL</li> <li>c) PRZR Pressure Protection instrumentation – NORMAL</li> <li>d) CTMT pressure instrumentation – NORMAL</li> <li>e) RWST level instrumentation – NORMAL</li> <li>f) VCT level instrumentation – NORMAL</li> <li>g) Underground Fuel Oil Storage Tank level instrumentation – NORMAL</li> <li>h) Chemical Addition Tank level instrumentation – NORMAL</li> <li>i) Emergency Condensate Makeup Tank level instrumentation – NORMAL</li> <li>j) Fire Protection and Domestic Water Tank level instrumentation – NORMAL</li> </ul>
	SRO	<p>12. CHECK FAILED INSTRUMENT - IS A REGULATORY GUIDE 1.97 VARIABLE</p> <p>STA will determine that this is not a Reg. Guide 1.97 variable, when directed.</p> <p>RNO: GO TO Step 14.</p>

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Event Description: 'B' SG PORV Fails Open.

Cue: By Examiner.

	SRO	14. REVIEW THE FOLLOWING: <ul style="list-style-type: none"><li>• Tech Spec 3.7</li></ul> Not Applicable <ul style="list-style-type: none"><li>• VPAP-2802, NOTIFICATIONS AND REPORTS</li><li>• TRM SECTION 3.3, INSTRUMENTATION</li></ul> STA will review TRM and VPAP-2802, when directed.
	SRO	15. PROVIDE NOTIFICATIONS AS NECESSARY: <ul style="list-style-type: none"><li>• Shift Supervision</li><li>• OMOG</li><li>• STA (PRA determination)</li><li>• I&amp;C</li></ul> - END -

END – Event 4

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 5

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Event Description: RCP 'A' thermal barrier tube leak (Greater than 50 GPM).

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	Crew	Diagnoses RCP 'A' thermal barrier leak Alarms: <ul style="list-style-type: none"> <li>• 1C-A3 RCP 1A THERMAL BARRIER CC HI TEMP</li> <li>• 1C-A2 RCP 1A THERMAL BARRIER CC HI FLOW</li> </ul> Indications: <ul style="list-style-type: none"> <li>• 'A' RCP thermal barrier flow is indicating greater than 200 gpm</li> <li>• Thermal barrier temperatures are increasing</li> <li>• Pressurizer level decreasing</li> <li>• CC Head tank level increasing</li> </ul> AP-16.00 AND AP-9.00 ARE ATTACHED AT THE END OF THIS GUIDE IF THE CREW UTILIZES THEM.
	SRO	Directs performance of ARP 1C-A3 (depending on timing, the SRO may direct performance of 1C-A2)
	RO	<b>ARP 1C-A3</b> 1. VERIFY ALARM – THERMAL BARRIER CC TEMPERATURE GREATER THAN OR EQUAL TO 145 F <ul style="list-style-type: none"> <li>• TI-CC-107A</li> </ul>

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 5

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Event Description: RCP 'A' thermal barrier tube leak (Greater than 50 GPM).

Cue: By Examiner.

	RO	<p>2. CHECK 1-CC-TV-120A - CLOSED</p> <p>RNO - Do the following:</p> <p>a) Verify open or open 1-CC-TV-140A and 140B</p> <p>b) Check for Thermal Barrier Tube Leakage</p> <ul style="list-style-type: none"> <li>• CC Surge Tank Level – INCREASING AT 1% PER MINUTE INDICATES APPROXIMATELY 35 GPM LEAKAGE.</li> <li>• Thermal Barrier CC temperature – INCREASING</li> <li>• Thermal Barrier CC flow – HIGH FLOW</li> <li>• PRZR level – DECREASING</li> <li>• PRZR Pressure – DECREASING</li> </ul> <p>c) IF a Thermal Barrier tube leak exists, THEN do the following:</p> <ol style="list-style-type: none"> <li>1) Close 1-CC-TV-120A and 1-CC-TV-140A/B</li> <li>2) GO TO STEP 3</li> </ol> <p>RO closes 1-CC-TV-120A and 1-CC-TV-140A/B</p>
	RO	GO TO ANNUNCIATOR PROCEDURE 1C-A2, RCP 1A THERMAL BARRIER CC HI FLOW
	RO	<p><b>ARP 1C-A2</b></p> <p><b>CAUTION:</b></p> <ul style="list-style-type: none"> <li>• If 1A Thermal Barrier CC flow is greater than or equal to 50 GPM, 1-CC-TV-120A should close automatically after a 10 second time delay.</li> <li>• If Thermal Barrier return CC Header flow is greater than or equal to 145 GPM, 1-CC-TV-140A/B should close automatically after a 10 second time delay</li> <li>• RCP seal injection flow must be maintained greater than RCP seal leak-off flow.</li> </ul>

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 5

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Event Description: RCP 'A' thermal barrier tube leak (Greater than 50 GPM).

Cue: By Examiner.

	RO	<p>1. CHECK THERMAL BARRIER ISOLATION VALVE 1-CC-TV-120A – CLOSED.</p> <p>RNO – Do the following:</p> <ul style="list-style-type: none"> <li>a) Check Thermal Barrier CC flow on FI-CC-107A</li> <li>b) IF Thermal Barrier CC flow is greater than or equal to 50 GPM, THEN close Thermal Barrier Isolation valve 1-CC-TV-120A.</li> </ul> <p>RO closes 1-CC-TV-120A if not previously closed</p> <ul style="list-style-type: none"> <li>c) IF Thermal Barrier CC flow is less than 50 GPM, THEN initiate a Work Request AND GO TO step 19.</li> </ul>
	RO	<p>2. CHECK CC CTMT ISOLATION VALVES - CLOSED</p> <ul style="list-style-type: none"> <li>• 1-CC-TV-140A</li> <li>• 1-CC-TV-140B</li> </ul> <p>RO closes 1-CC-TV-140A/B if valves not previously closed.</p>
	RO	<p>3. INCREASE SURVEILLANCE OF RCP PARAMETERS:</p> <ul style="list-style-type: none"> <li>• Frame vibrations</li> <li>• Shaft vibrations</li> <li>• Temperatures</li> <li>• Pump Amps</li> </ul> <p>RO reviews above listed parameters.</p>

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 5

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Event Description: RCP 'A' thermal barrier tube leak (Greater than 50 GPM).

Cue: By Examiner.

	RO	<p>NOTE:</p> <p>High flow at the seal leak-off may cause CC in thermal barrier to boil, causing sporadic CC flow.</p> <p>4. CHECK SEAL LEAK-OFF:</p> <ul style="list-style-type: none"> <li>• RCP 1A SEAL LEAK-OFF GREATER THAN OR EQUAL TO 5 GPM ON 1-CH-FI-1190 (Pen 1)</li> </ul> <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <li>• Annunciator 1C-A4, RCP 1A SEAL LKOFF HI FLOW – LIT</li> </ul> <p>RNO – GO TO STEP 7</p>
	RO	<p>7. CHECK THERMAL BARRIER CC TEMPERATURE:</p> <ul style="list-style-type: none"> <li>• RCP A THERMAL BARRIER CC OUTLT TEMP – GREATER THAN 145 F ON TI-CC-107A</li> </ul> <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <li>• Annunciator 1C-A3 RCP 1A THERMAL BARRIER CC HI TEMP - LIT</li> </ul>
	RO	<p>NOTE:</p> <p>Step 8 will require a CTMT entry. Step 9 cannot be performed until Step 8 is completed. The ARP should continue with Step 10 while waiting for steps 8 and 9 to be completed.</p>
	SRO	<p>8. LOCALLY CLOSE MANUAL ISOLATION VALVE 1-CC-28.</p> <p>SRO directs preparations to be made for a containment entry.</p>
	SRO	<p>10. CONSULT WITH SHIFT SUPERVISOR AND OMOC TO DETERMINE IF UNIT OPERATION SHOULD CONTINUE WITH ONE THERMAL BARRIER ISOLATED.</p> <p>SRO contacts shift manager and/or OMOC who determine operation will continue.</p>

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 5

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Event Description: RCP 'A' thermal barrier tube leak (Greater than 50 GPM).

Cue: By Examiner.

	RO	<p>CAUTION:</p> <p>The limits of Step 11 apply as long as the RCP is operating without Thermal Barrier Cooling Water.</p> <p>NOTE:</p> <p>The alarm setpoint for the lower radial bearing is 175 F. The technical manual allows pump operation above 175 F with attention paid to other pump parameters.</p> <p>11. CHECK LOWER BEARING SEAL WATER TEMPERATURE AND SEAL WATER OUTLET TEMPERATURE:</p> <ul style="list-style-type: none"> <li>• Lowering Bearing Seal Water Temperature – GREATER THAN 225 F ON PCS POINT T0417A</li> </ul> <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <li>• Seal Water Outlet Temperature – GREATER THAN 235 ON PCS POINT T0181A</li> </ul> <p>RNO</p> <p>IF both temperatures are less than 195 F then go to step 17.</p>
	RO	<p>CAUTION:</p> <p>When operating without Thermal Barrier CC flow, a loss of seal injection flow may result in pump damage. Repairs should be planned as soon as possible.</p> <p>17. MONITOR MOTOR AND BEARING TEMPERATURES</p>

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 5

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Event Description: RCP 'A' thermal barrier tube leak (Greater than 50 GPM).

Cue: By Examiner.

	RO	18. MONITOR THE FOLLOWING <ul style="list-style-type: none"><li>• RCS leak rate</li><li>• CC surge tank level</li><li>• CC process radiation</li><li>• Auxiliary building sump level</li><li>• Auxiliary building central area radiation</li></ul>
	SRO	19. PROVIDE NOTIFICATIONS AS NECESSARY: <ul style="list-style-type: none"><li>• OMO</li><li>• STA</li><li>• SHIFT SUPERVISOR</li></ul>

END – Event 5

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 6

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Event Description: Normal offsite supply to 1J bus trips and breaker 15J9 (stub bus supply breaker cannot be re-closed). Loss of CC.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	Crew	<p>Diagnoses the loss of the normal supply of the 1J bus and that the #3 EDG energized the emergency bus and identifies the loss of CC by the following alarms/indications:</p> <p>Alarms:</p> <ul style="list-style-type: none"> <li>• 1K-D4 CC PP 1B IN LOCAL CONTROL OR OL TRIP</li> <li>• 1K-D5 CC PPS DISCH HDR B LO FLOW</li> <li>• 1K-E5 CC PP DISCH HDR LO PRESS</li> <li>• 4KV EMERG BUS STUB BUS TIE BKR TRIP</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• Various alarms on the loss of power</li> <li>• Breaker 15J8 open (breaker disagreement light) and Breaker 15J3 closed.</li> <li>• #3 EDG running</li> <li>• No CC pumps running</li> <li>• Various CC related alarms</li> </ul> <p>AP-10.07 IS ATTACHED AT THE END OF THIS GUIDE IF THE CREW UTILIZES IT.</p>
	SRO	<p>Asks Unit 2 for the status of Unit 2 CC.</p> <p>UNIT 2 Response: CC is split out between units. 1-CC-P-1C is running.</p>
	SRO	<p>Directs local operation of CC Cross-connect valves.</p> <p>Local report is that these valves will not open.</p>

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 6

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Event Description: Normal offsite supply to 1J bus trips and breaker 15J9 (stub bus supply breaker cannot be re-closed). Loss of CC.

Cue: By Examiner.

	SRO	Enters 1-AP-15.00, LOSS OF COMPONENT COOLING
	SRO	<p>CAUTION:</p> <p>If Unit is on RHR, 1-AP-27.00, LOSS OF DECAY HEAT REMOVAL CAPABILITY, should be implemented.</p> <p>NOTE:</p> <p>CC Surge Tank level decreasing at 1% per minutes indicates approximately 35 gpm leakage.</p> <p>1. TRIP THE REACTOR AND INITIATE 1-E-0, REACTOR TRIP OR SAFETY INJECTION.</p> <p>SRO directs the RO to trip Unit 1 and perform 1-E-0.</p>
	RO	<p><b>1-E-0</b></p> <p>[ 1 ] VERIFY REACTOR TRIP:</p> <p>a) Manually trip reactor</p> <p>b) Check the following:</p> <ul style="list-style-type: none"> <li>• All Rods On Bottom light – LIT</li> <li>• Reactor trip and bypass breakers – OPEN</li> <li>• Neutron flux - DECREASING</li> </ul>
	BOP	<p>2 ] VERIFY TURBINE TRIP:</p> <p>a) Manually trip the turbine</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"> <li>• 1-MS-SOV-104</li> </ul> <p>d) Verify generator output breakers – OPEN (Time Delayed)</p>

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 6

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Event Description: Normal offsite supply to 1J bus trips and breaker 15J9 (stub bus supply breaker cannot be re-closed). Loss of CC.

Cue: By Examiner.

	BOP	[ 3 ] VERIFY BOTH AC EMERGENCY BUSES - ENERGIZED
	RO  Critical Task	<p>[ 4 ] ___ CHECK IF SI INITIATED:</p> <p>a) Check if SI is actuated:</p> <ul style="list-style-type: none"> <li>• LHSI pumps – RUNNING</li> <li>• SI annunciators – LIT</li> <li>• A-F-3</li> <li>• A-F-4</li> </ul> <p><b>b) Manually initiate SI</b></p> <p>Team should identify that automatic SI did not occur and manually initiate SI. The Large Break LOCA (Event 7) will be initiated 2 minutes after the Reactor Trip. This should occur while the BOP performs 1-AP-15.00 and the RO/SRO verify the 1-E-0 immediate actions.</p> <p>The SRO may also direct the BOP to perform 1-AP-10.07 as time permits.</p> <p>Follow on 1-E-0 actions will be listed in Event 7 starting with Step 5 of 1-E-0. The remainder of this section will be AP-15.00 actions.</p>
	BOP	<p><b>AP-15.00</b></p> <p>2. STOP THE RCPS AND INITIATE 1-AP-39.00, NATURAL CIRCULATION OF THE RCS.</p> <p>BOP will obtain copy of 1-AP-39.00 while continuing in 1-AP-15.00.</p> <p>1-AP-39.00 is attached at the end of this scenario guide for review, if the BOP begins the AP.</p>

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 6

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Event Description: Normal offsite supply to 1J bus trips and breaker 15J9 (stub bus supply breaker cannot be re-closed). Loss of CC.

Cue: By Examiner.

	BOP	3. SECURE LETDOWN BY CLOSING THE FOLLOWING VALVES: <ul style="list-style-type: none"><li>• 1-CH-HCV-1200A</li><li>• 1-CH-HCV-1200B</li><li>• 1-CH-HCV-1200C</li></ul>
	BOP	Due to the Large Break LOCA (Event 7) AP-15.00 will no longer be a priority procedure.
	BOP	BOP may have been given Attachment 8 of 1-E-0 for AFW control.

END – Event 6

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 7

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Event Description: Large Break LOCA with a trip of the 'B' LHSI pump.

Cue: Two minutes following reactor trip.

Time	Position	Applicant's Action or Behavior
	BOP	5. VERIFY FW ISOLATION: <ul style="list-style-type: none"> <li>• Feed pump discharge MOVs – CLOSED               <ul style="list-style-type: none"> <li>• 1-FW-MOV-150A</li> <li>• 1-FW-MOV-150B</li> </ul> </li> <li>• MFW pumps – TRIPPED</li> <li>• Feed REG valves – CLOSED</li> <li>• SG FW bypass flow valves – DEMAND AT ZERO</li> <li>• SG blowdown TVs - CLOSED</li> </ul>
	RO	6. VERIFY CTMT ISOLATION PHASE I: <ul style="list-style-type: none"> <li>• Phase I TVs – CLOSED</li> <li>• 1-CH-MOV-1381 – CLOSED</li> <li>• 1-SV-TV-102A – CLOSED</li> <li>• PAM isolation valves – CLOSED               <ul style="list-style-type: none"> <li>• 1-DA-TV-103A</li> <li>• 1-DA-TV-103B</li> </ul> </li> </ul>
	BOP	7. VERIFY AFW PUMPS RUNNING: <ul style="list-style-type: none"> <li>a) MD AFW pumps – RUNNING (Time Delayed)</li> <li>b) TD AFW pump - RUNNING</li> </ul>
	RO	8. VERIFY SI PUMPS RUNNING: <ul style="list-style-type: none"> <li>• CHG pumps – RUNNING</li> <li>• LHSI pumps - RUNNING</li> </ul>

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 7

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Event Description: Large Break LOCA with a trip of the 'B' LHSI pump.  
 Cue: Two minutes following reactor trip.

	RO	<p>9. CHECK CHG PUMP AUXILIARIES:</p> <ul style="list-style-type: none"> <li>• CHG pump CC pump – RUNNING</li> <li>• CHG pump SW pump - RUNNING</li> </ul>
	BOP	<p>10. CHECK INTAKE CANAL:</p> <ul style="list-style-type: none"> <li>• Level - GREATER THAN 24 FT</li> <li>• Level - BEING MAINTAINED BY CIRC WATER PUMPS</li> </ul>
	BOP/RO	<p>11. 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"> <li>• E-F-10 (High Steam Flow SI)</li> <li>• B-C-4 (Hi Hi CLS Train A)</li> <li>• B-C-5 (Hi Hi CLS Train B)</li> </ul> <p>b) Check MSTVs – CLOSED</p> <p>c) Check either of the following – ACTUATED</p> <ul style="list-style-type: none"> <li>• Hi steam flow SI</li> </ul> <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <li>• Header to line SI</li> </ul> <p>d) Verify RWST crosstie valves – OPEN</p> <ul style="list-style-type: none"> <li>• 1-SI-TV-102A</li> <li>• 1-SI-TV-102B</li> <li>• 2-SI-TV-202A</li> <li>• 2-SI-TV-202B</li> </ul> <p>e) Check RCS pressure – LESS THAN 185 PSIG</p>

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 7

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Event Description: Large Break LOCA with a trip of the 'B' LHSI pump.

Cue: Two minutes following reactor trip.

	RO	<p>*12. CHECK IF CS REQUIRED:</p> <p>a) CTMT pressure – HAS EXCEEDED 23 PSIA</p> <p>b) Manually initiate HI HI CLS: RO will manually initiate HI HI CLS, if not previously performed.</p> <p>c) Trip all RCPs RO will trip all RCPs, if not previously tripped.</p> <p>d) Verify CS pump - RUNNING</p> <p>e) Check ISRS pumps – RUNNING (Time Delayed)</p> <p>f) Check OSRS pumps – RUNNING (Time Delayed)</p> <p>g) Initiate Attachment 1</p>
	BOP	Attachment 1 is attached at the end of this scenario guide.
	RO	<p>*13. BLOCK LOW PRZR PRESS SI SIGNAL:</p> <p>a) Check PRZR pressure – LESS THAN 2000 psig</p> <p>b) Turn both LO PRZR PRESS &amp; STM HDR/LINE ΔP switches to block</p> <p>c) Verify Permissive Status light C-2 - LIT</p>
	RO	<p>*14. BLOCK LOW TAVE SI SIGNAL:</p> <p>a) Check RCS Tave - LESS THAN 543°F</p> <p>b) Turn both HI STM FLOW &amp; LO TAVG OR LP switches to block</p> <p>c) Verify Permissive Status light F-1 - LIT</p>

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Event Description: Large Break LOCA with a trip of the 'B' LHSI pump.

Cue: Two minutes following reactor trip.

	RO	<p><b>NOTE:</b></p> <ul style="list-style-type: none"><li>• CHG pumps should be run in the following order of priority: C, B, A.</li><li>• Subsequent SI signals may be reset by reperforming Step 15.</li></ul> <p>15. VERIFY SI FLOW:</p> <p>a) HHSI to cold legs - FLOW INDICATED</p> <ul style="list-style-type: none"><li>• 1-SI-FI-1961 (NQ)</li><li>• 1-SI-FI-1962 (NQ)</li><li>• 1-SI-FI-1963 (NQ)</li><li>• 1-SI-FI-1943 or 1-SI-FI-1943A</li></ul> <p>b) Check CHG pumps - THREE RUNNING</p> <p>c) Reset SI</p> <p>d) Stop one CHG pump and put in AUTO</p> <p>e) RCS pressure - LESS THAN 185 PSIG</p> <p>f) LHSI flow - INDICATED</p>
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Event Description: Large Break LOCA with a trip of the 'B' LHSI pump.

Cue: Two minutes following reactor trip.

	BOP	16. VERIFY TOTAL AFW FLOW - GREATER THAN 350 GPM [450 GPM]
	BOP	17. CHECK AFW MOVs - OPEN
	RO	18. VERIFY SI VALVE ALIGNMENT IAW ATTACHMENT 2 Attachment 2 is attached at the end of this scenario guide
	BOP	19. VERIFY VENTILATION ALIGNMENT AND AC POWER ALIGNMENT IAW ATTACHMENT 3 Attachment 3 is attached at the end of this scenario guide
	RO	*20. CHECK RCS AVERAGE TEMPERATURE <ul style="list-style-type: none"> <li>• STABLE AT 547°F</li> </ul> <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <li>• TRENDING TO 547°F</li> </ul> <p>RNO: IF temperature less than 547°F AND decreasing, THEN do the following:</p> <ul style="list-style-type: none"> <li>a) Stop dumping steam.</li> <li>b) IF cooldown continues, THEN 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.</li> <li>c) IF cooldown continues, THEN close MSTVs.</li> </ul>
	RO	21. CHECK PRZR PORVs AND SPRAY VALVES: <ul style="list-style-type: none"> <li>a) PRZR PORVs – CLOSED</li> <li>b) PRZR spray controls - DEMAND AT ZERO</li> <li>c) PORV block valves - AT LEAST ONE OPEN</li> </ul>

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Event Description: Large Break LOCA with a trip of the 'B' LHSI pump.

Cue: Two minutes following reactor trip.

	RO	<p><b>NOTE:</b> Seal injection flow should be maintained to all RCPs.</p> <p>*22. CHECK RCP TRIP AND MINIFLOWRECIRC CRITERIA:</p> <p>a) Charging Pumps – AT LEAST ONE RUNNING AND FLOWING TO THE RCS.</p> <p>b) RCS subcooling - LESS THAN 30°F [85°F]</p> <p>c) Stop all RCPs</p> <p>d) RCS pressure - LESS THAN 1275 psig [1475 PSIG]</p> <p>e) Close CHG pump miniflow recirc valves:</p> <ul style="list-style-type: none"> <li>• 1-CH-MOV-1275A</li> <li>• 1-CH-MOV-1275B</li> <li>• 1-CH-MOV-1275C</li> </ul>
	BOP	<p>23. CHECK IF SGs ARE NOT FAULTED:</p> <ul style="list-style-type: none"> <li>• Check pressures in all SGs – STABLE OR INCREASING</li> <li>• Check pressures in all SGs – GREATER THAN 100 PSIG</li> </ul>
	BOP	<p>24. CHECK IF SG TUBES ARE NOT RUPTURED</p> <ul style="list-style-type: none"> <li>• Condenser air ejector radiation – NORMAL</li> <li>• SG blowdown radiation – NORMAL</li> <li>• SG MS radiation – NORMAL</li> <li>• TD AFW pump exhaust radiation – NORMAL</li> <li>• SG NR Level – NOT INCREASING IN AN UNCONTROLLED MANNER.</li> </ul>

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Event Description: Large Break LOCA with a trip of the 'B' LHSI pump.

Cue: Two minutes following reactor trip.

	RO	<p>25. CHECK RCS – INTACT INSIDE CTMT</p> <ul style="list-style-type: none"> <li>• CTMT radiation – NORMAL</li> <li>• CTMT pressure – NORMAL</li> <li>• CTMT RS sump level – NORMAL</li> </ul> <p>RNO GO TO 1-E-1, LOSS OF REACTOR OR SECONDARY COOLANT</p> <p>BOOTH: TIME COMPRESSION WILL BE USED TO PROVIDE FOR A TRANSITION FROM 1-E-0 DIRECTLY TO 1-ES-1.3.</p>
	SRO	<p>At approximately 25% RWST level 1-SI-P-1B will trip. The pump cannot be re-started.</p> <p>At 20% RWST level the SRO should transition the team to 1-ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, based on the 1-E-0 CAP page.</p>

End – Event 7

Op-Test No.: Surry 2006 Scenario No.: 4 Event No.: 8

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Event Description: Loss of Emergency Coolant Recirculation.

Cue: When RMT actuates (phase 2).

Time	Position	Applicant's Action or Behavior
	SRO	Enters 1-ES-1.3, TRANSFER TO COLD LEG RECIRCULATION.
	SRO	<p>CAUTION:</p> <ul style="list-style-type: none"> <li>• SI recirculation flow to the RCS must be maintained at all times.</li> <li>• Transfer to recirculation may cause high radiation in the Auxiliary Building.</li> </ul> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Steps 1 through 5 should be performed without delay. FRs should NOT be implemented before completion of these steps.</li> <li>• If sump blockage or a complete loss of sump suction capability occurs, FRs should not be implemented until directed in Attachment 1, or in 1-ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.</li> </ul> <p>1. VERIFY OR PLACE BOTH RMT MODE TRANSFER SWITCHES IN RMT.</p>
	RO	2. RESET SI

Event Description: Loss of Emergency Coolant Recirculation.

Cue: When RMT actuates (phase 2).

	RO	<p>3 VERIFY SI RECIRC PHASE HEAT SINK:</p> <ul style="list-style-type: none"> <li>a) Verify SW flow established to at least two RS HXs</li> <li>b) Verify AC emergency buses – ENERGIZED BY OFFSITE POWER.</li> <li>b) RNO – stop CC and RHR pumps energized by EDG</li> <li>c) Verify RS pump associated with RS HXs supplied SW – AT LEAST TWO RUNNING <ul style="list-style-type: none"> <li>• 1-RS-P-1A RS HX A</li> <li>• 1-RS-P-1B RS HX B</li> <li>• 1-RS-P-2A RS HX C</li> <li>• 1-RS-P-2B RS HX D</li> </ul> </li> </ul>
	RO	<p>4. VERIFY LHSI PUMPS BOTH RUNNING</p> <p>RO identifies only 1 LHSI pump running (depending on timing there may be no LHSI pumps running, in which case the crew would transition to 1-ECA-1.1)</p> <p>4. RNO</p> <p>IF only one LHSI pump can be started, then run only one CHG pump in accordance with the following steps:</p> <ul style="list-style-type: none"> <li>b) If SI headers are not split, then run one CHG pump in the preferred order – C, B, A, and place the remaining CHG pumps in PTL.</li> </ul> <p>IF no LHSI pumps can be started, then go to 1-ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.</p>

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Event Description: Loss of Emergency Coolant Recirculation.

Cue: When RMT actuates (phase 2).

	RO	<p>CAUTION:</p> <p>If suction source is lost to any SI or spray pump, the pump should be stopped.</p> <p>5. ALIGN SI SYSTEM FOR RECIRC</p> <p>a) Close CHG pump miniflow recirc valves:</p> <ul style="list-style-type: none"> <li>• 1-CH-MOV-1275A</li> <li>• 1-CH-MOV-1275B</li> <li>• 1-CH-MOV-1275C</li> </ul> <p>b) RWST Level – LESS THAN 13%</p> <p>c) Verify Phase 1 - INITIATED</p> <ol style="list-style-type: none"> <li>1) White Phase 1 Status light on bench board - LIT</li> <li>2) LHSI discharge to HHSI - OPEN <ul style="list-style-type: none"> <li>• 1-SI-MOV-1863A</li> <li>• 1-SI-MOV-1863B</li> </ul> </li> <li>3) LHSI recirc valves - CLOSED <ul style="list-style-type: none"> <li>• 1-SI-MOV-1885A</li> <li>• 1-SI-MOV-1885B</li> <li>• 1-SI-MOV-1885C</li> <li>• 1-SI-MOV-1885D</li> </ul> </li> </ol> <p>d) Verify Phase 2 - INITIATED</p> <p>RO Identifies 1-SI-P-1A has tripped</p> <ol style="list-style-type: none"> <li>1) Amber Phase 2 Status light on bench board - LIT</li> <li>2) LHSI suction from sump - OPEN <ul style="list-style-type: none"> <li>• 1-SI-MOV-1860A</li> <li>• 1-SI-MOV-1860B</li> </ul> </li> <li>3) LHSI suction from RWST valves- CLOSED <ul style="list-style-type: none"> <li>• 1-SI-MOV-1862A</li> <li>• 1-SI-MOV-1862B</li> </ul> </li> <li>4) CHG pump suction from RWST valves- CLOSED <ul style="list-style-type: none"> <li>• 1-CH-MOV-1115B</li> <li>• 1-CH-MOV-1115D</li> </ul> </li> </ol>
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Event Description: Loss of Emergency Coolant Recirculation.  
 Cue: When RMT actuates (phase 2).

	RO	<p>STEP 5 CONTINUED</p> <p>e) Verify recirculation flow - ESTABLISHED</p> <p>RNO e) IF at least one flow path from the sump to the RCS can NOT be established or maintained, then GO TO 1-ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.</p>
	SRO	<p>Enters TO 1-ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.</p>
	SRO/RO	<p><b>ECA-1.1</b></p> <p>CAUTION:</p> <ul style="list-style-type: none"> <li>• If emergency coolant recirculation capability is restored during this procedure, further recovery actions should continue by returning to the procedure and step in effect.</li> <li>• If suction source is lost to any SI or spray pump, the pump should be stopped.</li> </ul> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Attachment 2 provides a graph of the minimum amount of RCS makeup flow required to remove decay heat</li> <li>• If procedure has been entered due to CTMT sump blockage, FRs should not be implemented until directed.</li> </ul> <p>1. CHECK EMERGENCY COOLANT RECIRCULATION EQUIPMENT - AVAILABLE.</p> <p>a) Check the following pumps - AVAILABLE</p> <ul style="list-style-type: none"> <li>• 1-SI-P-1A</li> </ul> <p>RNO a) GO TO Step 2</p>

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Event Description: Loss of Emergency Coolant Recirculation.  
 Cue: When RMT actuates (phase 2).

	RO	<p>2. TRY TO RESTORE THE REDUNDANT FLOW PATH FROM THE CTMT SUMP TO THE RCS.</p> <p>a) Check the following pumps - AVAILABLE</p> <ul style="list-style-type: none"> <li>• 1-SI-P-1B</li> </ul> <p>RNO a) GO TO Step 3</p>
	RO	3. RESET BOTH TRAINS OF SI
	RO	4. PUT RMT MODE TRANSFER SWITCHES IN REFUEL MODE
	RO  SRO/STA	<p>5. CHECK RWST LEVEL – GREATER THAN 3%</p> <p>RNO 5. Do the following:</p> <p>a) Implement FRs as necessary.</p> <p>STA CUE: WILL REVIEW FRs AND CONTACT THE SRO WITH ANY RECOMMENDATIONS</p> <p>b) GO TO Step 33</p>
	SRO/RO	<p>CAUTION:</p> <p>A CHG pump must not be stopped if aligned to UNIT 2 RWST using crosstie.</p> <p>33. STOP PUMPS TAKING SUCTION FROM RWST AND PUT IN PTL</p> <ul style="list-style-type: none"> <li>• LHSI pumps</li> <li>• CHG pumps</li> <li>• CS pumps</li> </ul>

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Event Description: Loss of Emergency Coolant Recirculation.

Cue: When RMT actuates (phase 2).

	SRO/RO	<p>34. TRY TO ADD MAKEUP TO RCS FROM ALTERNATE SOURCE</p> <ul style="list-style-type: none"> <li>• Use RWST crosstie <ul style="list-style-type: none"> <li>○ Verify closed or close 1-SI-MOV-1863A/B</li> <li>○ Verify open or open 1-CH-MOV-1115B/D</li> <li>○ Verify open or open 1-SI-TV-102A/B</li> <li>○ Verify open or open 2-SI-TV-202A/B</li> <li>○ Start 1 CHG pump</li> </ul> </li> <li>• Establish CH Crosstie IAW Attachment 4</li> </ul>
	<b>Critical Tasks</b>	<b>Establish alternate charging flow path</b>

END – Scenario 4