

**HLP NRC EXAM  
SCENARIO #1**

## Catawba Nuclear Station NRC Exam December 2010

Facility: Catawba NRC Exam 2010		Scenario No.: 1		Op Test No.: 1	
Examiners:		Operators: SRO			
		RO			
		BOP			
Initial Conditions: IC#141; Unit 1 is at 100% power BOL. 1B NI pump is tagged out.					
Turnover: 1B NI pump is tagged out due to its breaker failing to close during an IWP on the previous shift. TS 3.5.2 (ECCS-Operating) was entered 5 hours ago and 1B NI pump is expected to be returned to service in 6 hours. Crew direction is to swap hotwell pumps, placing 1C in service and shutting down 1B.					
Event No.	Malf. No.	Event Type*	Event Description		
1	N/A	N-BOP N-SRO	Start 1C hotwell pump and shutdown 1B hotwell pump.		
2	IDE003C	C-SRO C-RO	1SB-9 fails to intermediate position.		
3	RN002F	C-BOP TS-SRO	1RN-2B fails closed causing 'A' RN pit low/low level.		
4	EP051D	C-BOP R-RO TS-SRO	Blackout of 1ETB switchgear.		
5	IRX006K6	C-RO TS-SRO	Control rod K6 drops partially into the core.		
6	NC005K6	M-ALL	Control rod K6 ejection from the core causes intermediate size LOCA.		
7	ISE002A ISE031	C-BOP	Failure of 'A' train SI (auto and manual) requiring manual alignment of equipment.		
8	ISE007A/B	C-RO C-SRO	Failure of automatic feedwater isolation.		
9					
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

**Scenario 1 - Summary**

Initial Condition

Unit 1 is at 100% power BOL. 1B NI pump is tagged out.

Turnover:

1B NI pump is tagged out due to its breaker failing to close during an IWP on the previous shift. TS 3.5.2 (ECCS Operating) was entered 5 hours ago and 1B NI pump is expected to be returned to service in 6 hours. Crew direction is to swap hotwell pumps, placing 1C in service and shutting down 1B.

Event 1

Crew swaps hotwell pumps, placing 1C in service and shutting down 1B.

Event 2

Condenser steam dump valve 1SB-9 fails to an intermediate position, giving the crew a 2.5% steam leak. AP/1/A/5500/028 (Secondary Steam Leak) is entered to perform actions to isolate the leak.

Event 3

RN pit 'A' suction valve from the lake, 1RN-2B, fails closed. This causes 'A' pit level to decrease to the low level setpoint and eventually the low/low level setpoint, causing a swap to the standby nuclear service water pond. AP/0/A/5500/020 (Loss of Nuclear Service Water) case 2 will be entered to address loss of pit level. TS evaluation by SRO is required.

Event 4

Blackout of 1ETB switchgear occurs. 1B D/G starts and loads 1ETB. AP/1/A/5500/007 (Loss of Normal Power) is entered. RO will have to maintain reactor power less than 100% due to start of auxiliary feedwater pumps. BOP will need to secure CA pumps and excess NV pumps. TS evaluation by SRO is required.

Event 5

Control rod K6 falls partially into the core. AP/1/A/5500/014 (Control Rod Misalignment) case 1 is entered. TS evaluation by SRO is required.

Event 6

Control rod K6 ejects from the core, causing a 500 gpm leak in the NC system. This will require the crew to determine the need to manually trip the reactor and initiate safety injection and enter E-0 (Reactor Trip or Safety Injection). The crew will transition to E-1 for the reactor coolant system leak. Depending on the pace at which the crew works through this procedure, a transition to ES-1.1 (Safety Injection Termination) may be made. Ultimately, the crew will transition to ES-1.2 (Post LOCA Cooldown and Depressurization).

Event 7

Manual and automatic safety injection on 'A' train fails to actuate. This will require the BOP to manually align equipment.

Event 8

Main feedwater isolation fails to automatically actuate, requiring manual actuation by the RO.

**Critical task 1 – Manually trip the reactor from the control room before an automatic reactor trip occurs on OT delta T.**

**Critical task 2 - Establish flow from at least one intermediate-head ECCS pump before transition out of E-0.**

**EXERCISE GUIDE WORKSHEET**

1. INITIAL CONDITIONS:

1.1 Reset to IC 141

START TIME: \_\_\_\_\_

✓	✓	Instructor Action	Final	Delay	Ramp	Delete In	Event	
		MAL-ISE002A (AUTO SI TRN A FAILS TO ACTUATE)	ACTIVE					
		MAL-ISE007A (AUTO CF ISOL SIGNAL TRN A)	BLOCK					
		MAL-ISE007B (AUTO CF ISOL SIGNAL TRN B)	BLOCK					
		OVR-ISE031 (SAFETY INJECTION INITIATE PB TRN A)	OFF					
		MAL-IDE003C (STEAM DUMP VLV SB9 FAIL TO POSITION)	50				1	
		MAL-EDA001H8 (ROD H8 DRPI-OPEN /SHORTED COIL)	BOTH	5			11	
		MAL-EDA001K8 (ROD K8 DRPI-OPEN /SHORTED COIL)	BOTH	5			11	
		MAL-NC005K6 (ROD K6 EJECTION)	500				11	
		MAL-EDA001H6 (ROD H6 DRPI OPEN/SHORTED COIL)	BOTH				11	
		LOA-IDE003 (SB8 – INLET ISOL)	0		2		3	
		VLV-RN002F (RN2B RN PMPHSE PIT A ISOL FRM LAKE FAIL TO POSITION)	0				5	
		OVR-EP051D (ETB NORM FDR FRM ATD TRIP PB)	ON				7	
		MAL-IRX006K6 (DROPPED ROD K6)	STATIONARY				9	
		LOA-CNT002 (H2 ANALYZERS)	BOTH				13	
		LOA-NI004 (RACKOUT NI PMP 1B)	RACK-OUT					
		Place a red collar on 1B NI pump.						

2. SIMULATOR BRIEFING

2.1 Control Room Assignments:

Position	Name
CRS	
OATC	
BOP	

2.2 Give a copy of Attachment 2 (Shift Turnover Information) to the OSM.

3. EXERCISE PRESENTATION

3.1 Familiarization Period

A. Allow examinees time to familiarize themselves with Control Board alignments.

3.2 Scenario EVENT 1, Swap of HWP's

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>When</b> called to check out the 1C HWP, wait 3 minutes and <b>report</b> that the pump is running normal.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>IF</b> asked about the position of the HWP vent valve, <b>REPORT</b> that the vent valve closed after 30 seconds.

3.3 Scenario EVENT 2, 1SB-9 fails to intermediate position.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> directed by the lead examiner, <b>THEN INSERT EVENT 1</b> to fail 1SB-9 to 50%.

Catawba Nuclear Station NRC Exam December 2010

✓	BOOTH INSTRUCTOR ACTION
	IF an NLO is dispatched to isolate 1SB-9, THEN INSERT EVENT 3 to close 1SB-8.
	AFTER ten (10) minutes REPORT "1SB-8 is closed".

✓	BOOTH INSTRUCTOR ACTION
	WHEN RP is notified of the leak repeat back information as given.

3.4 Scenario EVENT 3, 1RN-2B fails closed causing 'A' RN pit low/low level.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT EVENT 5 to fail 1RN-2B.

✓	BOOTH INSTRUCTOR ACTION
	IF an NEO is dispatched to check out RN pumps that are started, WAIT 15 minutes, THEN report that all pumps are running normally.

✓	BOOTH INSTRUCTOR ACTION
	IF asked about Unit 2 RN pump flows, report the values from the XtremeView RN graphic.

3.5 Scenario EVENT 4, Blackout on 1ETB switchgear.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT EVENT 7 to give a loss of 1ETB.

✓	BOOTH INSTRUCTOR ACTION
	IF an NEO is dispatched to check out 1ETB, repeat back the order. (No reason for the loss of 1ETB will be given.)

**Catawba Nuclear Station NRC Exam December 2010**

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3.6 **Scenario EVENT 5**, Control rod K6 drops partially into the core.

✓	BOOTH INSTRUCTOR ACTION
	<b>WHEN</b> directed by the lead examiner, <b>THEN INSERT EVENT 9</b> to cause rod K6 to drop part way into the core. <b>MAL-IRX006K6</b> should automatically <b>DELETE</b> in <b>1 second</b> .

3.7 **Scenario EVENT 6, 7 and 8**, Control rod K6 ejects from the core causing an intermediate sized LOCA. Failure of 'A' train SI (auto and manual) requiring manual alignment of 'A' train equipment. Failure of automatic feedwater isolation requiring manual initiation.

✓	BOOTH INSTRUCTOR ACTION
	<b>WHEN</b> directed by the lead examiner, <b>THEN INSERT EVENT 11</b> to cause rod K6 to eject from the core.

✓	BOOTH INSTRUCTOR ACTION
	<b>WHEN</b> dispatched to secure all ice condenser air handling units and place the H2 analyzers in service, <b>repeat</b> the order. <b>ACTIVATE EVENT 13 (LOA-CNT002 H2 ANALYZERS)</b> . <b>AFTER</b> 15 minutes call and report that the ice condenser AHUs are secured and the H2 analyzers are in service.

Op Test No.:   NRC   Scenario #   1   Event #   1   Page   8   of   32  

Event Description: Start 1C Hotwell pump and shutdown 1B Hotwell pump.

Time	Position	Applicant's Actions or Behavior
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CREW ASSUMES THE WATCH: \_\_\_\_\_

NOTE TO EVALUATOR: The following actions are taken from OP/1/A/6250/001 (Condensate and Feedwater System) Encl. 4.20 (Shifting Operating Hotwell Pumps). Initial conditions are complete and pre job brief has previously been completed. NEO is in the field and standing by to start 1C Hotwell pump.		
	BOP	2.1 Ensure the following parameters for the Hotwell Pump to be started <ul style="list-style-type: none"> <li>• HTWL PUMP 1C</li> <li>▫ Verify proper oil level.</li> <li>▫ Ensure 1CM-26 (1C Hotwell Pump Bearing-Cooling Outlet) (TB-553, 1L-23) is throttled to obtain following seal water flow requirements for Hotwell Pump 1C               <ul style="list-style-type: none"> <li>• &gt;2.5 gpm as read on 1CMFE6770 (TB-549, 1L, 23-24)</li> <li>• Reading on 1CMPG7260 is 25 - 75 psig greater than stuffing box pressure as read on 1CMPG7210 (TB-555, 1L 23)</li> </ul> </li> <li>▫ Ensure 1KR-332 (1C Hotwell Pump Motor Bearing Cooler Outlet Throttle) is throttled for 20 gpm as read on 1KRFE6800 (TB-560, 1L-23).</li> </ul>
	BOP	2.2 Dispatch an operator to 1HWCP control panel (TB-568, 1J-22) to verify the vent valve closes per Step 2.5.
NOTE TO EVALUATOR: Step 2.3 should be N/A'd.		
	BOP	2.4 Start the idle hotwell pump: <ul style="list-style-type: none"> <li>▫ "HTWL PUMP 1C"</li> </ul>
	BOP	2.5 Within 30 seconds after pump start, verify that the hotwell pump vent valve closes automatically. (On 1HWCP, TB-568, 1J-22, or OAC CMHWP graphic) <ul style="list-style-type: none"> <li>▫ 1CM-28 (HWP-C Vent Vlv)</li> </ul>
	BOP	2.6 Place the control switch for the hotwell pump to be stopped in the "OFF" position: <ul style="list-style-type: none"> <li>▫ "HTWL PUMP 1B"</li> </ul>
	BOP	2.7 Place the hotwell pump stopped in Step 2.6 in standby alignment, place the control switch in "AUTO": <ul style="list-style-type: none"> <li>▫ "HTWL PUMP 1B"</li> </ul>

Appendix D		Required Operator Actions		Form ES-D-2	
Op Test No.: <u>  NRC  </u> Scenario # <u>  1  </u> Event # <u>  1  </u> Page <u>  9  </u> of <u>  32  </u>					
Event Description: Start 1C Hotwell pump and shutdown 1B Hotwell pump.					
Time	Position	Applicant's Actions or Behavior			

	BOP	2.8 Record the Hotwell pumps now in service: <ul style="list-style-type: none"> <li>▫ "HTWL PUMP 1A"</li> <li>▫ "HTWL PUMP 1B"</li> <li>▫ "HTWL PUMP 1C"</li> </ul>
<b>NOTE TO EVALUATOR: Step 2.9 should be N/A'd.</b>		
	BOP	2.10 File this enclosure in the Control Copy folder of this procedure.
<b>END OF EVENT 1</b>		

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u>	Scenario # <u>  1  </u>	Event # <u>  2  </u> Page <u>  10  </u> of <u>  32  </u>
Event Description: 1SB-9 fails to intermediate position.		
Time	Position	Applicant's Actions or Behavior

Booth Operator can insert Event 2 at the discretion of lead examiner.		
Indications: <input type="checkbox"/> OAC alarm for 1SB-9 in intermediate position. <input type="checkbox"/> Tavg decreasing. <input type="checkbox"/> Reactor power increasing.		
	RO	Attempts to manually close the condenser dump valve by going to OFF/RESET position on STEAM DUMP INTLK BYP TRN A/B.
	RO	Manually decreases turbine load to maintain reactor power less than 100%.
	SRO	Enters AP/1/A/5500/028 (Secondary Steam Leak).
NOTE TO EVALUATOR: The following actions are taken from AP/1/A/5500/028 (Secondary Steam Leak).		
	CREW	1. Monitor Enclosure 1 (Foldout Page).
	RO	2. Verify turbine - ONLINE.
	RO	3. Verify the following: <input type="checkbox"/> Reactor power - LESS THAN OR EQUAL TO 100% POWER <input type="checkbox"/> T-Avg - WITHIN 1.5°F OF T-Ref.
	RO	4. Verify proper reactor response as follows: <input type="checkbox"/> Control rods - IN "AUTO" AND STEPPING IN <input type="checkbox"/> P/R neutron flux - DECREASING.
	CREW	5. IF AT ANY TIME reactor power is greater than 100%, THEN perform Step 3 RNO.
	BOP	6. Verify Pzr level - STABLE OR INCREASING.
	CREW	7. IF AT ANY TIME while in this procedure Pzr level is decreasing in an uncontrolled manner, THEN RETURN TO Step 6.
	CREW	8. IF AT ANY TIME VCT level goes below 23%, THEN align NV pump suction to FWST as follows:
	BOP	9. Attempt to identify and isolate leak as follows: a. Verify the following conditions - NORMAL: <input type="checkbox"/> Containment temperature <input type="checkbox"/> Containment pressure <input type="checkbox"/> Containment humidity <input type="checkbox"/> Containment floor & equipment sump level.

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u> Scenario # <u>  1  </u> Event # <u>  2  </u> Page <u>  11  </u> of <u>  32  </u>		
Event Description: 1SB-9 fails to intermediate position.		
Time	Position	Applicant's Actions or Behavior

	BOP	9b. Dispatch operators to locate and identify source of steam leak.
	RO	9c. Verify S/G PORVs - CLOSED.
	RO	9d. Verify condenser dump valves - CLOSED.
	RO	9d. RNO Perform the following: 1) Select "OFF RESET" on the following switches: <input type="checkbox"/> "STEAM DUMP INTLK BYP TRN A" <input type="checkbox"/> "STEAM DUMP INTLK BYP TRN B". 2) IF valve will not close, THEN dispatch operator to close affected condenser dump valve isolation valve.
	RO	9e. Verify atmospheric dump valves - CLOSED.
	BOP	9f. Verify CA PMP #1 - OFF.
	BOP	9g. IF leak is suspected to be in a doghouse, THEN close the following valves:
	SRO	10. Determine required notifications: <input type="checkbox"/> REFER TO RP/0/A/5000/001 (Classification Of Emergency) <input type="checkbox"/> REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
	BOP	11. Notify RP of leak.
	RO	12. Verify - LEAK ISOLATED.
	SRO	13. Determine long term plant status. RETURN TO procedure and step in effect.
<b>END OF EVENT 2</b>		



Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.:	<u>NRC</u> Scenario # <u>1</u> Event # <u>3</u> Page <u>13</u> of <u>32</u>	
Event Description: 1RN-2B fails closed causing 'A' RN pit low/low level.		
Time	Position	Applicant's Actions or Behavior

	BOP	<p><b>5. IF any of the following alarms are lit OR were previously lit:</b></p> <p><input type="checkbox"/> 1AD-12, E/2 "RN PIT A SWAP TO SNSWP"</p> <p><b>THEN</b> perform the following:</p> <p>a. Ensure all RN pumps - ON.</p> <p>b. Ensure correct RN valve alignment. <b>REFER TO</b> Enclosure 2 (RN Valve Alignment for RN Swap to SNSWP).</p> <p>c. <b>IF AT ANY TIME</b> RN pump(s) running on RN pit with LO-LO level, <b>THEN secure affected pump(s).</b></p> <p>d. <b>IF</b> WL discharge in progress, <b>THEN coordinate with Radwaste Chemistry to secure all controlled WL discharges.</b></p> <p>e. <b>IF</b> any RN chemical addition is in progress, <b>THEN</b> have Chemistry secure it.</p>
	BOP	<p><b>6. Verify SNSWP level adequate and stable as follows:</b></p> <p><input type="checkbox"/> 1AD-12, A/3 "SNSWP LEVEL LO" – DARK</p> <p><input type="checkbox"/> SNSWP level indication - STABLE.</p>
	BOP	<p><b>7. Ensure proper alignment of RN to KC Hxs as follows:</b></p> <p>a. Verify RN - ALIGNED TO KC HX(S) IN SERVICE.</p> <p>b. Ensure KC Hx Off Mode switches - PROPERLY ALIGNED.</p>
	BOP	<p><b>8. Verify each operating RN pump discharge flow - GREATER THAN 8,600 GPM.</b></p>
		<p>8. RNO <b>NOTE:</b> IF RN supply headers are in normal two header operation, and the RN supply crossover isolations are closed, <b>THEN one RN pump on each train must be in service if desired to supply both trains of RN.</b></p>
	BOP	<p>8. RNO <b>Stop any RN pump(s) not required to support system operation.</b></p>
<p><b>NOTE TO EVALUATOR:</b> At this time, flow on both 'A' train RN pumps is less than 8,600 GPM. One of the 'A' train RN pumps should be secured to alleviate this low flow condition.</p>		
	SRO	<p><b>9. Determine and correct cause of loss of RN pit level.</b></p>
	SRO	<p><b>10. Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual:</b></p> <p><input type="checkbox"/> SLC 16.7-6 (RN Discharge Instrumentation)</p> <p><input type="checkbox"/> 3.3.2 (Engineered Safety Features Actuation System (ESFAS) Instrumentation).</p> <p><input type="checkbox"/> 3.6.5 (Containment Air Temperature)</p> <p><input type="checkbox"/> 3.7.8 (Nuclear Service Water System (NSWS))</p>

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>NRC</u> Scenario # <u>1</u> Event # <u>3</u> Page <u>14</u> of <u>32</u>		
Event Description: 1RN-2B fails closed causing 'A' RN pit low/low level.		
Time	Position	Applicant's Actions or Behavior

		<input type="checkbox"/> 3.7.9 (Standby Nuclear Service Water Pond (SNSWP)).
<b>NOTE TO EVALUATOR: No Tech Specs or Selected Licensee Commitments apply at this time.</b>		
		<b>11. Determine required notifications:</b>
	SRO	<input type="checkbox"/> REFER TO RP/0/A/5000/001 (Classification Of Emergency)
		<input type="checkbox"/> REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
	SRO	<b>12. WHEN corrective action for loss of pit level taken, THEN restore RN to normal alignment.</b>
	SRO	<b>13. Ensure RN pumps - IN OPERATION AS NEEDED.</b>
	BOP	<b>14. Verify each operating RN pump discharge flow - GREATER THAN 8,600 GPM.</b>
	BOP	<b>15. Notify Environmental Chemistry of any RN pump shifts that have occurred.</b>
	SRO	<b>16. Determine long term plant status. RETURN TO procedure in effect.</b>
<b>END OF EVENT 3</b>		

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>NRC</u>	Scenario # <u>1</u>	Event # <u>4</u>
Page <u>15</u> of <u>32</u>		
Event Description: Blackout of 1ETB switchgear		
Time	Position	Applicant's Actions or Behavior

Booth Operator can insert Event 4 at the discretion of the lead examiner.		
INDICATIONS: 1AD-11 D/1 "4KV ESS PWR TRAIN B TROUBLE".		
1AD-11 E/7 "D/G B PANEL TROUBLE".		
"SWGR ETB UV" status lights on 1SI-14.		
	BOP	Verify 1B D/G starts and loads 1ETB.
	SRO	Recognizes entry conditions for AP/1/A/5500/007 (Loss of Normal Power) Case I (Loss of Normal Power to and Essential Train).
	RO	Decreases turbine load as required to maintain reactor power < 100% due to CA system autostart.
	BOP	Secure excess NV and CA pumps.
NOTE TO EVALUATOR: The following actions are taken from AP/1/A/5500/007, Case I (Loss of Normal Power).		
	CREW	1. Monitor Enclosure 1 (Foldout Page).
	BOP	2. Verify affected bus - ENERGIZED.
	BOP	3. Verify proper diesel generator operation as follows: a. Dispatch operator to affected D/G room(s) to monitor D/G operation. REFER TO OP/1/A/6350/002 (Diesel Generator Operation). b. Verify RN cooling flow to the affected D/G.
	BOP	4. Stop any dilutions in progress.
	BOP	5. Verify CA Pump #1 - ON.
	RO	6. Maintain reactor power less than or equal to 100%.
	BOP	7. Verify S/I status as follows: a. S/I - HAS ACTUATED.
	SRO	7a. Observe Caution prior to Step 8 and GO TO Step 8.
		<b>CAUTION</b> Resetting sequencer will prevent further automatic loading of B/O loads.
	BOP	8. Verify ND System status as follows: a. Verify ND on affected train(s) - PREVIOUSLY OPERATING IN RESIDUAL HEAT REMOVAL MODE.
	SRO	8a. RNO GO TO Step 9.

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u> Scenario # <u>  1  </u> Event # <u>  4  </u> Page <u>  16  </u> of <u>  32  </u>		
Event Description: Blackout of 1ETB switchgear		
Time	Position	Applicant's Actions or Behavior

	BOP	<p><b>9. Verify B/O busses are energized as follows:</b></p> <p>a. 1AD-11, K/3 "4KV B/O BUS FTA VOLTAGE LO" - DARK.</p> <p>b. 1AD-11, K/4 "4KV B/O BUS FTB VOLTAGE LO" - DARK.</p>
	BOP	<p><b>10. Verify B/O loads in service as follows:</b></p> <p>a. Maintain D/G load less than 5750 KW.</p> <p>b. Ensure proper B/O sequencer(s) loading as follows:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> REFER TO Enclosure 2 (Blackout Loads)</li> <li><input type="checkbox"/> Dispatch operator to ensure all required in plant loads are energized or on. REFER TO Enclosure 3 (Local Blackout Loads).</li> </ul> <p>c. Restore spent fuel pool cooling. REFER TO OP/1/A/6200/005 (Spent Fuel Cooling System).</p>
	BOP	<b>11. Verify VI pressure - GREATER THAN 85 PSIG AND STABLE.</b>
	BOP	<b>12. Verify 6.9KV busses - ENERGIZED.</b>
		<b>NOTE:</b> There is a five minute time delay for the automatic swapover from YV to RN.
	BOP	<b>13. Verify "YV OPERABLE" light - LIT.</b>
	RO	<b>14. Verify "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT.</b>
		<b>NOTE:</b> Maintaining D/G load greater than 500 KW will facilitate paralleling with offsite power.
	BOP	<p><b>15. Stop unnecessary loads placed on affected bus by the sequencer as follows:</b></p> <p>a. Reset affected D/G load sequencer(s).</p> <p>b. Establish normal control room ventilation. REFER TO OP/0/A/6450/011 (Control Room Area Ventilation/Chilled Water System).</p> <p>c. Stop unnecessary loads.</p>
<p><b>NOTE TO EVALUATOR:</b> Operators should recognize the need to shutdown 1B CA pump, CAPT # 1, and possibly 1B NV pump. This should still keep D/G load greater than 500 KW.</p>		
	SRO	<b>16. Determine and correct cause of blackout.</b>
	BOP	<b>17. IF spent fuel pool instrumentation is failed low... N/A</b>



Appendix D	Required Operator Actions	Form ES-D-2
Op. Test No.:	NRC Scenario # 1	Event # 5 Page 18 of 32
Event Description: Control rod K6 drops partially into the core.		
Time	Position	Applicant's Actions or Behavior

<b>Booth Operator can insert Event 5 at the discretion of the lead examiner.</b>		
Indications: 1AD-2 B/2 "P/R UPPER DET HI FLUX DEV OR AUTO DEFEAT". 1AD-2 B/3 "COMPARATOR P/R CHANNEL DEVIATION". DRPI display shows rod K6 inserted partially into the core with an orange background showing it is deviated from its bank by > 12 steps.		
	RO	Verifies only 1 rod misaligned.
	SRO	Recognizes entry conditions for AP/1/A/5500/014 (Control Rod Misalignment) Case I.
<b>NOTE TO EVALUATOR: The following actions are taken from AP/1/A/5500/014 (Control Rod Misalignment).</b>		
	RO	1. Verify only one rod - MISALIGNED. (Immediate action step)
	RO	2. Ensure "CRD BANK SELECT" switch – IN MANUAL.
	RO	3. Verify affected rod bottom light(s) - DARK.
	RO	4. Stop any turbine load changes in progress.
	RO	5. Adjust turbine load to maintain T-Avg within 1°F of T-Ref.
	RO	6. Verify any of the following DRPI indications - IN ALARM: <input type="checkbox"/> Data A Failure OR <input type="checkbox"/> Data B Failure.
	SRO	6. RNO GO TO Step 11.
	SRO	11. Ensure compliance with appropriate Tech Specs: <input type="checkbox"/> 3.1.1 (Shutdown Margin (SDM)) <input type="checkbox"/> 3.1.4 (Rod Group Alignment Limits) <input type="checkbox"/> 3.1.5 (Shutdown Bank Insertion Limit) <input type="checkbox"/> 3.1.6 (Control Bank Insertion Limits) <input type="checkbox"/> 3.1.7 (Rod Position Indication) <input type="checkbox"/> 3.2.3 (Axial Flux Difference (AFD)) <input type="checkbox"/> 3.2.4 (Quadrant Power Tilt Ratio (QPTR)) <input type="checkbox"/> SLC 16.7-11 (Position Indication System - Shutdown).
<b>NOTE TO EVALUATOR: Tech Spec 3.1.4 Condition B applies at this time.</b>		
<b>End Event 5 after Tech Spec call has been made.</b>		

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u>	Scenario # <u>  1  </u>	Event # <u>  6, 7, and 8  </u>
Page <u>  19  </u> of <u>  32  </u>		
Event Description: Control rod K6 ejects from the core, causing an intermediate sized LOCA. Failure of 'A' train of SI (auto and manual) requiring manual alignment of 'A' train equipment. Failure of automatic feedwater isolation requiring manual initiation.		
Time	Position	Applicant's Actions or Behavior

**Booth operator can insert Event 6 at the lead examiners discretion.**

Indications: Pressurizer pressure decreasing, containment pressure and humidity increasing.

	SRO	Recognize that a reactor trip and safety injection are needed.
	RO	Trip the reactor.
	BOP	Manually Safety Inject.
	RO	Manually initiate feedwater isolation after Tavg decreases to 564°F.
	BOP	Manually align 'A' train SI equipment

**NOTE TO EVALUATOR: The following step is from AP/1/A/5500/010 (Reactor Coolant Leak) Encl. 2.**

<b>CRITICAL STEP</b>	SRO	<p>a. IF Pzr level cannot be maintained greater than 4% OR Pzr/NC pressure is decreasing in an uncontrolled manner, THEN:</p> <p>1) IF in Mode 1, 2 or 3 with CLAs in service, THEN:</p> <p>a) Manually trip reactor.</p> <p>b) WHEN reactor trip verified, THEN manually initiate S/I.</p> <p>c) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).</p>
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**NOTE TO EVALUATOR: The following actions are from EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).**

	CREW	1. Monitor Enclosure 1 (Foldout Page).
	RO	<p>2. Verify Reactor Trip: (Immediate action step)</p> <p><input type="checkbox"/> All rod bottom lights – LIT</p> <p><input type="checkbox"/> All reactor trip and bypass breakers – OPEN</p> <p><input type="checkbox"/> I/R amps - DECREASING.</p>
	RO	<p>3. Verify Turbine Trip: (Immediate action step)</p> <p><input type="checkbox"/> All turbine stop valves - CLOSED</p>
	BOP	4. Verify 1ETA and 1ETB - ENERGIZED. (Immediate action step)

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u> Scenario # <u>  1  </u> Event # <u>  6, 7, and 8  </u> Page <u>  20  </u> of <u>  32  </u>		
Event Description: Control rod K6 ejects from the core, causing an intermediate sized LOCA. Failure of 'A' train of SI (auto and manual) requiring manual alignment of 'A' train equipment. Failure of automatic feedwater isolation requiring manual initiation.		
Time	Position	Applicant's Actions or Behavior

	BOP	<p><b>5. Verify S/I is actuated: (Immediate action step)</b></p> <p>a. "SAFETY INJECTION ACTUATED" status light (1SI-13) - LIT.</p> <p>b. Both E/S load sequencer actuated status lights (1SI-14) - LIT.</p>
	RO	<b>6. Announce "Unit 1 Safety Injection".</b>
	SRO	<p><b>7. Determine required notifications:</b></p> <p><input type="checkbox"/> REFER TO RP/0/A/5000/001 (Classification Of Emergency)</p> <p><input type="checkbox"/> REFER TO RP/0/B/5000/013 (NRC Notification Requirements).</p>
	RO	<b>8. Verify all Feedwater Isolation status lights (1SI-5) - LIT.</b>
	RO	<p>8 RNO a. Manually initiate Feedwater Isolation.</p> <p>b. <b>IF</b> proper status light indication is not obtained, <b>THEN</b> manually close valves.</p>
	BOP	<p><b>9. Verify Phase A Containment Isolation status as follows:</b></p> <p>a. Phase A "RESET" lights - DARK.</p> <p>b. Monitor Light Panel Group 5 St lights - LIT.</p>
	BOP	<p><b>10. Verify proper Phase B actuation as follows:</b></p> <p>a. Containment pressure – HAS REMAINED LESS THAN 3 PSIG.</p> <p>b. <b>IF AT ANY TIME</b> containment pressure exceeds 3 PSIG while in this procedure, <b>THEN</b> perform Step 10.a.</p>
	RO	<p><b>11. Verify proper CA pump status as follows:</b></p> <p>a. Motor driven CA pumps - ON.</p> <p>b. 3 S/G N/R levels - GREATER THAN 11%.</p>
	BOP	<p><b>12. Verify all of the following S/I pumps - ON:</b></p> <p><input type="checkbox"/> NV pumps</p> <p><input type="checkbox"/> ND pumps</p> <p><input type="checkbox"/> NI pumps.</p>

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u>	Scenario # <u>  1  </u>	Event # <u>  6, 7, and 8  </u> Page <u>  21  </u> of <u>  32  </u>
Event Description: Control rod K6 ejects from the core, causing an intermediate sized LOCA. Failure of 'A' train of SI (auto and manual) requiring manual alignment of 'A' train equipment. Failure of automatic feedwater isolation requiring manual initiation.		
Time	Position	Applicant's Actions or Behavior

<b>CRITICAL STEP</b>	BOP	12 RNO Perform the following for affected train(s): a. Reset ECCS. b. Reset D/G load sequencer. c. Manually start affected pump. d. <b>IF AT ANY TIME</b> a B/O occurs, <b>THEN</b> restart S/I equipment previously on.
	BOP	13. Verify all KC pumps - ON.
	BOP	14. Verify all Unit 1 and Unit 2 RN pumps - ON.
	BOP	15. Verify proper ventilation systems operation as follows: <input type="checkbox"/> REFER TO Enclosure 2 (Ventilation System Verification). <input type="checkbox"/> Notify Unit 2 operator to perform Enclosure 3 (Opposite Unit Ventilation Verification).
	RO	16. Verify all S/G pressures – GREATER THAN 775 PSIG.
	RO	17. Verify proper S/I flow as follows: a. "NV S/I FLOW" - INDICATING FLOW. b. NC pressure - LESS THAN 1620 PSIG. c. NI pumps - INDICATING FLOW. d. NC pressure - LESS THAN 285 PSIG.
	BOP	17d RNO 1) Ensure ND pump miniflow valve on operating ND pump(s) - OPEN. 2) <b>IF</b> the ND pump miniflow valve(s) cannot be opened, <b>THEN</b> perform the following for affected train(s): 3) <b>GO TO</b> Step 18.
	RO	18. Control S/G levels as follows: a. Verify total CA flow - GREATER THAN 450 GPM. b. <b>WHEN</b> at least one S/G N/R level is greater than 11% (29% ACC), <b>THEN</b> throttle feed flow to maintain all S/G N/R levels between 11% (29% ACC) and 50%.
	RO	19. Verify all CA isolation valves - OPEN.
	BOP	20. Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u>	Scenario # <u>  1  </u>	Event # <u>  6, 7, and 8  </u>
Page <u>  22  </u> of <u>  32  </u>		
Event Description: Control rod K6 ejects from the core, causing an intermediate sized LOCA. Failure of 'A' train of SI (auto and manual) requiring manual alignment of 'A' train equipment. Failure of automatic feedwater isolation requiring manual initiation.		
Time	Position	Applicant's Actions or Behavior

	RO	21. <b>Control NC temperature. REFER TO Enclosure 4 (NC Temperature Control).</b>
	BOP	22. <b>Verify Pzr PORV and Pzr spray valve status as follows:</b> a. All Pzr PORVs - CLOSED. b. Normal Pzr spray valves - CLOSED. c. At least one Pzr PORV isolation valve - OPEN.
	RO	23. <b>Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.</b>
	RO	24. <b>Verify main steamlines are intact as follows:</b> <input type="checkbox"/> All S/G pressures - STABLE OR INCREASING <input type="checkbox"/> ALL S/Gs - PRESSURIZED.
	BOP	25. <b>Verify S/G tubes are intact as follows:</b> <input type="checkbox"/> Verify the following EMF trip 1 lights - DARK: <input type="checkbox"/> 1EMF-33 (Condenser Air Ejector Exhaust) <input type="checkbox"/> 1EMF-26 (Steamline 1A) <input type="checkbox"/> 1EMF-27 (Steamline 1B) <input type="checkbox"/> 1EMF-28 (Steamline 1C) <input type="checkbox"/> 1EMF-29 (Steamline 1D). <input type="checkbox"/> All S/G levels - STABLE OR INCREASING IN A CONTROLLED MANNER.
	BOP	26. <b>Verify NC System is intact as follows:</b> a. Verify the following NC pump thermal barrier alarms - DARK: <input type="checkbox"/> 1AD-6, E/1, "NCP A THERMAL BARRIER KC OUTLET HI/LO FLOW" <input type="checkbox"/> 1AD-6, E/2, "NCP B THERMAL BARRIER KC OUTLET HI/LO FLOW" <input type="checkbox"/> 1AD-6, E/3, "NCP C THERMAL BARRIER KC OUTLET HI/LO FLOW" <input type="checkbox"/> 1AD-6, E/4, "NCP D THERMAL BARRIER KC OUTLET HI/LO FLOW". b. Verify NC System is intact as follows: <input type="checkbox"/> Containment pressure - LESS THAN 1 PSIG.

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u> Scenario # <u>  1  </u> Event # <u>  6, 7, and 8  </u> Page <u>  23  </u> of <u>  32  </u>		
Event Description: Control rod K6 ejects from the core, causing an intermediate sized LOCA. Failure of 'A' train of SI (auto and manual) requiring manual alignment of 'A' train equipment. Failure of automatic feedwater isolation requiring manual initiation.		
Time	Position	Applicant's Actions or Behavior

	BOP	<p>26b RNO 1) Energize H2 igniters.</p> <p>2) Dispatch operator to perform the following:</p> <p style="margin-left: 20px;">a) Secure all ice condenser air handling units. <b>REFER TO</b> Enclosure 13 (Securing All Ice Condenser Air Handling Units).</p> <p style="margin-left: 20px;">b) Place containment H2 analyzers in service. <b>REFER TO</b> OP/1/A/6450/010 (Containment Hydrogen Control Systems).</p> <p>3) <b>IF</b> both the following conditions exist,</p> <p style="margin-left: 20px;"><input type="checkbox"/> Containment pressure - GREATER THAN 1 PSIG</p> <p style="margin-left: 20px;"><input type="checkbox"/> Containment pressure – HAS REMAINED LESS THAN 3 PSIG</p> <p style="margin-left: 20px;"><b>THEN</b> manually start one VX fan. <b>REFER TO</b> Enclosure 5 (VX Fan Manual Start).</p> <p>4) Concurrently:</p> <p style="margin-left: 20px;"><input type="checkbox"/> Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).</p> <p style="margin-left: 20px;"><input type="checkbox"/> <b>GO TO</b> EP/1/A/5000/E-1 (Loss Of Reactor Or Secondary Coolant).</p>
<b>NOTE TO EVALUATOR: The following actions are from EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant).</b>		
	CREW	<b>1. Monitor Enclosure 1 (Foldout Page).</b>
	RO	<b>2. Verify main steamlines are intact as follows:</b> <input type="checkbox"/> All S/G pressures - STABLE OR INCREASING <input type="checkbox"/> All S/Gs - PRESSURIZED.
	RO	<b>3. Control intact S/G levels as follows:</b> a. Verify N/R level in all intact S/Gs - GREATER THAN 11% (29% ACC). b. Throttle feed flow to maintain all intact S/G N/R levels between 11% (29% ACC) and 50%.
	BOP	<b>4. Verify secondary radiation is normal as follows:</b>

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u> Scenario # <u>  1  </u> Event # <u>  6, 7, and 8  </u> Page <u>  24  </u> of <u>  32  </u>		
Event Description: Control rod K6 ejects from the core, causing an intermediate sized LOCA. Failure of 'A' train of SI (auto and manual) requiring manual alignment of 'A' train equipment. Failure of automatic feedwater isolation requiring manual initiation.		
Time	Position	Applicant's Actions or Behavior

		<p>a. Ensure the following signals - RESET:</p> <ul style="list-style-type: none"> <li>1) Phase A Containment Isolations</li> <li>2) CA System valve control</li> <li>3) KC NC NI NM St signals.</li> </ul> <p>b. Align all S/Gs for Chemistry sampling.</p> <p>c. Perform at least one of the following:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Notify Chemistry to sample all S/Gs for activity.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Notify RP to frisk all cation columns for activity.</li> </ul> <p>d. Verify the following EMF trip 1 lights - DARK:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1EMF-33 (Condenser Air Ejector Exhaust)</li> <li><input type="checkbox"/> 1EMF-26 (Steamline 1A)</li> <li><input type="checkbox"/> 1EMF-27 (Steamline 1B)</li> <li><input type="checkbox"/> 1EMF-28 (Steamline 1C)</li> <li><input type="checkbox"/> 1EMF-29 (Steamline 1D).</li> </ul> <p>e. <b>WHEN</b> activity results are reported, <b>THEN</b> verify all S/Gs indicate no activity.</p>
	BOP	<p><b>5. Verify Pzr PORV and isolation valve status as follows:</b></p> <ul style="list-style-type: none"> <li>a. Power to all Pzr PORV isolation valves - AVAILABLE.</li> <li>b. All Pzr PORVs - CLOSED.</li> <li>c. At least one Pzr PORV isolation valve - OPEN.</li> <li>d. <b>IF AT ANY TIME</b> a Pzr PORV opens due to high pressure, <b>THEN</b>, after Pzr pressure decreases to less than 2315 PSIG, ensure the valve closes or is isolated.</li> </ul>
	CREW	<p><b>6. Verify S/I termination criteria as follows:</b></p> <ul style="list-style-type: none"> <li>a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.</li> <li>b. Verify secondary heat sink as follows: <ul style="list-style-type: none"> <li><input type="checkbox"/> N/R level in at least one intact S/G - GREATER THAN 11% (29% ACC)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Total feed flow to all intact S/Gs - GREATER THAN 450 GPM.</li> </ul> </li> <li>c. NC pressure - STABLE OR INCREASING.</li> </ul>

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u>	Scenario # <u>  1  </u>	Event # <u>  6, 7, and 8  </u>
Page <u>  25  </u> of <u>  32  </u>		
Event Description: Control rod K6 ejects from the core, causing an intermediate sized LOCA. Failure of 'A' train of SI (auto and manual) requiring manual alignment of 'A' train equipment. Failure of automatic feedwater isolation requiring manual initiation.		
Time	Position	Applicant's Actions or Behavior

		d. Pzr level - GREATER THAN 11% (20% ACC).
	CREW	6d RNO Perform the following: 1) IF NC pressure is increasing AND normal Pzr spray is available, THEN attempt to stabilize NC pressure using normal Pzr spray. 2) GO TO Step 6.f.
	CREW	6f. Monitor S/I termination criteria. REFER TO Enclosure 2 (S/I Termination Criteria).
	CREW	6g. IF AT ANY TIME S/I termination criteria is met while in this procedure, THEN RETURN TO Step 6.
<p><b>NOTE TO EVALUATOR:</b> Depending on how rapid the crew gets to this point, NC system pressure may be stable or increasing at this point. If crew reads this step and initiates pressurizer spray, then pressurizer level could increase to &gt; 11% and SI termination criteria would be met. However SI termination procedure will not allow a full termination and will require an eventual transition to EP/1/A/5000/ES-1.2 (Post LOCA Cooldown and Depressurization). EP/1/A/5000/ES-1.1 (Safety Injection Termination) steps will be at the end of this form.</p>		
	BOP	7. Verify proper NS pump operation as follows: a. At least one NS pump - ON.
	SRO	7a. RNO Perform the following: 1) IF AT ANY TIME an NS pump(s) starts while in this procedure, THEN perform Step 7. 2) GO TO Step 8.
	BOP	8. Verify criteria to stop operating ND pumps as follows: a. NC pressure - GREATER THAN 285 PSIG. b. NC pressure - STABLE OR INCREASING. c. At least one ND pump - ON. d. ND pumps suction - ALIGNED TO FWST. e. Verify FWST level - GREATER THAN 45%. f. Ensure S/I - RESET: 1) ECCS. 2) D/G load sequencers. 3) IF AT ANY TIME a B/O occurs, THEN restart S/I equipment previously on.

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u> Scenario # <u>  1  </u> Event # <u>  6, 7, and 8  </u> Page <u>  26  </u> of <u>  32  </u>		
Event Description: Control rod K6 ejects from the core, causing an intermediate sized LOCA. Failure of 'A' train of SI (auto and manual) requiring manual alignment of 'A' train equipment. Failure of automatic feedwater isolation requiring manual initiation.		
Time	Position	Applicant's Actions or Behavior

		g. Stop ND pumps. h. <b>IF AT ANY TIME</b> NC pressure decreases to less than 285 PSIG in an uncontrolled manner, <b>THEN</b> restart ND pumps.
	RO	<b>9. Verify NC and S/G pressures as follows:</b> a. All S/G pressures - STABLE OR INCREASING. b. NC pressure - STABLE OR DECREASING.
<b>NOTE TO EVALUATOR: If the crew says that NC pressure is increasing at this point then a loop back to step 1 of EP/1/A/5000/E-1 will occur.</b>		
	BOP	<b>10. Verify conditions to stop operating D/Gs as follows:</b> a. At least one D/G - ON. b. Verify 1ETA is energized by offsite power as follows: <input type="checkbox"/> "D/G 1A BKR TO ETA" – OPEN <input type="checkbox"/> 1ETA - ENERGIZED. c. <b>WHEN</b> S/I is reset, <b>THEN</b> dispatch operator to stop 1A D/G and place in standby readiness. <b>REFER TO</b> OP/1/A/6350/002 (Diesel-Generator Operation). d. Verify 1ETB is energized by offsite power as follows: <input type="checkbox"/> "D/G 1B BKR TO ETB" – OPEN <input type="checkbox"/> 1ETB - ENERGIZED.
	BOP	10 d. RNO 1) Attempt to restore offsite power to affected switchgear. <b>REFER TO</b> AP/1/A/5500/007 (Loss of Normal Power). 2) <b>IF</b> 1ETA is energized from offsite power, <b>THEN GO TO</b> Step 10.f. 3) <b>GO TO</b> Step 11.
<b>NOTE TO EVALUATOR: The crew will not perform step 10.e due to 1ETA being energized from offsite power (step 10.d.2) RNO).</b>		
	BOP	10. f. Ensure S/I - RESET: 1) ECCS.

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>NRC</u>	Scenario # <u>1</u>	Event # <u>6, 7, and 8</u> Page <u>27</u> of <u>32</u>
Event Description: Control rod K6 ejects from the core, causing an intermediate sized LOCA. Failure of 'A' train of SI (auto and manual) requiring manual alignment of 'A' train equipment. Failure of automatic feedwater isolation requiring manual initiation.		
Time	Position	Applicant's Actions or Behavior

		<p>2) D/G load sequencers.</p> <p>3) <b>IF AT ANY TIME</b> a B/O occurs, <b>THEN</b> restart S/I equipment previously on.</p>
	BOP	<p><b>11. Obtain containment H2 concentration as follows:</b></p> <p>a. Ensure operator has been dispatched to secure all ice condenser air handling units. <b>REFER TO</b> Enclosure 3 (Securing All Ice Condenser Air Handling Units).</p> <p>b. Verify containment H2 analyzers – IN SERVICE.</p> <p>c. Verify containment H2 concentration - LESS THAN 6%.</p> <p>d. Verify containment H2 concentration - d. Dispatch operator to place H2 LESS THAN 0.5%.</p> <p>e. <b>WHEN</b> the ice condenser air handling units are off <b>AND</b> H2 concentration is less than 6%, <b>THEN</b> energize the H2 igniters (1MC-7).</p>
	BOP	<p><b>12. Initiate evaluation of plant status as follows:</b></p> <p>a. Verify S/I systems - ALIGNED FOR INJECTION MODE.</p> <p>b. Verify Cold Leg Recirc capability as follows:</p> <p>1) At least one ND pump - AVAILABLE.</p> <p>2) Verify power to all of the following valves - AVAILABLE:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1FW-27A (ND Pump 1A Suct From FWST)</li> <li><input type="checkbox"/> 1NI-185A (ND Pump 1A Cont Sump Suct)</li> <li><input type="checkbox"/> 1ND-28A (ND Supply To NV &amp; 1A NI Pmps)</li> <li><input type="checkbox"/> 1FW-55B (ND Pump 1B Suct From FWST)</li> <li><input type="checkbox"/> 1NI-184B (ND Pump 1B Cont Sump Suct)</li> <li><input type="checkbox"/> 1NI-332A (NI Pump Suct X-Over From ND)</li> <li><input type="checkbox"/> 1NI-333B (NI Pump Suct From ND)</li> <li><input type="checkbox"/> 1NI-334B (NI Pump Suct X-Over From ND)</li> <li><input type="checkbox"/> 1NI-136B (ND Supply To NI Pump 1B).</li> </ul> <p>3) Verify power to all of the following valves - AVAILABLE:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NI-115A (NI Pump 1A Miniflow Isol)</li> <li><input type="checkbox"/> 1NI-144A (NI Pump 1B Miniflow Isol)</li> <li><input type="checkbox"/> 1NI-147B (NI Pump Miniflow Hdr To FWST Isol).</li> </ul> <p>4) Verify the "ENABLE" lights for the following switches -</p>

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u> Scenario # <u>  1  </u> Event # <u>  6, 7, and 8  </u> Page <u>  28  </u> of <u>  32  </u>		
Event Description: Control rod K6 ejects from the core, causing an intermediate sized LOCA. Failure of 'A' train of SI (auto and manual) requiring manual alignment of 'A' train equipment. Failure of automatic feedwater isolation requiring manual initiation.		
Time	Position	Applicant's Actions or Behavior

		LIT: <input type="checkbox"/> "C-LEG RECIR FWST TO CONT SUMP SWAP TRN A" <input type="checkbox"/> "C-LEG RECIR FWST TO CONT SUMP SWAP TRN B".
	BOP/SRO	c. Verify auxiliary building radiation is normal as follows: <input type="checkbox"/> EMF-41 (Aux Bldg Ventilation) trip 1light – DARK <input type="checkbox"/> All area monitor EMF trip 1 lights - DARK. d. <b>WHEN</b> the TSC is activated <b>AND</b> staffed, <b>THEN</b> : 1) Notify the Reactor Engineer to assess core damage. <b>REFER TO</b> RP/0/A/5000/015 (Core Damage Assessment). 2) Notify Chemistry to obtain current NC boron concentration. 3) <b>WHEN</b> ND is aligned for Cold Leg Recirc, <b>THEN</b> notify Chemistry to obtain current-containment sump boron concentration. 4) Notify Operating Engineer of the following: a) VA is required to be aligned to normal <b>AND</b> filter mode within 72 hours of the event. b) Evaluate aligning VA to normal <b>AND</b> filter mode. <b>REFER TO</b> OP/0/A/6450/003 (Auxiliary Building Ventilation System). e. Notify station management to evaluate starting additional plant equipment to assist in recovery.
	BOP/SRO	<b>13. Verify NC System cooldown and depressurization is required as follows:</b>

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u>	Scenario # <u>  1  </u>	Event # <u>  6, 7, and 8  </u>
Page <u>  29  </u> of <u>  32  </u>		
Event Description: Control rod K6 ejects from the core, causing an intermediate sized LOCA. Failure of 'A' train of SI (auto and manual) requiring manual alignment of 'A' train equipment. Failure of automatic feedwater isolation requiring manual initiation.		
Time	Position	Applicant's Actions or Behavior

		a. NC pressure - GREATER THAN 285 PSIG. b. <b>GO TO EP/1/A/5000/ES-1.2</b> (Post LOCA Cooldown And Depressurization).
<b>END OF SCENARIO</b>		
<b>NOTE TO EVALUATOR: If the crew enters ES-1.1 to terminate SI, begin here.</b>		
	CREW	1. <b>Monitor Enclosure 1 (Foldout Page).</b>
	BOP	2. <b>Ensure S/I - RESET:</b> a. EGCS. b. D/G load sequencers. c. <b>IF AT ANY TIME</b> a B/O occurs, <b>THEN</b> restart S/I equipment previously on.
	BOP	3. <b>Ensure the following containment isolation signals - RESET:</b> <input type="checkbox"/> Phase A <input type="checkbox"/> Phase B.
	BOP	4. <b>Establish VI to containment as follows:</b> <input type="checkbox"/> Ensure 1VI-77B (VI Cont Isol) - OPEN. <input type="checkbox"/> Verify VI pressure - GREATER THAN 85 PSIG.
	BOP	5. <b>Verify proper NS pump operation as follows:</b> a. Containment pressure – HAS EXCEEDED 3 PSIG. b. Verify the following valves - OPEN: <input type="checkbox"/> 1FW-27A (ND Pump 1A Suct From FWST) <input type="checkbox"/> 1FW-55B (ND Pump 1B Suct From FWST). c. Containment pressure - LESS THAN 2.4 PSIG. d. Reset NS. e. Stop NS pumps.

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u> Scenario # <u>  1  </u> Event # <u>  6, 7, and 8  </u> Page <u>  30  </u> of <u>  32  </u>		
Event Description: Control rod K6 ejects from the core, causing an intermediate sized LOCA. Failure of 'A' train of SI (auto and manual) requiring manual alignment of 'A' train equipment. Failure of automatic feedwater isolation requiring manual initiation.		
Time	Position	Applicant's Actions or Behavior

		f. Close the following valves: <input type="checkbox"/> 1NS-29A (NS Spray Hdr 1A Cont Isol) <input type="checkbox"/> 1NS-32A (NS Spray Hdr 1A Cont Isol) <input type="checkbox"/> 1NS-15B (NS Spray Hdr 1B Cont Isol) <input type="checkbox"/> 1NS-12B (NS Spray Hdr 1B Cont Isol).
	BOP/RO	<b>6. Ensure only one NV pump - ON.</b>
	BOP/RO	<b>7. Verify NC pressure - STABLE OR INCREASING.</b>
	BOP/RO SRO	<b>7. RNO Perform the following:</b> a. Ensure Pzr spray valves - CLOSED. b. <b>IF</b> NC pressure continues to decrease, <b>THEN GO TO</b> EP/1/A/5000/ES-1.2 (Post LOCA Cooldown And Depressurization).
<b>END OF SCENARIO</b>		

ATTACHMENT 1

<b>CREW CRITICAL TASK SUMMARY</b>			
<b>SAT</b>	<b>UNSAT</b>	<b>CT #</b>	<b>CRITICAL TASK</b>
		C-1	Manually trip the reactor from the control room before an automatic reactor trip occurs on OT delta T.
		C-2	Establish flow from at least one intermediate-head ECCS pump before transition out of E-0.

Comments:

## ATTACHMENT 2

<b>SHIFT TURNOVER INFORMATION</b>			
<b>Unit 1 Status</b>			
Power Level	Power History	NCS Boron	Xenon
100%	Per IC	1224 PPM	per OAC
<b>Controlling Procedure</b>			
<ul style="list-style-type: none"> <li>• OP/1/A/6100/003 (Controlling Procedure for Unit Operation), Enclosure 4.3 (Unit Operation Between 85% and 100% Power). The steps required for 100% power operation are complete.</li> </ul>			
<b>Other Information Needed to Assume the Shift</b>			
<ul style="list-style-type: none"> <li>• 1B NI pump is tagged out due to its breaker failing to close during an IWP on the previous shift.</li> <li>• TS 3.5.2 (ECCS-Operating) was entered 5 hours ago and 1B NI pump is expected to be returned to service in 6 hours.</li> <li>• Crew direction is to swap hotwell pumps, placing 1C in service and shutting down 1B.</li> </ul>			
<b>NLO's Available</b>			
Six NLO's are available as listed on the status board			
<b>METEOROLOGICAL CONDITIONS</b>			
<ul style="list-style-type: none"> <li>• Upper wind direction = 315 degrees, speed = 10 mph</li> <li>• Lower wind direction = 315 degrees, speed = 10.5 mph</li> <li>• Forecast calls for clear skies over the next 24 hours.</li> </ul>			

**HLP NRC EXAM  
SCENARIO #2**

**Catawba Nuclear Station NRC Exam December 2010**

Facility: Catawba NRC Exam 2010		Scenario No.: 2		Op Test No.: 1	
Examiners: _____		Operators: SRO		RO	
_____				BOP	
_____					
Initial Conditions: IC#142; Unit 1 is at 100% power EOL. 1A LH pump is tagged out.					
Turnover: 1A LH pump is tagged out to repair a leak on the motor-cooler. Maintenance estimates that repairs will take 10 hours to complete. Direction for the crew is to swap NV pumps, placing 1B in service and shutting down 1A.					
Event No.	Malf. No.	Event Type*	Event Description		
1	--	N-BOP N-SRO	Swap NV pumps placing 1B in service and securing 1A.		
2	NV056D	C-BOP TS-SRO	NV pump 1B trip.		
3	FWP012C	C-SRO R-RO	1A CFPT trip with failure of automatic turbine runback.		
4	ENB013B	I-BOP TS-SRO	PR N-42 blown control power fuse.		
5	FWP015C	C-RO	1B CFPT trip (Loss of all CF flow to S/G's) requiring reactor trip.		
6	EHC002	C-RO	Automatic and manual failure of turbine trip on reactor trip.		
7	CA005 CA004A/B	C-RO C-SRO	CAPT # 1 overspeed trip, motor driven CA pumps fail to start.		
8	--	M-ALL	Loss of secondary heat sink.		
9					
*	(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor				

## Scenario 2 - Summary

### Initial Condition

Unit 1 is at 100% power EOL. 1A LH pump is tagged out.

### Turnover:

1A LH pump is tagged out to repair a leak on the motor cooler. Maintenance estimates that repairs will take 10 hours. Direction for the crew is to swap NV pumps, placing 1B in service and shutting down 1A.

### Event 1

Crew swaps NV pumps, placing 1B in service and securing 1A.

### Event 2

1B NV pump trips, causing a loss of charging and letdown. AP/1/A/5500/012 (Loss of Charging or Letdown) Cases 1 & 2 will be entered to restore charging and letdown. TS evaluation by SRO is required.

### Event 3

1A CFPT trips. An automatic turbine runback to 65% does not occur and requires RO to manually decrease turbine load. AP/1/A/5500/003 (Load Rejection) will be entered.

### Event 4

Power range N-42 control power fuse blows. Crew will enter AP/1/A/5500/016 (Malfunction of Nuclear Instrumentation) Case 4 will be entered to remove this channel from service. TS evaluation by SRO is required.

### Event 5

1B CFPT trips, causing a loss of all feed flow to the S/G's. Immediate actions of AP/1/A/5500/006 (Loss of S/G Feedwater) will have the RO trip the reactor with reactor power greater than 5%.

### Event 6

Upon reactor trip, the turbine will fail to trip automatically and manually, requiring the RO to manually close the turbine control valves. Crew enters E-0 (Reactor Trip or Safety Injection).

### Event 7

1A and 1B motor driven CA pumps fail to start automatically and cannot be started manually. CAPT # 1 will trip on a mechanical overspeed.

### Event 8

Once all S/G levels decrease to less than 11% NR level, a transition will be made to FR-H.1 (Response to Loss of Secondary Heat Sink). Crew will establish feed flow to at least one S/G from the main condensate system by depressurizing a S/G to less than 505 psig and aligning CF flow to the CA nozzles on the S/G to be fed.

***Critical task 1 – Manually trip the main turbine before a severe (orange-path) challenge develops to either the subcriticality or the integrity CSF or before transition to ECA-2.1 (Uncontrolled Depressurization of All S/G's), whichever happens first.***

***Critical task 2 – Establish feedwater flow To at least one S/G before reactor coolant system feed and bleed is required.***

## EXERCISE GUIDE WORKSHEET

### 1. INITIAL CONDITIONS:

1.1 Reset to IC 142

START TIME: \_\_\_\_\_

✓	✓	Instructor Action	Final	Delay	Ramp	Delete In	Event	
		MAL-EHC003F (ALL TURBINE AUTO RUNBACK FAILURE)	BLOCK					
		MAL-EHC002 (TURBINE TRIP FAILURE)	BOTH					
		MAL-CA004A (FAILURE OF CA PUMP A TO START)	BOTH					
		MAL-CA004B (FAILURE OF CA PUMP B TO START)	BOTH					
		OVR-NV056D (NV PMP 1B OFF PB)	ON				1	
		OVR-FWP012C (CFPT 1A TRIP_RESET TRIP PB)	ON				3	
		MAL-ENB013B (P/R 42 BLOWN FUSE)	CONTROL				5	
		OVR-FWP015C (CFPT 1B TRIP_RESET TRIP PB)	ON				7	
		MAL-CA005 (CA PUMP OVERSPEED TRIP)	MECHANICAL					
		LOA-EHC014 (RACKOUT EHC PMP 1A)	RACKOUT					
		Place a red tag collar on 1A LH pump.						

**2. SIMULATOR BRIEFING**

2.1 Control Room Assignments:

Position	Name
CRS	
OATC	
BOP	

2.2 Give a copy of Attachment 2 (Shift Turnover Information) to the OSM.

**3. EXERCISE PRESENTATION**

3.1 Familiarization Period

A. Allow examinees time to familiarize themselves with Control Board alignments.

3.2 **Scenario EVENT 1**, Swap of NV pumps.

✓	BOOTH INSTRUCTOR ACTION
	<b>IF</b> called to check out the 1B NV pump, <b>THEN</b> wait 3 minutes <b>report</b> that the pump is running normally.

3.3 **Scenario EVENT 2**, 1B NV pump trips.

✓	BOOTH INSTRUCTOR ACTION
	<b>WHEN</b> directed by the lead examiner, <b>THEN INSERT SIMULATOR EVENT 1</b> to trip the 1B NV pump.

✓	BOOTH INSTRUCTOR ACTION
	<b>IF</b> an NLO is dispatched to investigate the 1B NV pump and/or 1ETB breaker, <b>repeat</b> back the order. No reason will be given.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	IF an NEO is dispatched to check out the 1A NV pump, <b>repeat</b> back the order. <b>After 3 minutes report</b> that the 1A NV pump is running normally.

3.4 Scenario EVENT 3, 1A CFPT trips.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> directed by the lead examiner, <b>THEN INSERT SIMULATOR EVENT 3</b> to trip 1A CFPT.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> the SOC is contacted <b>repeat</b> back the information.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	IF and NEO is dispatched to investigate the cause of the 1A CFPT tripping, <b>repeat</b> back the order. No reason will be given for the trip.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> RP is notified to sample and analyze gaseous effluents <b>repeat</b> back the information.
	<b>WHEN</b> PC is notified to sample for isotopic analysis of iodine <b>repeat</b> back the information.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> the Reactor Group Engineer is notified of the occurrence <b>repeat</b> back the information.

3.5 Scenario EVENT 4, Power Range N42 blown control power fuse.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> directed by the lead examiner, <b>THEN INSERT SIMULATOR EVENT 5</b> to give a loss of N-42.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> IAE is directed to place bistables in the tripped condition <b>repeat</b> back the order.
✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> the Reactor Group Engineer is notified of the occurrence <b>repeat</b> back the information.

3.6 Scenario EVENT 5, 1B CFPT trips.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> directed by the lead examiner, <b>THEN INSERT SIMULATOR EVENT 7</b> to-cause the 1B CFPT to trip.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>IF</b> an NEO is dispatched to investigate why the 1B CFPT tripped <b>repeat</b> back the order. No reason will be given.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>IF</b> and NEO is dispatched to investigate why the MD CA pumps did not start <b>repeat</b> back the order. <b>No</b> reason will be given.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>IF</b> an NEO is dispatched to investigate why the CAPT #1 tripped <b>repeat</b> back the order. No reason will be given.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>IF</b> the NEO is ordered to reset the mechanical overspeed trip wait 3 minutes <b>THEN</b> report that the trip lever is mechanically bound and cannot be reset.

Op Test No.: NRC Scenario # 2 Event # 1 Page 8 of 35

Event Description: Crew will swap to the 1B NV pump and secure 1A NV pump.

Time	Position	Applicant's Actions or Behavior
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CREW ASSUMES THE WATCH: \_\_\_\_\_

**NOTE TO EVALUATOR:** The following actions are taken from OP/1/A/6200/001, Chemical and Volume Control System, Enclosure 4.13. All initial conditions are complete and a pre-job brief has been completed. A NEO is in the field standing by for the start of 1B NV pump.

	BOP	<p>2.1 Shift the operating centrifugal charging pump by completing the following steps:</p> <p>2.1.1 Ensure VCT pressure is between 18-40 psig as read on 1NVP5500 (VCT Vent Press) (1MC5).</p> <p>2.1.2 30 seconds prior to starting the idle NV pump, place its associated aux oil pump in the "ON" position:</p> <ul style="list-style-type: none"> <li>• "NV PUMP 1A AUX OIL PUMP"</li> <li>• "NV PUMP 1B AUX OIL PUMP"</li> </ul> <p>2.1.3 Start the idle NV pump. (R.M.)</p> <ul style="list-style-type: none"> <li>• "NV PUMP 1A"</li> <li>• "NV PUMP 1B"</li> </ul> <p>2.1.4 Place the NV pump aux oil pump started in Step 2.1.2 in "AUTO".</p> <p>2.1.5 Stop the previously running NV pump:</p> <ul style="list-style-type: none"> <li>• "NV PUMP 1A"</li> <li>• "NV PUMP 1B"</li> </ul> <p>2.1.6 Verify proper charging flow rate.</p>
<b>END OF EVENT 1</b>		

Op Test No.: NRC Scenario # 2 Event # 2 Page 9 of 35

Event Description: NV pump trip.

Time	Position	Applicant's Actions or Behavior
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**Booth Operator can insert Event 2 at the discretion of lead examiner.**

- Indications:
- 1AD-7, C/4 "NCP SEAL WATER LO FLOW" alarm - LIT
  - 1AD-7, E/1 "CHARGING LINE HI/LO FLOW" alarm - LIT
  - Pzr level - DECREASING
  - Letdown Isolates

No operator actions are required outside of the AP.

**NOTE TO EVALUATOR: The following actions are taken from 1/A/5500/012, Case 1, Loss of Charging.**

	RO	1. Stop any power changes.
	BOP	2. Ensure the following letdown isolation valves - CLOSED: <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NV-10A (Letdn Orif 1B Otlt Cont Isol)</li> <li><input type="checkbox"/> 1NV-11A (Letdn Orif 1C Otlt Cont Isol)</li> <li><input type="checkbox"/> 1NV-13A (Letdn Orif 1A Otlt-Cont Isol).</li> </ul>
	BOP	3. Ensure any malfunctioning NV pump - SECURED.
	BOP	4. Monitor conditions for continued NC pump operation as follows: <ul style="list-style-type: none"> <li><input type="checkbox"/> NC pump #1 seal outlet temperature - LESS THAN 235°F</li> <li><input type="checkbox"/> NC pump lower bearing temperature - LESS THAN 225°F.</li> </ul>
	BOP	5. IF excess letdown in service, THEN ensure manual loader for 1NV-124B (Excess Letdn Press Ctrl) - ADJUSTED TO 0%.
		<b>NOTE</b> Gas entrainment in the NV pump suction can produce pump failure or degradation. Gas entrainment can result in a complete loss of charging, or in a reduction of charging capacity, without indication of cavitation.
	BOP	6. Verify NV pump status as follows: <ul style="list-style-type: none"> <li><input type="checkbox"/> At least one NV pump - ON.</li> <li><input type="checkbox"/> Charging flow - ADEQUATE FOR PLANT CONDITIONS.</li> </ul>

Op Test No.: NRC Scenario # 2 Event # 2 Page 10 of 35

Event Description: NV pump trip.

Time	Position	Applicant's Actions or Behavior
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	BOP	<p>6. RNO</p> <p>a. Ensure any malfunctioning NV pump - SECURED.</p> <p>b. Ensure the following valves - OPEN:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NV-203A (NV Pumps A&amp;B Recirc Isol)</li> <li><input type="checkbox"/> 1NV-202B (NV Pmps A&amp;B Recirc Isol).</li> </ul> <p>c. Ensure only one suction source as follows:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> VCT <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NV-188A (VCT Otlt Isol) - OPEN</li> <li><input type="checkbox"/> 1NV-189B (VCT Otlt Isol) - OPEN</li> <li><input type="checkbox"/> VCT level - GREATER THAN 23%</li> <li><input type="checkbox"/> 1NV-252A (NV Pumps Suct From FWST) - CLOSED</li> <li><input type="checkbox"/> 1NV-253B (NV Pumps Suct From FWST) - CLOSED.</li> </ul> </li> <li>OR</li> <li><input type="checkbox"/> FWST <ul style="list-style-type: none"> <li><input type="checkbox"/> Either of the following valves - OPEN: <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NV-252A (NV Pumps Suct From FWST)</li> <li><input type="checkbox"/> 1NV-253B (NV Pumps Suct From FWST).</li> </ul> </li> <li><input type="checkbox"/> Either of the following valves - CLOSED: <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NV-188A (VCT Otlt Isol)</li> <li><input type="checkbox"/> 1NV-189B (VCT Otlt Isol).</li> </ul> </li> </ul> </li> </ul>
<b>NOTE TO EVALUATOR: Step 6.d should be N/A'd.</b>		
	BOP	<p>6. e. Start the available NV pump as follows:</p> <ol style="list-style-type: none"> <li>1) Open 1NV-309 (Seal Water Injection Flow) to full open.</li> <li>2) Close 1NV-294 (NV Pmps A&amp;B Disch Flow Ctrl).</li> <li>3) Start NV pump aux oil pump.</li> <li>4) Start available NV pump.</li> <li>5) Stop NV pump aux oil pump.</li> <li>6) <b>IF</b> suction is from the FWST, <b>THEN</b> adjust Control Rods and Turbine load, as required, to maintain T-Avg within 1°F of T-Ref. <b>REFER TO</b> the following: <ul style="list-style-type: none"> <li><input type="checkbox"/> AP/1/A/5500/009 (Rapid Downpower)</li> </ul> </li> <li>OR</li> <li><input type="checkbox"/> OP/1/A/6100/003 (Controlling Procedure For Unit Operation).</li> </ol>
<b>NOTE TO EVALUATOR: Step 6.f should be N/A'd. The SRO will continue with step 7.</b>		

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>NRC</u>	Scenario # <u>2</u>	Event # <u>2</u> Page <u>11</u> of <u>35</u>
Event Description: NV pump trip.		
Time	Position	Applicant's Actions or Behavior

	BOP	<p><b>7. Verify charging header is aligned to NC loop as follows:</b></p> <ul style="list-style-type: none"> <li>a. 1NV-312A (Chrg Line Cont Isol) - OPEN.</li> <li>b. 1NV-314B (Chrg Line Cont Isol) – OPEN</li> <li>c. Verify one of the following valves – OPEN <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NV-32B (NV Supply To Loop A Isol)</li> </ul> </li> <li>OR</li> <li><input type="checkbox"/> 1NV-39A (NV Supply To Loop D Isol).</li> <li>d. Verify 1NV-294 (NV Pmps A&amp;B Disch Flow Ctrl) - OPEN.</li> </ul>
	BOP	<p><b>8. Verify the following:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> "TOTAL SEAL WTR FLOW" - GREATER THAN 32 GPM</li> <li><input type="checkbox"/> 1NV-309 (Seal Water Injection Flow) – IN AUTO.</li> </ul>
	BOP	<p><b>8. RNO Perform the following:</b></p> <ul style="list-style-type: none"> <li>a. Slowly throttle 1NV-309 (Seal Water Injection Flow) to establish 32 GPM "TOTAL SEAL WTR FLOW".</li> <li>b. Place 1NV-309 in auto.</li> </ul>
	BOP	<b>9. Verify Pzr level - GREATER THAN 17%.</b>
	BOP	<b>10. Control charging to stabilize Pzr level greater than 17%.</b>
	BOP	<b>11. Ensure "PZR HTR GROUP 1C" - ON.</b>
	BOP	<p><b>12. Control VCT level as follows:</b></p> <ul style="list-style-type: none"> <li>a. Verify NC system makeup - SET FOR DESIRED BORON CONCENTRATION.</li> <li>b. Verify "NC MAKEUP MODE SELECT" - IN AUTO.</li> </ul>
		<b>13. Verify normal letdown - IN SERVICE.</b>
	BOP	<p><b>13. RNO Perform the following:</b></p> <ul style="list-style-type: none"> <li>a. <b>IF</b> excess letdown was previously in service, <b>THEN</b> perform the following: <ul style="list-style-type: none"> <li>1) Establish excess letdown. <b>REFER TO</b> OP/1/A/6200/001 (Chemical and Volume Control System)</li> <li>2) <b>GO TO</b> Step 14.</li> </ul> </li> <li>b. Restore normal letdown. <b>REFER TO</b> Case II (Loss of Letdown).</li> </ul>
<b>NOTE TO EVALUATOR: Restoration of L/D is performed in Case 2 of AP/1/A/5500/012 following</b>		

Event Description: NV pump trip.

Time	Position	Applicant's Actions or Behavior
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the end of this case.		
	SRO	<b>14. Ensure compliance with appropriate Tech Specs:</b> <input type="checkbox"/> 3.4.13 (RCS Operational Leakage) <input type="checkbox"/> 3.4.14 (RCS Pressure Isolation Valve (PIV) Leakage) <input type="checkbox"/> 3.5.2 (ECCS - Operating) <input type="checkbox"/> 3.5.3 (ECCS - Shutdown) <input type="checkbox"/> 3.5.5 (Seal Injection Flow) <input type="checkbox"/> 3.6.3 (Containment Isolation Valves) <input type="checkbox"/> SLC 16.9-9 (Boration Systems-Charging Pump - Shutdown) <input type="checkbox"/> SLC 16.9-10 (Boration Systems Charging Pump - Operating).
<b>NOTE TO EVALUATOR: T.S. 3.5.2 and SLC 16.9-10 apply.</b>		
	SRO	<b>15. Determine required notifications:</b> <input type="checkbox"/> REFER TO RP/0/A/5000/001 (Classification Of Emergency) <input type="checkbox"/> REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
	BOP	<b>16. Verify at least one NV pump - ON.</b>
	BOP	<b>17. IF Standby Makeup Pump is in service and is no longer required, THEN secure the pump. REFER TO OP/0/B/6100/013 (Standby Shutdown Facility Operations).</b>
	CREW	<b>18. Determine long term plant status. RETURN TO procedure in effect.</b>
<b>END OF CASE 1.</b>		
<b>NOTE TO EVALUATOR: AP/1/A/5500/012, Case 2, begins here.</b>		
	RO	<b>1. Stop any power changes.</b>
	BOP	<b>2. Ensure the following letdown isolation valves - CLOSED:</b> <input type="checkbox"/> 1NV-10A (Letdn Orif 1B Otlt Cont Isol) <input type="checkbox"/> 1NV-11A (Letdn Orif 1C Otlt Cont Isol) <input type="checkbox"/> 1NV-13A (Letdn Orif 1A Otlt Cont Isol).
	BOP	<b>3. Verify Pzr level - GREATER THAN 17%.</b>
	BOP	<b>4. Control charging to stabilize Pzr level at program level while maintaining seal injection flow.</b>
	BOP	<b>5. Ensure "PZR HTR GROUP 1C" - ON.</b>

Op Test No.: NRC Scenario # 2 Event # 2 Page 13 of 35

Event Description: NV pump trip.

Time	Position	Applicant's Actions or Behavior
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	BOP	<p><b>6. Control VCT level as follows:</b></p> <p>a. Verify NC system makeup - SET FOR DESIRED BORON CONCENTRATION.</p> <p>b. Verify "NC MAKEUP MODE SELECT" - IN AUTO.</p>
	CREW	<b>7. Determine and correct cause of loss of letdown.</b>
	BOP	<b>8. IF AT ANY TIME excess letdown is required, THEN establish excess letdown. REFER TO OP/1/A/6200/001 (Chemical and Volume Control System).</b>
	BOP	<b>9. Verify proper VC/YC system operation. REFER TO Enclosure 5 (Control Room Ventilation System Verification).</b>
	SRO	<p><b>10. Ensure compliance with appropriate Tech Specs:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 3.3.1 (Reactor Trip System (RTS) Instrumentation)</li> <li><input type="checkbox"/> 3.3.3 (Post Accident Monitoring (PAM) Instrumentation)</li> <li><input type="checkbox"/> 3.3.4 (Remote Shutdown System)</li> <li><input type="checkbox"/> 3.4.1 (RCS Pressure, Temperature, and Flow Departure From Nucleate Boiling (DNB) Limits)</li> <li><input type="checkbox"/> 3.4.12 (Low Temperature Overpressure Protection (LTOP) System)</li> <li><input type="checkbox"/> 3.4.13 RCS (Operational Leakage).</li> <li><input type="checkbox"/> 3.6.3 (Containment Isolation Valves).</li> </ul>
<b>NOTE TO EVALUATOR: No T.S. apply for this case.</b>		
	BOP	<p><b>11. Verify at least one of the following valves - CLOSED:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NV-1A (NC Letdn To Regen Hx Isol)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NV-2A (NC Letdn To Regen Hx Isol).</li> </ul>
	SRO	<b>11. RNO GO TO Step 16.</b>
	BOP	<p><b>16. Establish letdown as follows:</b></p> <p>a. Verify ability to establish normal letdown - RESTORED.</p> <p>b. Ensure 1NV-849 (Letdn Flow Var Orif Ctrl) valve demand position - 0%.</p> <p>c. Verify the following valves - OPEN:</p>

Op Test No.: NRC Scenario # 2 Event # 2 Page 14 of 35

Event Description: NV pump trip.

Time	Position	Applicant's Actions or Behavior
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		<p><input type="checkbox"/> 1NV-1A (NC Letdn To Regen Hx Isol)</p> <p><input type="checkbox"/> 1NV-2A (NC Letdn To Regen Hx Isol)</p> <p><b>NOTE</b> If LTOP is in service, then 1NC-34A will be made inoperable when the only letdown path aligned is NV system normal letdown. 1NC-34A LTOP operability is based on the letdown alignment. (PIP C-10-1320)</p> <p>d. Open the following valves:</p> <p><input type="checkbox"/> 1NV-15B (Letdn Cont Isol)</p> <p><input type="checkbox"/> 1NV-10A (Letdn Orif 1B Orif Cont Isol)</p> <p>e. Adjust 1NV-294 (NV Pmps A&amp;B Disch Flow Ctrl) as necessary to maintain letdown subcooled in following steps.</p> <p>f. Throttle 1NV-148 (Letdn Press Control) to 45% demand.</p> <p>g. Throttle open 1NV-849 (Letdn Flow Var Orif Ctrl) in 1% to 5% increments until one of the following conditions is met:</p> <p><input type="checkbox"/> Letdown flow and letdown pressure increases</p> <p>OR</p> <p><input type="checkbox"/> Valve demand position is 60% open.</p> <p>h. Do not continue until one of the above conditions is met.</p> <p>i. Verify letdown flow and letdown pressure - HAS INCREASED.</p> <p>j. Adjust 1NV-148 (Letdn Press Control) to maintain letdown pressure between 150 - 200 PSIG.</p> <p>k. <b>WHEN</b> 5 minutes have elapsed, <b>THEN</b> perform the following:</p> <p>1) <b>IF AT ANY TIME</b> letdown flow is increased to greater than 80 GPM, <b>THEN</b> perform the following:</p> <p>a) Determine current NC Dose Equivalent Iodine concentration (DEI). (OAC Point C1P0097)</p> <p>b) Verify DEI specific activity - <b>LESS THAN</b> 0.18 µCi/GM.</p> <p>c) Notify Primary Chemistry that lower DEI limits are in effect due to NV letdown flows greater than 80 GPM.</p>
	BOP	<p>16.</p> <p>2) Adjust 1NV-849 (Letdn Flow Var Orif Ctrl) in 1% increments to desired letdown flow.</p> <p>3) <b>WHEN</b> letdown at desired flow, <b>THEN</b> perform the following:</p> <p>a) Adjust 1NV-148 (Letdn Press Control) to maintain letdown</p>

Op Test No.: NRC Scenario # 2 Event # 2 Page 15 of 35

Event Description: NV pump trip.

Time	Position	Applicant's Actions or Behavior
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		pressure at 350 PSIG. b) Ensure 1NV-148 (Letdn Press Control) - IN AUTO. 4) <b>IF AT ANY TIME</b> additional letdown flow desired, <b>THEN</b> establish letdown with the 45 or 75 GPM orifice. <b>REFER TO</b> OP/1/A/6200/001 (Chemical and Volume Control System). I. <b>WHEN</b> Pzr level is restored to programmed level, <b>THEN</b> perform the following: 1) Ensure 1NV-294 (NV Pmps A&B Disch Flow Ctrl) - IN AUTO. 2) Ensure "PZR Level Master" – IN AUTO.
		17. <b>Determine required notifications:</b> <input type="checkbox"/> <b>REFER TO</b> RP/0/A/5000/001 (Classification Of Emergency) <input type="checkbox"/> <b>REFER TO</b> RP/0/B/5000/013 (NRC Notification Requirements).
		19. <b>Determine long term plant status. RETURN TO procedure in effect.</b>
<b>END OF EVENT 2</b>		

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u> Scenario # <u>  2  </u> Event # <u>  3  </u> Page <u>  16  </u> of <u>  35  </u>		
Event Description: 1RN-2B fails closed causing 'A' RN pit low/low level.		
Time	Position	Applicant's Actions or Behavior

Booth Operator can insert Event 3 at the discretion of the lead examiner.		
Indications: AD5, A1 'CFPT A TRIPPED' AD5, A4 'CFPT A COMMON TROUBLE' 1AD1, F4 'TURB RUNBACK INITIATED' 1AD2, A4 'T-REF/T-AVG HI/LO' Generator MW will NOT be decreasing Main Turbine Control Valves will NOT be closing		
	RO	Manually decreases turbine load
	RO	Ensures control rods are operating properly
	SRO	Enter AP/1/A/5500/003 (Load Rejection)
<b>NOTE TO EVALUATOR: The following actions are taken from 1/A/5500/003, Case 1, Load Rejection .</b>		
	RO	<b>1. Verify turbine load - DECREASING IN AUTOMATIC.</b>
	RO	<b>1. RNO Perform the following:</b> a. Select "MANUAL" on turbine-control panel. b. Depress "CONTROL VALVES LOWER" pushbutton and reduce turbine load as required.
	RO	<b>2. Verify proper reactor response:</b> <input type="checkbox"/> Control rods - IN "AUTO" AND STEPPING IN <input type="checkbox"/> P/R neutron flux - DECREASING.
	BOP	<b>3. Verify proper steam dump operation as follows:</b> a. Verify T-Ref instrumentation - AVAILABLE. b. "C-9-COND AVAILABLE FOR STM DUMP" status light (1SI- 18) - LIT. c. Verify the following: <input type="checkbox"/> "C-7A LOSS OF LOAD INTLK COND DUMP" status light (1SI-18) - LIT. <input type="checkbox"/> Steam dump valves - MODULATING. d. T-Avg - DECREASING TO T-REF.

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.:	NRC Scenario # 2	Event # 3 Page 17 of 35
Event Description: 1RN-2B fails closed causing 'A' RN pit low/low level.		
Time	Position	Applicant's Actions or Behavior

	BOP	<b>4. Verify Pzr PORV and Pzr spray valve status as follows:</b> a. All Pzr PORVs - CLOSED. b. Normal Pzr spray valves - CLOSED.
	BOP	<b>5. Verify proper CM System operation as follows:</b> a. <b>WHEN</b> reactor power is less than 75%, <b>THEN</b> ensure both C-htr drain pumps - OFF. b. Verify reactor power - GREATER THAN 56% PRIOR TO THE EVENT. c. Verify standby hotwell pump(s) - ON. d. Verify standby condensate booster d. Manually start standby condensate pump(s) - ON.
	BOP	5.c. RNO Manually start standby hotwell pump(s) as necessary.
	BOP	5.d. RNO Manually start standby condensate booster pump(s) as necessary.
	BOP	<b>6. Verify the following generator alarms - DARK:</b> <input type="checkbox"/> 1AD-11, C/1 "GEN BKR A OVER CURRENT" <input type="checkbox"/> 1AD-11, F/1 "GEN BKR B OVER CURRENT".
	BOP	<b>7. Verify S/G levels are adequate as follows:</b> <input type="checkbox"/> All S/G low level alert alarms (1AD-4) – DARK <input type="checkbox"/> All S/G low CF flow alarms (1AD-4) - DARK.
	RO	<b>8. Verify reactor power - GREATER THAN 20%.</b>
	RO	<b>9. IF AT ANY TIME reactor power is less than or equal to 20%, THEN perform Step 8 RNO.</b>
	BOP	<b>10. Verify AS header pressure – GREATER THAN OR EQUAL TO 140 PSIG.</b>
	BOP	<b>11. Adjust 1TL-4 (Stm Seal Reg Byp) as necessary to maintain steam seal pressure between 4 PSIG - 6 PSIG.</b>
	BOP	<b>12. Monitor Enclosure 3 (Rod Insertion Limit Boration).</b>
	RO	<b>13. Verify reactor power - LESS THAN 30%.</b>

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>  NRC  </u> Scenario # <u>  2  </u> Event # <u>  3  </u> Page <u>  18  </u> of <u>  35  </u>		
Event Description: 1RN-2B fails closed causing 'A' RN pit low/low level.		
Time	Position	Applicant's Actions or Behavior

	RO	<p>13. RNO</p> <p>a. <b>IF</b> the runback target load is less than 30%, <b>THEN:</b></p> <p>b. <b>WHEN</b> the appropriate runback target load is reached, <b>THEN:</b></p> <p style="margin-left: 20px;">1) Stabilize unit at current power level.</p> <p style="margin-left: 20px;">2) Maintain control rods above insertion limits.</p> <p style="margin-left: 20px;">3) Adjust the following as required to maintain T-Avg within 1°F of T-Ref:</p> <p style="margin-left: 40px;"><input type="checkbox"/> Turbine load</p> <p style="margin-left: 40px;"><input type="checkbox"/> Control rods</p> <p style="margin-left: 40px;"><input type="checkbox"/> Boron concentration.</p> <p>c. <b>GO TO</b> Step 15.</p>
	BOP	<p>15. <b>Verify the following PCBs - CLOSED:</b></p> <p style="margin-left: 20px;"><input type="checkbox"/> Generator breaker 1A</p> <p style="margin-left: 20px;"><input type="checkbox"/> Generator breaker 1B</p> <p style="margin-left: 20px;"><input type="checkbox"/> PCB 14</p> <p style="margin-left: 20px;"><input type="checkbox"/> PCB 15</p> <p style="margin-left: 20px;"><input type="checkbox"/> PCB 17</p> <p style="margin-left: 20px;"><input type="checkbox"/> PCB 18.</p>
	RO	<p>16. <b>Adjust power factor as necessary. REFER TO Unit 1 Revised Data Book Figure 43.</b></p>
	RO	<p>17. <b>WHEN</b> the appropriate runback target load is reached, <b>THEN:</b></p> <p style="margin-left: 20px;"><input type="checkbox"/> Stabilize unit at appropriate power level.</p> <p style="margin-left: 20px;"><input type="checkbox"/> Maintain control rods above insertion limits.</p> <p style="margin-left: 20px;"><input type="checkbox"/> Adjust the following as required to maintain T-Avg within 1°F of T-Ref:</p> <p style="margin-left: 40px;"><input type="checkbox"/> Turbine load</p> <p style="margin-left: 40px;"><input type="checkbox"/> Control rods</p> <p style="margin-left: 40px;"><input type="checkbox"/> Boron concentration.</p>
	BOP	<p>18. <b>Notify System Operating Center (SOC) using the red dispatcher telephone of current unit status.</b></p>
	CREW	<p>19. <b>Determine and correct cause of load rejection.</b></p>

Event Description: 1RN-2B fails closed causing 'A' RN pit low/low level.

Time	Position	Applicant's Actions or Behavior
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	BOP	<p><b>20. Shut down unnecessary plant equipment as follows:</b></p> <p>a. Restore CM and CF as follows:</p> <ol style="list-style-type: none"> <li>1) Verify C-htr drain pumps - ON.</li> <li>2) Verify both CF Pumps – IN SERVICE.</li> <li>3) Shutdown one CF pump as necessary. <b>REFER TO</b> OP/1/A/6250/001 (Condensate and Feedwater System).</li> <li>4) Shutdown excess Condensate Booster Pumps. <b>REFER TO</b> OP/1/A/6250/001 (Condensate and Feedwater System).</li> <li>5) Shutdown excess Hotwell Pumps. <b>REFER TO</b> OP/1/A/6250/001 (Condensate and Feedwater System).</li> </ol> <p>b. RC pump(s) and cooling tower fans. <b>REFER TO</b> OP/1/B/6400/001A (Condenser Circulating Water System).</p>
	RO	<p><b>21. Reset steam dump valves as follows:</b></p> <ol style="list-style-type: none"> <li>a. Verify reactor power - STABLE.</li> <li>b. Verify steam dump valves – IN "T-AVG" MODE.</li> <li>c. Verify steam dump valves - CLOSED.</li> </ol>
<p><b>Note to Evaluator: Depending on the speed of the crew the steam dumps may not be closed at this time. If the steam dumps are open the crew will go to the RNO, then step 22 and then back to 21.d when the steam dumps are closed.</b></p>		
	RO	<p>21.c. RNO Perform the following:</p> <ol style="list-style-type: none"> <li>1) <b>WHEN</b> steam dump valves are closed, <b>THEN</b> perform Steps 21.d through 21.g.</li> <li>2) <b>GO TO</b> Step 22.</li> </ol>
	RO	<p>d. Reset steam dump valves.</p> <p>e. Verify the following status lights (1SI-18) - DARK:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> "C-7A LOSS OF LOAD INTLK COND DUMP"</li> <li><input type="checkbox"/> "C-7B LOSS OF LOAD INTLK ATMOS DUMP".</li> </ul> <p>f. <b>IF</b> "T-AVG" mode of operation is available, <b>THEN</b> ensure steam dump valves in "T-AVG" mode.</p> <p>g. Verify "STM DUMP CTRL" - IN AUTO.</p>
	RO	<p><b>22. Verify reactor power - GREATER THAN 15%.</b></p>

<b>Appendix D</b>	<b>Required Operator Actions</b>	<b>Form ES-D-2</b>
Op Test No.: <u>  NRC  </u> Scenario # <u>  2  </u> Event # <u>  3  </u> Page <u>  20  </u> of <u>  35  </u>		
Event Description: 1RN-2B fails closed causing 'A' RN pit low/low level.		
Time	Position	Applicant's Actions or Behavior

	RO	23. Verify CA pumps - OFF.
	RO	24. Verify reactor power change – GREATER THAN OR EQUAL TO 15% IN A 1 HOUR PERIOD.
	BOP	<b>25. Notify the following sections to take appropriate samples:</b> <input type="checkbox"/> Radiation Protection to sample and analyze gaseous effluents. REFER TO Selected Licensee Commitments Manual, Section 16.11-6. <input type="checkbox"/> Primary Chemistry to sample for isotopic analysis of iodine. REFER TO Tech Specs 3.4.16 (Sample must be taken between 2 hours and 6 hours following last power change greater than or equal to 15% rated thermal power within a 1 hour period).
	SRO	<b>26. Ensure compliance with appropriate Tech Specs:</b> <input type="checkbox"/> 3.1.1-(Shutdown Margin (SDM)) <input type="checkbox"/> 3.1.6 (Control Bank Insertion Limits) <input type="checkbox"/> 3.8.1 (AC Sources - Operating).
<b>Note to Evaluator: The crew should enter T.S. 3.1.6 (control Bank Insertion Limits).</b>		
	BOP	27. Notify Reactor Group Engineer of occurrence.
	SRO	28. Determine long term plant status. RETURN TO OP/1/A/6100/003 (Controlling Procedure For Unit Operation).
<b>END OF EVENT 3</b>		

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: NRC	Scenario # 2	Event # 4
Page 21 of 35		
Event Description: PR N-42 blown control power fuse.		
Time	Position	Applicant's Actions or Behavior

<b>Booth Operator can insert Event 4 at the discretion of the lead examiner.</b>		
Indications: AD2, A1 'P/R NEUTRON FLUX RATE ALERT' AD2, A3 'P/R HI NEUTRON FLUX HI SET POINT ALERT' AD2, B5 'P/R HI VOLTAGE FAILURE' AD2, E8 'OVER POWER ROD STOP' AD2, F10 'DCS TROUBLE' INDICATING LIGHTS ON N-42 PANEL GO DARK		
	RO	Verifies all rod motion is stopped
	SRO	Enters AP/1/A/5500/016, Malfunction of Nuclear Instrumentation System, Case IV – Power Range Malfunction
<b>EVALUATOR NOTE: The following actions are from AP/1/A/5500/016, Malfunction of Nuclear Instrumentation System, Case IV – Power Range Malfunction.</b>		
	RO	1. Verify all rod motion - STOPPED.
	RO	2. Verify 1AD-2, E/8 "OVER POWER ROD STOP" - DARK.
	RO	2. RNO Adjust Turbine load to maintain T-Avg at T-Ref.
	RO	3. Identify failed P/R channel: <input type="checkbox"/> N-41 OR <input type="checkbox"/> N-42 OR <input type="checkbox"/> N-43 OR <input type="checkbox"/> N-44.
	RO	4. Ensure unaffected channels - OPERABLE.
	BOP	5. Request IAE to place the following bistables in the tripped condition. REFER TO Model W/O #00874531: <input type="checkbox"/> OT DELTA T <input type="checkbox"/> OP DELTA T.

Appendix D		Required Operator Actions		Form ES-D-2	
Op Test No.:	NRC	Scenario #	2	Event #	4
		Page	22	of	35
Event Description: PR N-42 blown control power fuse.					
Time	Position	Applicant's Actions or Behavior			

	BOP	<p><b>6. Perform the following actions at the Miscellaneous Control And Indication Panel:</b></p> <p>a. Place the appropriate "ROD STOP BYPASS" switch to the affected channel position.</p> <p>b. Verify the affected nuclear overpower rod stop channel bypassed status light (1SI-19) - LIT.</p> <p>c. Place "POWER MISMATCH BYPASS" switch to the affected channel position.</p>
	BOP	<p><b>7. Perform the following actions at the Detector Current Comparator panel:</b></p> <p>a. Place "UPPER SECTION" channel defeat switch to the affected channel.</p> <p>b. Verify the "CHANNEL DEFEAT" light for the upper section - LIT.</p> <p>c. Place "LOWER SECTION" channel defeat switch to the affected channel.</p> <p>d. Verify the "CHANNEL DEFEAT" light for the lower section - LIT.</p>
	BOP	<p><b>8. At the Comparator And Rate panel, place the "COMPARATOR CHANNEL DEFEAT" switch to the affected channel position.</b></p>
	SRO	<p><b>NOTE</b> The following annunciators will actuate in the following step:</p> <p>1AD-2, A/1 "P/R HI NEUTRON FLUX RATE ALERT"</p> <p>1AD-2, A/3 "P/R HI NEUTRON FLUX HI SET POINT ALERT"</p> <p>1AD-2, B/5 "P/R HI VOLTAGE FAILURE".</p>
	BOP	<p><b>9. De-energize the affected channel as follows:</b></p> <p>a. Remove the control power fuses at Power Range A drawer.</p> <p>b. Request the OSM to maintain the control power fuses under his control.</p> <p>c. Verify the affected Power Range cabinet shows no physical signs of damage.</p>
	BOP	<p><b>10. Ensure affected channel bistables are in the required state. REFER TO Enclosure 1 (P/R Bistables That Must Be Tripped).</b></p>
	BOP	<p><b>11. Ensure operable P/R channel selected to record on "NIS RECORDER".</b></p>
	RO	<p><b>12. Adjust control rods to maintain T-Ave at T-Ref.</b></p>
	RO	<p><b>13. WHEN T-avg within 1°F of T-Ref, AND auto rod control desired, THEN return control rods to auto.</b></p>
	CREW	<p><b>14. Determine and correct cause of P/R malfunction.</b></p>

Appendix D		Required Operator Actions		Form ES-D-2	
Op Test No.: <u>  NRC  </u>		Scenario # <u>  2  </u>		Event # <u>  4  </u>	
		Page <u>  23  </u>		of <u>  35  </u>	
Event Description: PR N-42 blown control power fuse.					
Time	Position	Applicant's Actions or Behavior			

	SRO	<b>15. Ensure compliance with appropriate Tech Specs:</b> <input type="checkbox"/> 3.2.4 (Quadrant Power Tilt Ratio (QPTR)) <input type="checkbox"/> 3.3.1 (Reactor Trip System (RTS) Instrumentation).
<b>Note to Evaluator: The crew will enter T.S. 3.3.1</b>		
	SRO	<b>16. Determine required notifications:</b> <input type="checkbox"/> REFER TO RP/0/A/5000/001 (Classification Of Emergency) <input type="checkbox"/> REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
	BOP	<b>17. Notify Reactor Group Engineer of occurrence.</b>
	SRO	<b>18. WHEN the affected P/R channel is repaired, THEN ensure IAE returns the channel to service.</b>
	SRO	<b>19. Determine long term plant status. RETURN TO procedure in effect.</b>
<b>END OF EVENT 4</b>		

Appendix D		Required Operator Actions		Form ES-D-2	
Op Test No.: <u>NRC</u>		Scenario # <u>2</u>		Event # <u>5, 6, and 7</u>	
		Page <u>24</u>		of <u>35</u>	
Event Description: 1B CFPT trip (loss of all CF flow to S/G's) requiring reactor trip. Auto and Manual Turbine trip failure on reactor trip. CAPT #1 overspeed trip, MD CA failure to start.					
Time	Position	Applicant's Actions or Behavior			

**Booth Operator can insert Event 5 at the discretion of the lead examiner.**

Indications: AD5, C1 'CFPT B TRIPPED  
AD1, A6 'TURB TRIP ON LOSS OF BOTH CFPT'S'  
NUMEROUS AD1 ALARMS  
AD4, C1 – C4 'S/G A - D FLOW MISMATCH LO-CF FLOW'  
AD4, B1 – B4 'S/G A – D LEVEL DEVIATION'  
ENTER AP/1/A/5500/006 (LOSS OF S/G FEEDWATER)

	RO	Manually trip the reactor
	SRO	Go to EP/1/a/5000/E-0 (Reactor Trip or Safety Injection)
	RO	Manually reduce Turbine Load

**EVALUATOR NOTE: The following actions are taken from AP/1/A/5500/006 (LOSS OF S/G FEEDWATER) Case I.**

	RO	1. Verify reactor power - LESS THAN 5%.
	RO	1. RNO IF AT ANY TIME all CF supply to S/G(s) lost, THEN perform the following: a. Manually trip reactor. b. GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).

**EVALUATOR NOTE: The following actions are taken from EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection). The RO and BOP will perform the immediate actions.**

	RO/ BOP	1. Monitor Enclosure 1 (Foldout Page).
	RO	2. Verify Reactor Trip: <input type="checkbox"/> All rod bottom lights – LIT <input type="checkbox"/> All reactor trip and bypass breakers – OPEN <input type="checkbox"/> I/R amps - DECREASING.
	RO	3. Verify Turbine Trip: <input type="checkbox"/> All turbine stop valves - CLOSED



Appendix D		Required Operator Actions		Form ES-D-2	
Op Test No.: <u>NRC</u>		Scenario # <u>2</u>		Event # <u>5, 6, and 7</u>	
		Page <u>26</u>		of <u>35</u>	
Event Description: 1B CFPT trip (loss of all CF flow to S/G's) requiring reactor trip. Auto and Manual Turbine trip failure on reactor trip. CAPT #1 overspeed trip, MD CA failure to start.					
Time	Position	Applicant's Actions or Behavior			

EVALUATOR NOTE: The following actions are taken from EP/1/A/5000/ES-0.1 (Reactor Trip Response).		
	RO/ BOP	1. Monitor Enclosure 1 (Foldout Page).
	BOP	2. Verify the following: <input type="checkbox"/> All 6.9 KV busses - ENERGIZED. <input type="checkbox"/> VI pressure - GREATER THAN 85 PSIG.
	RO	3. Announce "Unit 1 Reactor Trip".
	SRO	4. Determine required notifications: <input type="checkbox"/> REFER TO RP/0/A/5000/001 (Classification Of Emergency) <input type="checkbox"/> REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
		<b>NOTE</b> Enclosure 2 (NC Temperature Control) shall remain in effect until subsequent steps provide alternative NC temperature control guidance.
	RO	5. Control NC temperature. REFER TO Enclosure 2 (NC Temperature Control).
	RO	6. Verify feedwater status as follows: a. T-Avg - LESS THAN 564°F. b. All Feedwater Isolation status lights (1SI-5) - LIT. c. Total feed flow to S/G(s) – GREATER THAN 450 GPM.
	BOP/ RO	6.c. RNO c. Establish feed flow to maintain at least one S/G N/R level greater than 11% <b>OR</b> total feed flow greater than 450 GPM using one of the following: <input type="checkbox"/> CA pumps <b>OR</b> <input type="checkbox"/> Main Feedwater System. REFER TO OP/1/A/6250/001 (Condensate and Feedwater System).

Appendix D		Required Operator Actions		Form ES-D-2	
Op Test No.: NRC		Scenario # 2		Event # 5, 6, and 7	
				Page 27 of 35	
Event Description: 1B CFPT trip (loss of all CF flow to S/G's) requiring reactor trip. Auto and Manual Turbine trip failure on reactor trip. CAPT #1 overspeed trip, MD CA failure to start.					
Time	Position	Applicant's Actions or Behavior			

	RO	<p><b>7. Verify adequate shutdown margin as follows:</b></p> <p>a. DRPI indication - AVAILABLE.</p> <p>b. All control and shutdown rods -FULLY INSERTED.</p> <p>c. All NC T-Colds -GREATER THAN 545°F.</p> <p>d. <b>IF AT ANY TIME</b> NC T-Colds decrease to less than or equal to 545°F, <b>THEN</b> perform Step 7.c.</p> <p>e. Stop any boron dilutions in progress.</p>
	BOP	<p><b>8. Verify proper Pzr level control as follows:</b></p> <p>a. Pzr level -GREATER THAN 17%.</p> <p>b. Charging and letdown - IN SERVICE.</p> <p>c. Pzr level - TRENDING TO "PZR REF LEVEL".</p>
	BOP	<p><b>9. Verify proper Pzr pressure control as follows:</b></p> <p>a. Pzr pressure -GREATER THAN 1845 PSIG.</p> <p>b. Pzr pressure - STABLE AT OR TRENDING TO 2235 PSIG.</p>
	RO	<p><b>10. Control S/G levels as follows:</b></p> <p>a. Verify N/R level in any S/G – GREATER THAN 11%.</p> <p>b. Throttle feed flow to maintain S/G N/R levels between 11% and 50%.</p>
	CREW	<p><b>11. Initiate concurrent actions in Abnormal Procedures as needed while continuing with this procedure.</b></p>
<p><b>EVALUATOR NOTE:</b> Depending on the speed of the crew in closing the main turbine stop valves. The rest of ES-0.1 is verification of proper plant response, shutting down equipment and shifting steam dumps to pressure mode. FR-H.1 will be entered when S/G NR levels are &lt;11% and total CA flow is &lt; 450 GPM.</p>		

Appendix D	Required Operator Actions	Form ES-D-2
Op Test No.: <u>NRC</u>	Scenario # <u>2</u>	Event # <u>8</u>
Page <u>28</u> of <u>35</u>		
Event Description: Loss of secondary heat sink.		
Time	Position	Applicant's Actions or Behavior

EVALUATOR NOTE: The following steps are from EP/1/A/5000/FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK.		
	SRO	1. IF total feed flow is less than 450 GPM due to operator action, THEN RETURN TO procedure and step in effect.
	RO	2. Verify secondary heat sink is required as follows: a. NC pressure - GREATER THAN ANY NON-FAULTED S/G PRESSURE. b. Any NC T-Hot - GREATER THAN 350°F.
	RO/BOP	3. Monitor Enclosure 1 (Foldout Page).
	BOP	4. Verify at least one NV pump - AVAILABLE.
	RO	5. Verify bleed and feed is required as follows: a. W/R level in at least 3 S/Gs - LESS THAN 24% (36% ACC).
	RO/BOP	5.a RNO Perform the following: 1) Monitor bleed and feed initiation criteria. REFER TO Enclosure 1 (Foldout Page). 2) WHEN criteria is satisfied, THEN GO TO Step 19. 3) GO TO Step 6.
	RO	6. Ensure S/G BB and NM valves closed. REFER TO Enclosure 16 (S/G BB and NM Valve Checklist).
	BOP	7. Attempt to establish CA flow to at least one S/G as follows: a. Verify 1AD-8, B/1 "UST LO LEVEL" - DARK. b. Verify 1CA-4 (CA Pmps Suct From UST) - OPEN. c. Verify proper CA pump status as follows: 1) Power to both motor driven CA pumps - AVAILABLE. 2) 1AD-5, F/3 "CAPT MECH OS TRIP" - DARK.
	BOP	7.c.2 RNO Perform the following: a) Dispatch operator to reset the CAPT trip and throttle valve. b) IF AT ANY TIME the CAPT trip and throttle valve is reset prior to reaching bleed and feed criteria, THEN perform Step 7. c) GO TO Step 7.d.

Appendix D		Required Operator Actions		Form ES-D-2	
Op Test No.:	NRC	Scenario #	2	Event #	8
		Page	29	of	35
Event Description: Loss of secondary heat sink.					
Time	Position	Applicant's Actions or Behavior			

	BOP	<p>7. d. Ensure all CA isolation valves - OPEN.</p> <p>e. Verify all CA flow control valves - OPEN.</p> <p>f. Start all available CA pumps.</p> <p>g. Verify total CA flow - GREATER THAN 450 GPM.</p>
	BOP	<p>7.g RNO Perform the following:</p> <p>1) <b>IF</b> any CA pump is on, <b>AND</b> Step 34 has been implemented, <b>THEN GO TO</b> Enclosure 8 (S/G-CA Flow Restoration).</p> <p>2) <b>IF</b> any feed flow to at least one S/G verified, <b>THEN</b> perform the following:</p> <p>3) <b>IF</b> no CA flow indicated, <b>THEN</b> perform the following:</p> <p>a) <b>IF</b> no CA pump can be started, <b>THEN</b> dispatch operator and maintenance to CA pumps to attempt to restore one CA pump to service. <b>REFER TO</b> EM/1/A/5200/007 (Troubleshooting Cause For-CA Pump(s) Failing to Start).</p> <p>b) Dispatch operator to verify proper CA valve alignment. <b>REFER TO</b> Enclosure 2 (Local CA Flowpath Restoration).</p> <p>c) <b>IF AT ANY TIME</b> CA flow is restored prior to meeting bleed and feed initiation criteria, <b>THEN</b> perform Step 7.</p> <p>4) <b>GO TO</b> Step 8.</p>
	RO	<p>8. <b>Transfer condenser steam dump to pressure control mode as follows:</b></p> <p>a. Verify condenser - AVAILABLE:</p> <p><input type="checkbox"/> "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT.</p> <p><input type="checkbox"/> Any MSIV - OPEN.</p> <p>b. Verify Steam Dumps in - T-AVG MODE.</p> <p>c. Place steam dumps in pressure mode as follows:</p> <p>1) Ensure "STM DUMP CTRL" – SET AT 1090 PSIG STEAM HEADER PRESSURE.</p> <p>2) Place "STM DUMP CTRL" M/A station in manual.</p> <p>3) Adjust "STM DUMP CTRL" M/A station output to match "% STM DUMP DEMAND" (1SMP5211).</p> <p>4) <b>WHEN</b> output on "STM DUMP CTRL" M/A station is equal to "% STM DUMP DEMAND" (1SMP5211), <b>THEN</b> place steam dumps in - PRESSURE MODE.</p> <p>d. Place "STM DUMP CTRL" M/A station in auto.</p>

Appendix D		Required Operator Actions		Form ES-D-2	
Op Test No.:	NRC	Scenario #	2	Event #	8
		Page	30	of	35
Event Description: Loss of secondary heat sink.					
Time	Position	Applicant's Actions or Behavior			

	BOP	9. Stop all NC pumps.
	BOP	10. Verify CM System is in service as follows: <input type="checkbox"/> Hotwell pump(s) – ON <input type="checkbox"/> Condensate Booster pump(s) - ON.
	BOP	11. Reset Feedwater Isolation as follows: a. Verify the following annunciators - DARK: <input type="checkbox"/> 1AD-8, D/7 "INNER DOGHOUSE TRAIN A LEVEL HI" <input type="checkbox"/> 1AD-8, E/7 "INNER DOGHOUSE TRAIN B LEVEL HI" <input type="checkbox"/> 1AD-8, D/8 "OUTER DOGHOUSE TRAIN A LEVEL HI" <input type="checkbox"/> 1AD-8, E/8 "OUTER DOGHOUSE TRAIN B LEVEL HI". b. Verify S/I - HAS PREVIOUSLY ACTUATED.
	RO	11.b RNO Perform the following: 1) Reset Feedwater Isolation. 2) IF Feedwater Isolation will not reset, THEN notify IAE to bypass Feedwater Isolation. REFER TO EM/1/A/5200/009 (Bypassing Feedwater Isolation). 3) GO TO Step 11.e.
	SRO	11.e IF AT ANY TIME a subsequent Feedwater Isolation occurs, THEN RETURN TO Step 11.
	RO	12. Attempt to establish CF flow to at least one S/G as follows: a. Verify CM System - IN SERVICE. b. Place the following valves in manual and closed: <input type="checkbox"/> All CF control valves <input type="checkbox"/> All CF bypass control valves. c. Ensure at least one of the following valves - OPEN: <input type="checkbox"/> 1CF-10 (1A CF Pump Disch Isol) (TB-579, 1E-21) <input type="checkbox"/> 1CF-17 (1B CF Pump Disch Isol) (TB-579, 1E-20). d. Verify at least one CF pump - AVAILABLE TO BE STARTED.
	RO	12.d RNO IF both CF pumps are known to be incapable of starting, THEN GO TO Step 14.
	BOP	14. Depressurize NC System as follows: a. Verify letdown - IN SERVICE. b. Verify power to 1NV-37A (NV Supply To Pzr Aux Spray) - AVAILABLE. c. Depressurize NC System to less than 1905 PSIG using NV aux

<b>Appendix D</b>	<b>Required Operator Actions</b>	<b>Form ES-D-2</b>
Op Test No.: <u>NRC</u>	Scenario # <u>2</u>	Event # <u>8</u>
Page <u>31</u> of <u>35</u>		
Event Description: Loss of secondary heat sink.		
Time	Position	Applicant's Actions or Behavior

		<p>spray as follows:</p> <ol style="list-style-type: none"> <li>1) OPEN the following valves: <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NV-312A (Chrg Line-Cont Isol)</li> <li><input type="checkbox"/> 1NV-314B (Chrg Line Cont Isol).</li> </ul> </li> <li>2) Ensure the following valves - CLOSED: <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NC-27 (Pzr Spray Ctrl Frm Loop A)</li> <li><input type="checkbox"/> 1NC-29 (Pzr Spray Ctrl Frm Loop B)</li> <li><input type="checkbox"/> 1NV-39A (NV Supply To Loop D Isol)</li> <li><input type="checkbox"/> 1NV-32B (NV Supply To Loop A Isol).</li> </ul> </li> <li>3) Maintain charging flow less than 180 GPM.</li> <li>4) Throttle 1NV-37A (NV Supply To Pzr Aux Spray) and charging flow as required.</li> </ol> <p>d. Maintain NC pressure less than 1905 PSIG.</p> <p>e. <b>IF AT ANY TIME</b> letdown is lost <b>AND</b> a Pzr PORV is available, <b>THEN</b>:</p> <ol style="list-style-type: none"> <li>1) CLOSE 1NV-37A (NV Supply To Pzr Aux Spray).</li> <li>2) OPEN one of the following valves: <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NV-39A (NV Supply To Loop D Isol)</li> <li>OR</li> <li><input type="checkbox"/> 1NV-32B (NV Supply To Loop A Isol).</li> </ul> </li> <li>3) Depressurize NC System to less than 1905 PSIG using one Pzr PORV.</li> </ol>
	BOP	<p><b>15. Block S/I as follows:</b></p> <ol style="list-style-type: none"> <li>a. Verify "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) - LIT.</li> <li>b. Depress the "BLOCK" pushbuttons for the following signals: <ul style="list-style-type: none"> <li><input type="checkbox"/> ECCS steam pressure</li> <li><input type="checkbox"/> ECCS Pzr pressure.</li> </ul> </li> <li>c. Verify the following status lights (1SI-13) - LIT: <ul style="list-style-type: none"> <li><input type="checkbox"/> Main Steam Isol</li> <li><input type="checkbox"/> Pzr low pressure S/I.</li> </ul> </li> <li>d. <b>IF AT ANY TIME</b> conditions degrade while in this procedure, <b>THEN</b> initiate S/I.</li> </ol>

Appendix D		Required Operator Actions		Form ES-D-2	
Op Test No.:	NRC	Scenario #	2	Event #	8
				Page	32 of 35
Event Description: Loss of secondary heat sink.					
Time	Position	Applicant's Actions or Behavior			

	RO	<p>16. <b>Attempt to establish feed flow from CM as follows:</b></p> <p>a. Verify condenser - AVAILABLE:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> "C-9-COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT.</li> <li><input type="checkbox"/> MSIV on S/Gs to be depressurized - OPEN.</li> </ul> <p>b. Place "STM DUMP CTRL" M/A station in manual.</p> <p>c. Verify steam dumps in – PRESSURE MODE.</p> <p>d. <b>WHEN</b> "P-12 LO-LO TAVG" status light (1SI-18) is lit, <b>THEN</b> place steam dump interlock bypass switches in "BYP INTLK".</p> <p>e. Verify Bleed and Feed – PREVIOUSLY ESTABLISHED (Steps 20 through 33 Completed)</p>
	RO	<p>16.e RNO Perform the following:</p> <ol style="list-style-type: none"> <li>1) CLOSE MSIV on two S/Gs not to be depressurized.</li> <li>2) Ensure S/G PORV closed or in "AUTO" on two S/Gs not to be depressurized.</li> <li>3) <b>GO TO</b> Step 16.h.</li> </ol>
		<p><b>NOTE</b> <input type="checkbox"/> After low steamline pressure main steam isolation signal is blocked, maintaining steam pressure negative rate less than 2 PSIG per second will prevent a Main Steam Isolation.</p> <p><input type="checkbox"/> OAC graphic SMRATES to monitor S/G pressure rates can be accessed via a hot button in the center of the SM graphic.</p>
<b>CRITICAL STEP</b>	RO	<p>h. Depressurize at least one S/G to less than 505 PSIG as follows:</p> <ol style="list-style-type: none"> <li>1) Dump steam to condenser at maximum rate while attempting to avoid a Main Steam Isolation.</li> </ol> <p>i. <b>WHEN</b> S/G pressure is less than 505 PSIG, <b>THEN</b> stabilize S/G pressure less than 505 PSIG.</p> <p>j. Verify Bleed and Feed - PREVIOUSLY ESTABLISHED (Steps 20 through 33 Completed)</p>
	SRO	16.j RNO <b>GO TO</b> Step 16.i.
<b>CRITICAL STEP</b>	RO	<p>16. i. Verify CF Isolation signal - RESET OR BYPASSED.</p> <p>m. OPEN CF to CA valve on S/G(s) to be fed:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1CA-149 (S/G 1A CF Byp To CA Nozzle)</li> <li><input type="checkbox"/> 1CA-150 (S/G 1B CF Byp To CA Nozzle)</li> <li><input type="checkbox"/> 1CA-151 (S/G 1C CF Byp To CA Nozzle)</li> <li><input type="checkbox"/> 1CA-152 (S/G 1D CF Byp To CA Nozzle).</li> </ul> <p>n. Throttle open CF control valve or CF bypass control valve for S/G(s) to be fed.</p> <p>o. Verify feedwater flow to depressurized S/G(s) - INDICATING FLOW.</p>

Appendix D		Required Operator Actions		Form ES-D-2	
Op Test No.: <u>NRC</u>		Scenario # <u>2</u>		Event # <u>8</u>	
		Page <u>33</u>		of <u>35</u>	
Event Description: Loss of secondary heat sink.					
Time	Position	Applicant's Actions or Behavior			

	SRO	16.o RNO Perform the following: 1) IF depressurized S/G pressure is less than 505 PSIG, THEN GO TO Step 18. 2) RETURN TO Step 16.h.
<b>NOTE TO EVALUATOR: At this point feed flow should be established to at least one S/G.</b>		
<b>END OF SCENARIO</b>		

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	UNSAT	CT #	CRITICAL TASK
		C-1	Manually trip the main turbine before a severe (orange-path) challenge develops to either the subcriticality or the integrity CSF or before transition to ECA-2.1 (Uncontrolled Depressurization of All S/G's), whichever happens first.
		C-2	Establish feedwater flow to at least one S/G before reactor coolant system feed and bleed is required.

Comments:

## ATTACHMENT 2

<b>SHIFT TURNOVER INFORMATION</b>			
<b>Unit 1 Status</b>			
<b>Power Level</b>	<b>Power History</b>	<b>NCS Boron</b>	<b>Xenon</b>
100%	EOL	90 PPM	per OAC
<b>Controlling Procedure</b>			
<ul style="list-style-type: none"><li>OP/1/A/6100/003 (Controlling Procedure for Unit Operation), Enclosure 4.3 (Unit Operation Between 85% and 100% Power). The steps required for 100% power operation are complete.</li></ul>			
<b>Other Information Needed to Assume the Shift</b>			
<ul style="list-style-type: none"><li>1A LH pump is tagged out to repair a leak on the motor-cooler.</li><li>Maintenance estimates that repairs will take 10 hours to complete.</li><li>Direction for the crew is to swap NV pumps, placing 1B in service and shutting down 1A.</li></ul>			
<b>NLO's Available</b>			
Six NLO's are available as listed on the status board			
<b>METEOROLOGICAL CONDITIONS</b>			
<ul style="list-style-type: none"><li>Upper wind direction = 315 degrees, speed = 10 mph</li><li>Lower wind direction = 315 degrees, speed = 10.5 mph</li><li>Forecast calls for clear skies over the next 24 hours.</li></ul>			

**HLP NRC EXAM  
SCENARIO #3**

## Catawba Nuclear Station NRC Exam December 2010

Facility: Catawba NRC Exam 2010		Scenario No.: 3	Op Test No.: 1
Examiners: _____		Operators: SRO	
_____		RO	
_____		BOP	
Initial Conditions: IC#143; Unit 1 is at 50% power BOL. 1A LH pump is tagged out.			
Turnover: 1A LH pump is tagged out to repair a leak on the motor cooler. Maintenance estimates that repairs will take 10 hours to complete. Direction for the crew is to increase power to 100%.			
Event No.	Malf. No.	Event Type*	Event Description
1	--	N-BOP N-SRO R-RO	Increase reactor power to 100%.
2	NC046D	C-RO TS-SRO	Pressurizer PORV 1NC-34A fails open.
3	KC046	I-BOP TS-SRO	KC surge tank B level failure causing non essential header isolations to close. One B train KC pump fails to start.
4	SG001D	C-BOP TS-SRO	S/G 1D develops a tube leak.
5	IRX009	C-RO C-SRO	Failure of control rods to move in automatic on TS required shutdown.
6	SG001D	M-ALL	S/G 1D tube rupture.
7	SM002D	C-RO C-SRO	S/G 1D PORV fails open requiring manual isolation.
8	ISE003A/B	C-RO	Failure of automatic Phase A containment isolation signal.
9			
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

# **Catawba Nuclear Station NRC Exam December 2010**

## **Scenario 3 - Summary**

### Initial Condition

Unit 1 is at 50% power BOL. 1A LH pump is tagged out.

### Turnover:

1A LH pump is tagged out to repair a leak on the motor-cooler. Maintenance estimates that repairs will take 10 hours. Direction for the crew is to increase reactor power to 100%.

### Event 1

BOP will perform an NC system dilution and RO will set turbine-control setpoints to begin power increase to 100% power.

### Event 2

An HVAC panel alarm will require the BOP to step out of the horseshoe area. Subsequently pressurizer PORV 1NC-34A will fail open. RO will attempt to manually close the PORV unsuccessfully, and will have to close the PORV isolation valve per the immediate actions of AP/1/A/5500/011 (Pressurizer Pressure Anomalies) Case 1. Crew enters AP/11 to address this issue. TS evaluation by SRO is required.

### Event 3

KC surge tank B level switch that feeds automatic isolation of both non essential headers fails low. With an 'A' train KC pump running, this causes a loss of cooling flow to the running 1B NV pump. Crew will enter AP/1/A/5500/021 (Loss of Component Cooling Water) to address this issue. The first 'B' train KC pump that the crew tries to start fails. The second pump starts. TS evaluation by SRO is required.

### Event 4

A 15 GPM tube leak develops on the 1D S/G. Crew will enter AP/1/A/5500/010 (Reactor Coolant Leak) Case 1 to address. TS evaluation by SRO is required. A shutdown will be required due to the leak size. AP/1/A/5500/009 (Rapid Downpower) will be entered to direct the shutdown.

### Event 5

When a Tavg/Tref mismatch of > 1.5 degrees F exists, RO will recognize that control rods failed to insert as required. Crew will enter AP/1/A/5500/015 (Rod Control Malfunction).

### Event 6

Tube leak size on 1D S/G increases to the point that the crew will not be able to maintain pressurizer level. AP/1/A/5500/010 Encl. 1 guidance states for the crew to manually trip the reactor and safety inject and to go to E-0 (Reactor Trip or Safety Injection).

### Event 7

S/G 1D PORV fails open, providing a release path to the environment. RO will attempt to manually close the PORV and eventually close the PORV isolation valve

### Event 8

Automatic actuation of Phase A containment isolation fails, requiring BOP to manually initiate or to ensure that at least one valve in each major penetration from containment is closed.

***Critical task 1 – Close containment isolation valves such that at least one valve is closed on each critical phase-A penetration before the end of the scenario.***

***Critical task 2 – Depressurize the RCS to meet SI termination criteria before S/G 1D reaches 92% narrow range level.***

**Catawba Nuclear Station NRC Exam December 2010**

**EXERCISE GUIDE WORKSHEET**

1. INITIAL CONDITIONS:

1.1 Reset to IC 143

START TIME: \_\_\_\_\_

✓	✓	Instructor Action	Final	Delay	Ramp	Delete In	Event
		MAL-IRX009 (RODS FAIL TO MOVE)	AUTO				
		MAL-KC001C (KC PUMP 1B1 FAILURE)	MANUAL				
		MAL-KC001D (KC PUMP 1B2 FAILURE)	MANUAL				
		MAL-ISE003B (AUTO PHASE A ISOLATION TRN B)	BLOCK				
		MAL-ISE003B (AUTO PHASE A ISOLATION TRN A)	BLOCK				
		ANN-AD13-F05 (HVAC PANEL TROUBLE)	ON				1
		ANN-AD19-F04 (YN CRITICAL TROUBLE)	ON				1
		MAL-SG001D (S/G D TUBE LEAK)	300				11
		MAL-SM002D (S/G PORV SV1 FAILURE)	100				13
		ANN-AD13-F05 (HVAC PANEL TROUBLE)	ON				2
		MAL-KC001C (KC PUMP 1B1 FAILURE)	MANUAL				29
		MAL-KC001D (KC PUMP 1B2 FAILURE)	MANUAL				30
		OVR-NC046D (1NC34 PZR PORV SEL SW OPEN POS)	ON				3
		XMT-KC046 (LKC_5641 KC SURGE TANK KCLS5640 TO VALVES)	0				5
		MAL-SG001D (S/G D TUBE LEAK)	15				9
		Set EVENT 2 = x5ri017a					
		Set EVENT 3 = psm_5170 > 1065					
		Set EVENT 29 = x11i289n					
		Set EVENT 30 = x11i286n					
		Place a red tag collar on 1A LH pump.					

## Catawba Nuclear Station NRC Exam December 2010

### 2. SIMULATOR BRIEFING

#### 2.1 Control Room Assignments:

Position	Name
CRS	
OATC	
BOP	

2.2 Give a copy of Attachment 2 (Shift Turnover Information) to the OSM.

### 3. EXERCISE PRESENTATION

#### 3.1 Familiarization Period

A. Allow examinees time to familiarize themselves with Control Board alignments.

3.2 **Scenario EVENT 1**, increase reactor power to 100%.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>IF</b> the SOC is called to be informed of the power increase <b>repeat</b> the information.

3.3 **Scenario EVENT 2**, Pzr PORV fails open.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> directed by the lead examiner, <b>THEN INSERT SIMULATOR EVENT 1</b> to give an HVAC panel trouble alarm and AD19 alarm.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>IF</b> SWM is called to investigate the problem with 1NC34A <b>repeat</b> back the information.

3.4 **Scenario EVENT 3**, 1A CFPT trips.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> directed by the lead examiner, <b>THEN INSERT SIMULATOR EVENT 5</b> to give a failure of KC surge tank level indication.

## Catawba Nuclear Station NRC Exam December 2010

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	IF the SWM is contacted to investigate the problem with KC level instrumentation <b>repeat</b> back the information.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	IF and NEO is dispatched to investigate the cause of the B train KC pump failure to start <b>repeat</b> back the order.

### 3.5 Scenario EVENT 4, Power Range N42 blown control power fuse.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> directed by the lead examiner, <b>THEN INSERT EVENT SIMULATOR 9</b> to give a leak in S/G 1D.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	IF RP is contacted to frisk the cation columns <b>repeat</b> back the order.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	IF Secondary Chemistry is notified to determine affected S/G by sampling <b>repeat</b> the order.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> a NEO is contacted to align auxiliary systems referring to enclosure 5 <b>repeat</b> back the order.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> RP is notified of the value of the leakage and to perform HP/0/B/1009/003 <b>repeat</b> the information and order.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> Reactor Engineering is notified of the occurrence <b>repeat</b> back the information.

### 3.6 Scenario EVENT 5, rods fail to move in AUTO.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	IF the SWM is contacted to investigate the failure of the rods to move <b>repeat</b> back the information.

## **Catawba Nuclear Station NRC Exam December 2010**

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3.7 Scenario EVENT 6, S/G D tube leak increases to 300 gpm.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> directed by the lead examiner, <b>THEN INSERT SIMULATOR EVENT 11</b> to cause the 1D S/G leak to increase.
✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>IF</b> RP is contacted to frisk the cation columns <b>repeat</b> back the order.
✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>IF</b> Secondary Chemistry is notified to determine affected S/G by sampling <b>repeat</b> the order.

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>1</u>	Page	<u>8</u>	of	<u>37</u>
Event Description: Power increase to 100% power.									
Time	Position	Applicant's Actions or Behavior							

**NOTE TO EVALUATOR:** Crew will begin with a power increase. BOP will perform a Dilution per OP/1/6150/009, Enclosure 4.3. Amount of dilution will be determined by the power increase plan. The RO will input turbine target data. These two evolutions may be performed concurrently. Initial conditions are complete. A reactivity management brief will be performed during turnover. Step 3.1 is complete.

	BOP	Perform a dilution.
	RO	Input targets into the main turbine control panel.
<b>NOTE TO EVALUATOR:</b> The following actions are taken from OP/1/6150/009, Boron Concentration Control.		
	BOP	3.2 IF the blender is set for automatic makeup per Enclosure 4.1, Automatic Makeup, record the setpoint on 1NV-242A (RMWST To B/A Blender Ctrl): _____ gpm
	BOP	3.3 Ensure the following valve control switches in "AUTO": 1NV-242A (RMWST To B/A Blender Ctrl) 1NV-181A (B/A Blender Otft To VCT)
	BOP	3.4 Ensure 1NV-242A (RMWST To B/A Blender-Ctrl) controller in auto.
	BOP	3.5 Ensure at least one reactor makeup water pump is in "AUTO" or "ON".
	BOP	3.6 Adjust the total makeup counter to the desired volume of reactor makeup water to be added. (R.M.)
	BOP	3.7 Place the "NC MAKEUP MODE SELECT" switch to the "DILUTE" position.
		<b>NOTE:</b> High letdown flow rates result in increased backpressure on the letdown line. If letdown flow is $\geq 90$ gpm, it may be desirable to reduce the dilution flow rate to 80 gpm to avoid the Rx Make-up Flow Deviation alarm and associated automatic actions.
	BOP	3.8 Adjust the setpoint for 1NV-242A (RMWST To B/A Blender Ctrl) to the desired flow.
	BOP	3.9 IF NC System boron concentration will be changed by $\geq 50$ ppm, initiate PZR spray to equalize the boron concentration throughout the system.

Op Test No.:	<u>  NRC  </u>	Scenario #	<u>  3  </u>	Event #	<u>  1  </u>	Page	<u>  9  </u>	of	<u>  37  </u>
Event Description:      Power increase to 100% power.									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>3.10 <b>IF AT ANY TIME</b> it is desired to divert letdown to the RHT manually operate 1NV-172A (3-Way Divert To VCT-RHT) as follows:</p> <p>3.10.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the "RHT" position.</p> <p>3.10.2 Ensure VCT level is monitored continuously while diverting to the RHT.</p> <p>3.10.3 <b>WHEN</b> desired VCT level is reached return 1NV-172A (3-Way Divert To VCTRHT) to auto as follows:</p> <p>3.10.3.1 Place the control switch for 1NV-172A (3-Way Divert To VCTRHT) in the "VCT" position.</p> <p>3.10.3.2 Place the control switch for 1NV-172A (3-Way Divert To VCTRHT) in the "AUTO" position.</p>
<b>NOTE TO EVALUATOR: Step 3.11 will be N/A'd.</b>		
	BOP	<p>3.12 <b>WHILE</b> makeup is in progress, monitor the following for expected results:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Control rod motion</li> <li><input type="checkbox"/> NC System Tavg</li> <li><input type="checkbox"/> Reactor Power</li> </ul>
	BOP	3.13 Place the "NC MAKEUP CONTROL" switch in the "START" position. (R.M.)
	BOP	<p>3.14 Verify the following valves open:</p> <ul style="list-style-type: none"> <li>• 1NV-242A (RMWST To B/A Blender Ctrl)</li> <li>• 1NV-181A (B/A Blender Oflit To VCT)</li> </ul>
	BOP	3.15 <b>IF</b> in "AUTO", verify the reactor makeup water pump starts.
	BOP	<p>3.16 <b>WHEN</b> the desired volume of reactor makeup water is reached on the total makeup counter, ensure the following valves close. (R.M.)</p> <ul style="list-style-type: none"> <li>• 1NV-242A (RMWST To B/A Blender Ctrl)</li> <li>• 1NV-181A (B/A Blender Oflit To VCT)</li> </ul>

Op Test No.:   NRC   Scenario #   3   Event #   1   Page   10   of   37  

Event Description: Power increase to 100% power.

Time	Position	Applicant's Actions or Behavior
	BOP	<p>3.17 IF automatic makeup is desired, perform one of the following:</p> <p>3.17.1 IF it is desired to change the blender outlet boron concentration, refer to Enclosure 4.1 (Automatic Makeup).</p> <p>OR</p> <p>3.17.2 IF makeup at the previous concentration is acceptable AND the system was previously aligned per Enclosure 4.1 (Automatic Makeup), perform the following:</p> <p>3.17.2.1 Ensure the controller for 1NV-242A (RMWST To B/A Blender Ctrl) is set to the value recorded in Step 3.2. (R.M.)</p> <p>3.17.2.2 Place the "NC MAKEUP MODE SELECT" switch in "AUTO".</p> <p>3.17.2.3 Place the "NC MAKEUP CONTROL" switch to the "START" position. (R.M.)</p>
<b>END OF DILUTION</b>		
<b>NOTE TO EVALUATOR: The following steps are from OP/1/B/6300/001, Turbine Generator, starting at step 2.1.2.</b>		
	RO	<p>2.1.2 Increase turbine generator load by performing the following:</p> <p>2.1.2.1 Select "LOAD RATE" and verify it illuminates.</p> <p>2.1.2.2 Input the desired load rate.</p> <p>2.1.2.3 Select "ENTER" or "OK" and verify "LOAD RATE" goes dark.</p> <p>2.1.2.4 Select "TARGET" and verify it illuminates.</p> <p>2.1.2.5 Input the desired load target.</p> <p>2.1.2.6 Select "ENTER" and verify " TARGET " goes dark.</p> <p>2.1.2.7 Verify new load target appears on Target Display.</p> <p>2.1.2.8 Select "GO" and verify it illuminates to start load increase.</p> <p>2.1.2.9 S/G blowdown changes shall be coordinated with Secondary Chemistry.</p>
<b>END OF PREPARATION FOR POWER INCREASE ON THE TURBINE PANEL.</b>		

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>2</u>	Page	<u>11</u>	of	<u>37</u>
Event Description: Pzr PORV 1NC34A fails open.									
Time	Position	Applicant's Actions or Behavior							

<b>Booth Operator can insert Event 2 at the discretion of lead examiner.</b>		
Indications: 1AD6, E-10 'PZR PORV DISCH HI TEMP' 1AD6, F-8 'PZR LO PRESS CONTROL NC PRESSURE DECREASING 1AD6, D-10 'PZR LO PRESS PORV NC32 AND 36 BLOCKED 1AD6, D11 'PZR LO PRESS PORV NC34 BLOCKED		
	BOP	Proceed to back of MCB to investigate HVAC trouble alarm.
	RO	Recognize 1NC34A is open and attempt to close or isolate.
<b>NOTE TO EVALUATOR: An HVAC Trouble alarm will come in requiring the BOP to leave the horse shoe area.</b>		
<b>NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/011, Pressurizer Pressure Anomalies.</b>		
	RO	<b>1. Verify all Pzr PORVs - CLOSED.</b>
	RO	<b>1. RNO Perform the following:</b> a. Manually close Pzr PORV(s). b. <b>IF</b> any Pzr PORV cannot be closed, <b>THEN:</b> 1) Close the affected PORV(s) isolation valve.
		<b>NOTE</b> Control rods may withdraw on decreasing NC pressure.
	RO	<b>2. Verify Pzr spray valve(s) - CLOSED.</b>
	RO	<b>3. Verify all Pzr heaters - ENERGIZED.</b>
	RO	<b>4. Ensure 1NV-37A (NV Supply To Pzr Aux Spray) - CLOSED.</b>
		<b>NOTE</b> Positive reactivity is inserted during an increase in NC pressure which may cause auto rod insertion.
	RO	<b>5. Verify NC pressure - STABLE OR INCREASING.</b>
	RO	<b>6. WHEN NC pressure is stable, THEN:</b> <input type="checkbox"/> Stabilize unit at appropriate power level. <input type="checkbox"/> Adjust the following as required to maintain T-Avg within 1°F of T-Ref: <input type="checkbox"/> Turbine load <input type="checkbox"/> Control rods <input type="checkbox"/> Boron concentration.
<b>NOTE TO EVALUATOR: Step 7 will be N/A'd.</b>		

Op Test No.:   NRC   Scenario #   3   Event #   2   Page   12   of   37  

Event Description: Pzr PORV 1NC34A fails open.

Time	Position	Applicant's Actions or Behavior
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	SRO	<p><b>8. Ensure compliance with appropriate Tech Specs:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 3.3.1 (Reactor Trip System (RTS) Instrumentation)</li> <li><input type="checkbox"/> 3.3.2 (Engineered Safety Features Actuation System (ESFAS) Instrumentation)</li> <li><input type="checkbox"/> 3.3.3 (Post Accident Monitoring (PAM) Instrumentation)</li> <li><input type="checkbox"/> 3.3.4 (Remote Shutdown System)</li> <li><input type="checkbox"/> 3.4.1 (RCS Pressure, Temperature, and Flow Departure From Nucleate Boiling (DNB) Limits)</li> <li><input type="checkbox"/> 3.4.4 (RCS Loops - MODES 1 and 2)</li> <li><input type="checkbox"/> 3.4.5 (RCS Loops - MODE 3)</li> <li><input type="checkbox"/> 3.4.6 (RCS Loops - MODE 4)</li> <li><input type="checkbox"/> 3.4.9 (Pressurizer)</li> <li><input type="checkbox"/> 3.4.10 (Pressurizer Safety Valves)</li> <li><input type="checkbox"/> 3.4.11 (Pressurizer Power Operated Relief Valves (PORVs))</li> <li><input type="checkbox"/> 3.4.13 (RCS Operational Leakage).</li> </ul>
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	SRO	<p><b>9. Determine long term plant status. RETURN TO procedure in effect.</b></p>
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**NOTE TO EVALUATOR: The SRO should determine entry into T.S. 3.4.11 is required.**

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**END OF EVENT 2.**


Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>3</u>	Page	<u>13</u>	of	<u>37</u>
Event Description:	KC surge tank B level failure causes non-essential header isolations to close. One B train KC pump fails to start.								
Time	Position	Applicant's Actions or Behavior							

Booth Operator can insert Event 3 at the discretion of lead examiner.		
Indications: KC B header cross-connect valves go closed. 1AD7, D-3 'NV PMP B OIL COOLER LO FLOW' Crew enters AP/1/A/5500/021, Loss of Component Cooling		
	CREW	Recognize a failure of the KC level transmitter going to the KC header cross-connect valves.
<b>NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/021, Loss of Component Cooling.</b>		
	CREW	<b>CAUTION</b> Failure to restore NC pump seal cooling via thermal barrier cooling or NV seal injection within 10 minutes will cause damage to the NC pump seals resulting in NC inventory loss.
	RO/BOP	1. Monitor Enclosure 1 (Foldout Page).
	BOP	2. Verify at least one KC pump - ON.
	SRO	3. IF AT ANY TIME all KC pumps are lost, THEN RETURN TO STEP 2.
		<b>NOTE</b> Uncooled letdown may result in loss of NV pumps within a matter of minutes.
	BOP	4. Verify the following: <input type="checkbox"/> 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - DARK. <b>AND</b> <input type="checkbox"/> At least one KC pump - ON.
	BOP	5. IF AT ANY TIME 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" LIT, THEN perform Step 4 RNO.
	BOP	6. Verify both KC surge tank levels - 50% - 90% AND STABLE.
	BOP	7. Start additional KC pump(s) as necessary to supply any KC loads presently in service.
<b>NOTE TO EVALUATOR: The first KC pump started will not start. The BOP will start the second KC pump on B train.</b>		
		<b>CAUTION</b> A loss of KC cooling to the NC pumps results in a gradual approach to an overheated condition in approximately 10 minutes which will result in shaft seizure.

Op Test No.:   NRC   Scenario #   3   Event #   3   Page   14   of   37  

Event Description: KC surge tank B level failure causes non-essential header isolations to close. One B train KC pump fails to start.

Time	Position	Applicant's Actions or Behavior
	BOP	<p><b>8. Verify KC flow to NC pumps as follows:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1AD-20, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK</li> <li><input type="checkbox"/> 1AD-21, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK.</li> </ul>
	BOP	<p><b>9. Verify KC available as follows:</b></p> <ul style="list-style-type: none"> <li>a. Verify the following Train A KC non-essential header isolation valves - OPEN:               <ul style="list-style-type: none"> <li><input type="checkbox"/> 1KC-230A (Rx Bldg Non-Ess Hdr Isol)</li> <li><input type="checkbox"/> 1KC-3A (Rx Bldg Non-Ess Ret Hdr Isol)</li> <li><input type="checkbox"/> 1KC-50A (Aux Bldg Non-Ess Hdr Isol)</li> <li><input type="checkbox"/> 1KC-1A (Aux Bldg Non-Ess Ret Hdr Isol).</li> </ul> </li> <li>b. Verify the following Train B KC non-essential header isolation valves - OPEN:               <ul style="list-style-type: none"> <li><input type="checkbox"/> 1KC-228B (Rx Bldg Non-Ess Hdr Isol)</li> <li><input type="checkbox"/> 1KC-18B (Rx Bldg Non-Ess Ret Hdr Isol)</li> <li><input type="checkbox"/> 1KC-53B (Aux Bldg Non-Ess Hdr Isol)</li> <li><input type="checkbox"/> 1KC-2B (Aux Bldg Non-Ess Ret Hdr Isol).</li> </ul> </li> <li>c. Start additional KC pump(s) as necessary to supply any KC loads presently in service.</li> </ul>
	BOP	<p>9.b RNO <b>NOTE</b> The KC non-essential header valves can be reopened when the appropriate train's level switch is reset. This should occur between 40% and 48% KC surge tank level.</p> <p>b. <b>WHEN</b> OAC alarm C1D2214 (KC Train B Low-Low Level Surge Tank Isol) is "NOT ACTUATED", <b>THEN</b> ensure the affected valve(s) are open.</p>
	BOP	<p><b>10. Verify KC surge tank levels normal as follows:</b></p> <ul style="list-style-type: none"> <li>a. Verify both KC surge tank levels - 50% - 90% AND STABLE.</li> <li>b. <b>GO TO</b> Step 14.</li> </ul>

Op Test No.:   NRC   Scenario #   3   Event #   3   Page   15   of   37  

Event Description: KC surge tank B level failure causes non-essential header isolations to close. One B train KC pump fails to start.

Time	Position	Applicant's Actions or Behavior
	BOP	14. Ensure KC heat exchanger outlet mode switches - PROPERLY ALIGNED.
	CREW	15. Determine and correct cause of loss of KC.
	SRO	16. Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual: <input type="checkbox"/> SLC 16.9-7 (Boration Systems Flow Path - Shutdown) <input type="checkbox"/> SLC 16.9-8 (Boration Systems Flow Path - Operating) <input type="checkbox"/> SLC 16.9-9 (Boration Systems Pumps - Shutdown) <input type="checkbox"/> SLC 16.9-10 (Boration Systems Charging Pumps - Operating) <input type="checkbox"/> 3.5.2 (ECCS - Operating) <input type="checkbox"/> 3.5.3 (ECCS - Shutdown) <input type="checkbox"/> 3.6.6 (Containment Spray System) <input type="checkbox"/> 3.7.5 (Auxiliary Feedwater (AFW) System) <input type="checkbox"/> 3.7.7 (Component Cooling Water (CCW) System).
NOTE TO EVALUATOR: The SRO should determine T.S. 3.7.7 should be entered.		
	SRO	17. Determine required notifications: <input type="checkbox"/> REFER TO RP/0/A/5000/001 (Classification Of Emergency) <input type="checkbox"/> REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
	SRO	18. IF KC Hx leak to RN is suspected, THEN perform the following:
NOTE TO EVALUATOR: Step 18 will be N/A'd.		
	BOP	19. Verify KC surge tanks level as follows: <input type="checkbox"/> Greater than 50% <input type="checkbox"/> Stable or increasing.
	BOP	20. WHEN plant conditions permit, THEN: <input type="checkbox"/> Return KC pumps to normal operation. REFER TO OP/1/A/6400/005 (Component Cooling Water System). <input type="checkbox"/> Return NV Pump 1A to normal cooling as applicable. REFER TO Enclosure 4 (Alternate Cooling To NV Pump 1A).

Op Test No.:   NRC   Scenario #   3   Event #   3   Page  16  of  37 

Event Description: KC surge tank B level failure causes non-essential header isolations to close. One B train KC pump fails to start.

Time	Position	Applicant's Actions or Behavior
	BOP	<p><b>21. Verify the following:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - DARK</li> <li><input type="checkbox"/> 1AD-7, H/3 "VCT HI TEMP" - DARK</li> <li><input type="checkbox"/> Normal letdown - IN SERVICE.</li> </ul>
	BOP	<p><b>22. Ensure VCT and letdown path aligned as follows:</b></p> <p>a. <b>IF</b> desired to align NV pump suction to VCT, then perform the following:</p> <ol style="list-style-type: none"> <li>1) Open the following valves:                     <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NV-188A (VCT Otlt Isol)</li> <li><input type="checkbox"/> 1NV-189B (VCT Otlt Isol).</li> </ul> </li> <li>2) Close the following valves:                     <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NV-252A (NV Pumps Suct From FWST)</li> <li><input type="checkbox"/> 1NV-253B (NV Pumps Suct From FWST).</li> </ul> </li> </ol> <p>b. <b>WHEN</b> NV suction aligned to VCT, <b>THEN</b> momentarily place 1NV-172A (3-Way Divert To VCT-RHT) to the "VCT" position and return to "AUTO".</p> <p>c. <b>IF</b> desired to restore letdown flow through the NV demineralizers, <b>THEN</b> momentarily place 1NV-153A (Letdn Hx Otlt 3-Way Vlv) to the "DEMIN" position and return to "AUTO".</p>
	CREW	<p><b>23. Determine long term plant status. RETURN TO procedure in affect.</b></p>
<b>END OF EVENT 3.</b>		

Op Test No.:	<u>  NRC  </u>	Scenario #	<u>  3  </u>	Event #	<u>  4 and 5  </u>	Page	<u>  17  </u>	of	<u>  37  </u>
Event Description:       S/G 1D develops a tube leak. Auto rod control is failed.									
Time	Position	Applicant's Actions or Behavior							

**Booth Operator can insert Event 4 at the discretion of lead examiner.**

Indications: 1RAD-1, B-1 1EMF 33 CSAE EXHAUST HI RAD  
 1RAD-1, B-4 1EMF 71 S/G A LEAKAGE HI RAD  
 1RAD-1, E-5 1EMF 74 S/G D LEAKAGE HI RAD

CREW	Recognize a S/G tube leak.
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**NOTE TO EVALUATOR: The following steps are from AP/1/5500/010, Reactor Coolant Leak, Case I.**

RO/BOP	1. <b>Monitor Enclosure 1 (Case I Steam Generator Tube Leak Foldout Page).</b>
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BOP	2. <b>Verify Pzr level - STABLE OR INCREASING.</b>
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CREW	3. <b>IF AT ANY TIME Pzr level decreases in an uncontrolled manner or cannot be maintained greater than 4%, THEN perform Step 2.</b>
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**NOTE** In subsequent steps the term "affected S/G" is a S/G with primary to secondary leakage.

4. **Identify the affected S/G(s) as follows:**

Notify RP to frisk all cation columns.

OR

Any S/G N/R level - INCREASING IN AN UNCONTROLLED MANNER.

OR

**NOTE** The S/G Leakage EMFs are highly sensitive which may cause the EMFs located on the adjacent steamline to be increasing or in alarm.

Verify any of the following S/G leakage EMF indication(s) - INCREASING OR IN ALARM:

1EMF-71 (S/G A Leakage)

1EMF-72 (S/G B Leakage)

1EMF-73 (S/G C Leakage)

1EMF-74 (S/G D Leakage).

OR

Verify any of the following S/G steamline EMF indication(s) - INCREASING OR IN ALARM:

1EMF-26 (Steamline 1A)

1EMF-27 (Steamline 1B)

1EMF-28 (Steamline 1C)

1EMF-29 (Steamline 1D).

(Continued)

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>4 and 5</u>	Page	<u>18</u>	of	<u>37</u>
Event Description: S/G 1D develops a tube leak. Auto rod control is failed.									
Time	Position	Applicant's Actions or Behavior							

		<p>OR</p> <p><input type="checkbox"/> Verify CF flow - LOWER TO ANY S/G AS COMPARED TO OTHERS.</p> <p>OR</p> <p><input type="checkbox"/> Notify Secondary Chemistry to determine affected S/G by sampling.</p>
	BOP	<p><b>5. Verify VCT level able to be maintained by normal makeup as follows:</b></p> <p>a. One of the following conditions exists:</p> <p><input type="checkbox"/> S/G tube leak is less than 90 gpm.</p> <p>OR</p> <p><input type="checkbox"/> Automatic makeup stabilizes or increases VCT level.</p> <p>OR</p> <p><input type="checkbox"/> Manual makeup stabilizes or increases VCT level.</p> <p>b. <b>IF AT ANY TIME</b> the following conditions exist:</p> <p><input type="checkbox"/> 1AD-7, I/1 "VCT LO LVL" alarm – LIT</p> <p>AND</p> <p><input type="checkbox"/> Reactor trip breakers are closed.</p> <p><b>THEN</b> perform Step 5.a RNO.</p>
	RO/BOP	<p><b>6. Minimize Secondary contamination as follows:</b></p> <p>a. Remove CM polishing demineralizers from service as follows:</p> <p>1) Ensure "POLSH DEMIN BYP CTRL" - PLACED IN MANUAL.</p> <p>2) Ensure "POLSH DEMIN BYP CTRL" - OPEN.</p> <p>3) Notify Secondary Chemistry CM polishing demineralizers have been bypassed.</p> <p>b. Align auxiliary systems to minimize secondary side contamination as follows:</p> <p>1) Transfer turbine steam supply to AS as follows:</p> <p>a) Open 1TL-8 (Aux Stm To Stm Seal Reg).</p> <p>b) Close 1TL-2 (Main Stm To Stm Seal Reg).</p> <p>2) Dispatch operator(s) to align auxiliary systems. <b>REFER TO</b> Enclosure 5 (Auxiliary System Alignment).</p> <p>c. Stop any transfer of water between both Unit's CSTs.</p>





Op Test No.:   NRC   Scenario #   3   Event #   4 and 5   Page   21   of   37  

Event Description: S/G 1D develops a tube leak. Auto rod control is failed.

Time	Position	Applicant's Actions or Behavior
	BOP	<p><b>13. Perform the following:</b></p> <p><b>NOTE</b> Leakage indications are validated by an EMF trending in the same direction. Precise duplication of leakage values is not required.</p> <p>a. Verify at least one of the following EMFs validate leakage indication:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1EMF-71 (S/G A Leakage)</li> <li><input type="checkbox"/> 1EMF-72 (S/G B Leakage)</li> <li><input type="checkbox"/> 1EMF-73 (S/G C Leakage)</li> <li><input type="checkbox"/> 1EMF-74 (S/G D Leakage).</li> </ul> <p><b>NOTE</b> Unit shutdown should not be postponed while waiting for chemistry calculation results.</p> <p>b. <b>IF AT ANY TIME</b> Chemistry calculations contradict leakage indications, <b>THEN</b> perform the following:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Unit shutdown may be suspended</li> <li><input type="checkbox"/> <b>RETURN TO</b> Step 8.</li> </ul> <p><b>NOTE</b> EMFs should be monitored every 15 minutes.</p> <p>c. Monitor the following EMFs:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1EMF-33 (Condenser Air Ejector Exhaust)</li> <li><input type="checkbox"/> 1EMF-71 (S/G A Leakage)</li> <li><input type="checkbox"/> 1EMF-72 (S/G B Leakage)</li> <li><input type="checkbox"/> 1EMF-73 (S/G C Leakage)</li> <li><input type="checkbox"/> 1EMF-74 (S/G D Leakage).</li> </ul> <p>d. Notify RP of the following:</p> <ol style="list-style-type: none"> <li>1) The current value of leakage.</li> <li>2) Perform HP/0/B/1009/003 (Radiation Protection Response Following A Primary To Secondary Leak).</li> </ol> <p>e. Evaluate secondary contamination potential. Review PT/1/B/4150/001G (Turbine Building Sump Isolation).</p>
	SRO	<p><b>14. Determine unit shutdown requirements as follows:</b></p> <p>a. <b>IF AT ANY TIME</b> leak rate is greater than or equal to 100 gpd, <b>THEN</b> perform the following:</p> <ol style="list-style-type: none"> <li>1) Ensure reactor power less than 50% within 1 hr.</li> <li>2) Ensure unit in Mode 3 within the following 2 hrs.</li> <li>3) Observe Note prior to Step 15 and <b>GO TO</b> Step 15.</li> </ol>
<b>NOTE TO EVALUATOR: The rest of step 14 will be N/A.</b>		

Op Test No.:	<u>  NRC  </u>	Scenario #	<u>  3  </u>	Event #	<u>  4 and 5  </u>	Page	<u>  22  </u>	of	<u>  37  </u>
Event Description:      S/G 1D develops a tube leak. Auto rod control is failed.									
Time	Position	Applicant's Actions or Behavior							

		<b>NOTE</b> EMF indications may decrease during unit shutdown. Unit shutdown should not be suspended based solely on decreasing radiation monitor indications.
	RO/BOP	<b>15. Shutdown the Unit as follows:</b> a. Notify Reactor Group Engineer of occurrence. b. Verify reactor power - GREATER THAN 15%. c. Initiate unit shutdown. <b>REFER TO:</b> <input type="checkbox"/> OP/1/A/6100/003 (Controlling Procedure For Unit Operation) OR <input type="checkbox"/> AP/1/A/5500/009 (Rapid Downpower). d. Ensure adequate shutdown margin is maintained. <b>REFER TO</b> ROD Book, Section 5.11.
<b>NOTE TO EVALUATOR:</b> At this step the crew will refer to AP/1/A/5500/009 (Rapid Downpower) and begin a rapid shutdown.		
<b>NOTE TO EVALUATOR:</b> The following steps are from AP/1/A/5500/009 (Rapid Downpower).		
	RO/BOP	<b>1. Monitor Enclosure 1 (Foldout Page).</b>
	SRO	<b>2. Determine required notifications:</b> <input type="checkbox"/> <b>REFER TO</b> RP/0/A/5000/001 (Classification Of Emergency) <input type="checkbox"/> <b>REFER TO</b> RP/0/B/5000/013 (NRC Notification Requirements).
	CREW	<b>3. IF AT ANY TIME prompt separation from the grid is required, THEN GO TO Step 26.</b>
	RO	<b>4. IF load reduction is due to grid instability, THEN perform the following:</b>
<b>NOTE TO EVALUATOR:</b> Step 4 will be N/A.		
	RO	<b>5. Verify Turbine Control - IN AUTO.</b>
	CREW	<b>6. Verify the following load reduction criteria - KNOWN:</b> <input type="checkbox"/> Time required to reduce load <input type="checkbox"/> Target load power level.
	RO	<b>7. Verify time required to reduce load - GREATER THAN OR EQUAL TO 15 MINUTES.</b>

Op Test No.:   NRC   Scenario #   3   Event #   4 and 5   Page   23   of   37    
 Event Description:   S/G 1D develops a tube leak. Auto rod control is failed.  

Time	Position	Applicant's Actions or Behavior
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		<b>NOTE</b> The following tables are estimates only and can be used for rapid entry into the turbine control panel.
	SRO/BOP	<b>8. Determine the required power reduction rate (MW/Min) from the table below:</b>
<b>NOTE TO EVALUATOR:</b> The SRO and BOP will refer to the table in this step and determine the appropriate load reduction rate.		
	SRO/BOP	<b>9. Determine the target load from the table below:</b>
<b>NOTE TO EVALUATOR:</b> The SRO and BOP will refer to the table in this step and determine the appropriate target load.		
	RO	<b>10. Initiate turbine load reduction as follows:</b>  <b>NOTE</b> Any load reduction rate of greater than 25 MW/Min must be performed in the manual mode. <input type="checkbox"/> Unloading rates greater than 60 MW/Min (5%/minute) will meet C-7A interlock and may result in steam dump actuation.  a. Verify automatic turbine load reduction - DESIRED. b. Enter the desired "LOAD RATE" on the turbine control panel. c. Enter the desired "TARGET" on the turbine control panel. d. Depress the "GO" pushbutton on the turbine control panel. e. Verify turbine load - DECREASING AS REQUIRED. f. <b>IF AT ANY TIME</b> the turbine controls fail to respond properly, <b>THEN</b> perform Step 10.e.
	RO/SRO	<b>11. IF AT ANY TIME the turbine load reduction rate OR the target load must be changed, THEN RETURN TO Step 5.</b>
	RO	<b>12. Adjust power factor as necessary. REFER TO Unit 1 Revised Data Book Figure 43.</b>
	RO	<b>13. Attempt to control T-Avg as follows:</b> a. Verify T-Ref instrumentation - AVAILABLE. b. Verify control rods - IN AUTO AND STEPPING IN.
	RO	<b>13.b RNO IF T-Avg is greater than 1.5°F higher than T-Ref, THEN manually insert control rods as required to maintain T-Avg within 1°F of T-Ref.</b>

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>4 and 5</u>	Page	<u>24</u>	of	<u>37</u>
Event Description:	S/G 1D develops a tube leak. Auto rod control is failed.								
Time	Position	Applicant's Actions or Behavior							

<b>NOTE TO EVALUATOR: At this step Event 5 is in progress. The RO should recognize a failure of rods to move and take manual control of the rods to restore Tavg.</b>		
	RO	13.c. Maintain T-Avg greater than or equal to 551°F. d. Verify Reactor Engineering Power Maneuvering Guidance has been provided by Duty Reactor Engineer.
	BOP	13.d RNO Perform the following: 1) Borate NC System as required. <b>REFER TO R.O.D. book</b> (section 4.8). 2) <b>GO TO</b> Step 13.f.
	BOP	13. f. Ensure operator monitors Enclosure 2 (Rod Insertion Limit Boration).
	BOP	14. <b>Verify Pzr PORV and Pzr spray valve status as follows:</b> a. All Pzr PORVs - CLOSED. b. Normal Pzr spray valves - CLOSED.
<b>NOTE TO EVALUATOR: The following steps are from AP/15, Rod Control Malfunctions. The crew may refer to this AP due to the failure of rods to move in automatic.</b>		
		<b>1. Verify plant conditions - STABLE.</b>
		1. RNO <b>Perform the following:</b> a. <b>IF</b> load rejection in progress, <b>THEN</b> do not continue in this procedure until plant conditions are stable. b. <b>IF</b> power decrease in progress, <b>THEN</b> perform the following: 1) Determine if power decrease can be stopped. 2) <b>IF</b> power decrease can be stopped, <b>THEN</b> perform the following: a) Stop power decrease. b) Observe Caution prior to Step 2 and <b>GO TO</b> Step 2. 3) <b>IF</b> power decrease must continue, <b>THEN</b> perform the following: <input type="checkbox"/> <b>IF</b> auto and manual rod control not available, <b>THEN</b> perform one of the following:  <input type="checkbox"/> Borate to maintain T-Avg at T-Ref and <b>RETURN TO</b> procedure in effect.  <b>OR</b>

Op Test No.:   NRC   Scenario #   3   Event #   4 and 5   Page   25   of   37  

Event Description: S/G 1D develops a tube leak. Auto rod control is failed.

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> <li><input type="checkbox"/> Trip reactor and <b>GO TO</b> EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).</li> <li><input type="checkbox"/> <b>IF</b> auto or manual rod control available, <b>THEN</b> perform the following:               <ul style="list-style-type: none"> <li>a) <b>IF AT ANY TIME</b> two or more rods are misaligned by greater than 24 steps, <b>THEN</b>:                   <ul style="list-style-type: none"> <li>(1) Trip Reactor.</li> <li>(2) <b>GO TO</b> EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).</li> </ul> </li> <li>b) <b>WHEN</b> plant conditions are stable, <b>THEN</b> observe Caution prior to Step 2 and <b>GO TO</b> Step 2.</li> <li>c) <b>RETURN TO</b> procedure in effect.</li> </ul> </li> </ul>
<b>END OF EVENT 4 and 5.</b>		

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>6, 7 and 8</u>	Page	<u>26</u>	of	<u>37</u>
Event Description: S/G 1D Tube Rupture with a stuck open S/G 1D PORV. Phase A fails to actuate Automatically.									
Time	Position	Applicant's Actions or Behavior							

**NOTE TO EVALUATOR: After step 14 of AP-09, the booth instructor can insert Event 6 at the lead instructor's discretion.**

Indications: Pzr Level begins to decrease in an uncontrolled rate.

	CREW	Recognize the need for a reactor trip and safety injection
	RO	Manually trip the reactor
	BOP	Manually actuate safety injection
	RO	Recognize the failed S/G PORV
	RO	Manually isolate the failed S/G PORV
	BOP	Manually actuate Phase A containment isolation.

**NOTE TO EVALUATOR: The following step is from AP/1/A/5500/010 (Reactor Coolant Leak) Encl. 1.**

	CREW	<p>a. IF Pzr level cannot be maintained greater than 4% OR Pzr pressure is decreasing in an uncontrolled manner, THEN:</p> <p>1) Manually trip reactor.</p> <p>2) WHEN reactor trip verified, THEN manually initiate S/I.</p> <p>3) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).</p>

**NOTE TO EVALUATOR: The following actions are from EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).**

	CREW	1. Monitor Enclosure 1 (Foldout Page).
	RO	<p>2. Verify Reactor Trip: (Immediate action step)</p> <p><input type="checkbox"/> All rod bottom lights – LIT</p> <p><input type="checkbox"/> All reactor trip and bypass breakers – OPEN</p> <p><input type="checkbox"/> I/R amps - DECREASING.</p>
	RO	<p>3. Verify Turbine Trip: (Immediate action step)</p> <p><input type="checkbox"/> All turbine stop valves - CLOSED</p>
	BOP	4. Verify 1ETA and 1ETB - ENERGIZED. (Immediate action step)

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>6, 7 and 8</u>	Page	<u>27</u>	of	<u>37</u>
Event Description:	S/G 1D Tube Rupture with a stuck open S/G 1D PORV. Phase A fails to actuate Automatically.								
Time	Position	Applicant's Actions or Behavior							

	BOP	<p><b>5. Verify S/I is actuated: (Immediate action step)</b></p> <p>a. "SAFETY INJECTION ACTUATED" status light (1SI-13) - LIT.</p> <p>b. Both E/S load sequencer actuated status lights (1SI-14) - LIT.</p>
	RO	<b>6. Announce "Unit 1 Safety Injection".</b>
	SRO	<p><b>7. Determine required notifications:</b></p> <p><input type="checkbox"/> REFER TO RP/0/A/5000/001 (Classification Of Emergency)</p> <p><input type="checkbox"/> REFER TO RP/0/B/5000/013 (NRC Notification Requirements).</p>
	RO	<b>8. Verify all Feedwater Isolation status lights (1SI-5) - LIT.</b>
	BOP	<p><b>9. Verify Phase A Containment Isolation status as follows:</b></p> <p>a. Phase A "RESET" lights - DARK.</p> <p>b. Monitor Light Panel Group 5 St lights - LIT.</p>
CRITICAL TASK	BOP	<b>9. RNO</b> a. Manually initiate Phase A Isolation.
	BOP	<p><b>10. Verify proper Phase B actuation as follows:</b></p> <p>a. Containment pressure – HAS REMAINED LESS THAN 3 PSIG.</p> <p>b. <b>IF AT ANY TIME</b> containment pressure exceeds 3 PSIG while in this procedure, <b>THEN</b> perform Step 10.a.</p>
	RO	<p><b>11. Verify proper CA pump status as follows:</b></p> <p>a. Motor driven CA pumps - ON.</p> <p>b. 3 S/G N/R levels - GREATER THAN 11%.</p>
	BOP	<p><b>12. Verify all of the following S/I pumps - ON:</b></p> <p><input type="checkbox"/> NV pumps</p> <p><input type="checkbox"/> ND pumps</p> <p><input type="checkbox"/> NI pumps.</p>
	BOP	<b>13. Verify all KC pumps - ON.</b>
	BOP	<b>14. Verify all Unit 1 and Unit 2 RN pumps - ON.</b>
	BOP	<p><b>15. Verify proper ventilation systems operation as follows:</b></p> <p><input type="checkbox"/> REFER TO Enclosure 2 (Ventilation System Verification).</p> <p><input type="checkbox"/> Notify Unit 2 operator to perform Enclosure 3 (Opposite Unit Ventilation Verification).</p>

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>6, 7 and 8</u>	Page	<u>28</u>	of	<u>37</u>
Event Description: S/G 1D Tube Rupture with a stuck open S/G 1D PORV. Phase A fails to actuate Automatically.									
Time	Position	Applicant's Actions or Behavior							

	RO	16. Verify all S/G pressures – GREATER THAN 775 PSIG.
	RO	17. Verify proper S/I flow as follows: a. "NV S/I FLOW" - INDICATING FLOW. b. NC pressure - LESS THAN 1620 PSIG.
	BOP	17.b RNO 1) Ensure ND pump miniflow valve on operating ND pump(s) - OPEN. 2) IF the ND pump miniflow valve(s) cannot be opened, THEN perform the following for affected train(s): 3) GO TO Step 18.
	RO	18. Control S/G levels as follows: a. Verify total CA flow - GREATER THAN 450 GPM. b. WHEN at least one S/G N/R level is greater than 11% (29% ACC), THEN throttle feed flow to maintain all S/G N/R levels between 11% (29% ACC) and 50%.
	RO	19. Verify all CA isolation valves - OPEN.
	BOP	20. Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.
	RO	21. Control NC temperature. REFER TO Enclosure 4 (NC Temperature Control).
	BOP	22. Verify Pzr PORV and Pzr spray valve status as follows: a. All Pzr PORVs - CLOSED. b. Normal Pzr spray valves - CLOSED. c. At least one Pzr PORV isolation valve - OPEN.
	RO	23. Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.
	RO	24. Verify main steamlines are intact as follows: <input type="checkbox"/> All S/G pressures - STABLE OR INCREASING <input type="checkbox"/> ALL S/Gs - PRESSURIZED.
NOTE TO EVALUATOR: If the crew has not identified the 1D S/G PORV failure they may identify S/G pressure as decreasing in an uncontrolled manner. This would send them to E-2, Faulted Steam Generator Isolation.		

Op Test No.:   NRC   Scenario #   3   Event #   6, 7 and 8   Page   29   of   37  Event Description:   S/G 1D Tube Rupture with a stuck open S/G 1D PORV. Phase A fails to actuate Automatically.  

Time	Position	Applicant's Actions or Behavior
	BOP	<p><b>25. Verify S/G tubes are intact as follows:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Verify the following EMF trip 1 lights - DARK: <ul style="list-style-type: none"> <li><input type="checkbox"/> 1EMF-33 (Condenser Air Ejector Exhaust)</li> <li><input type="checkbox"/> 1EMF-26 (Steamline 1A)</li> <li><input type="checkbox"/> 1EMF-27 (Steamline 1B)</li> <li><input type="checkbox"/> 1EMF-28 (Steamline 1C)</li> <li><input type="checkbox"/> 1EMF-29 (Steamline 1D).</li> </ul> </li> <li><input type="checkbox"/> All S/G levels - STABLE OR INCREASING IN A CONTROLLED MANNER.</li> </ul>
	SRO	<p><b>25. RNO IF any EMF trip 1 light is lit OR any S/G level is increasing in an uncontrolled manner, THEN concurrently:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).</li> <li><input type="checkbox"/> <b>GO TO EP/1/A/5000/E-3 (Steam Generator Tube Rupture).</b></li> </ul>
<b>NOTE TO EVALUATOR: The following actions are from EP/1/A/5000/E-3.</b>		
	CREW	<p><b>1. Monitor Enclosure 1 (Foldout Page).</b></p>
	BOP	<p><b>2. Identify ruptured S/G(s) as follows:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> S/G level - INCREASING IN AN UNCONTROLLED MANNER.</li> <li>OR</li> <li><input type="checkbox"/> RP determines ruptured S/G by frisking the cation columns in the CT lab.</li> <li>OR</li> <li><input type="checkbox"/> The following EMF trip 1 lights - LIT: <ul style="list-style-type: none"> <li><input type="checkbox"/> 1EMF-26 (Steamline 1A)</li> <li><input type="checkbox"/> 1EMF-27 (Steamline 1B)</li> <li><input type="checkbox"/> 1EMF-28 (Steamline 1C)</li> <li><input type="checkbox"/> 1EMF-29 (Steamline 1D).</li> </ul> </li> <li>OR</li> <li><input type="checkbox"/> IF S/G Sampling is required to identify ruptured S/G(s), THEN: <ul style="list-style-type: none"> <li>a. Ensure the following signals - RESET:</li> </ul> </li> </ul>

Op Test No.:   NRC   Scenario #   3   Event #   6, 7 and 8   Page   30   of   37  Event Description:   S/G 1D Tube Rupture with a stuck open S/G 1D PORV. Phase A fails to actuate Automatically.  

Time	Position	Applicant's Actions or Behavior
		1) Phase A Containment Isolations. 2) CA System valve control. 3) KC NC NI NM St signals. b. Align all S/Gs for Chemistry sampling. c. Notify Chemistry to sample all S/Gs for activity.
	RO	<b>3. Verify at least one intact S/G - AVAILABLE FOR NC SYSTEM COOLDOWN.</b>
	RO	<b>4. Isolate steam flow from ruptured S/G(s) as follows:</b> a. Verify all ruptured S/G(s) PORV - CLOSED. b. Verify S/G(s) 1B and 1C - INTACT. c. Isolate blowdown and steam drain on all ruptured S/G(s) as follows: <input type="checkbox"/> S/G 1D: 1) Close 1SM-74B (S/G 1D Otlt Hdr Bldwn C/V). 2) Verify the following blowdown isolation valves - CLOSED: a) 1BB-8A (S/G 1D Bldwn Cont Isol Insd). b) 1BB-147B (S/G 1D Bldwn Cont Isol Byp). c) 1BB-10B (S/G 1D Bldwn Cont Isol Otsd).
	RO	<b>5. Close the following valves on all ruptured S/G(s):</b> <input type="checkbox"/> MSIV <input type="checkbox"/> MSIV bypass valve.
	RO	<b>6. Control ruptured S/G(s) level as follows:</b> a. Verify ruptured S/G(s) N/R level - GREATER THAN 11% (29% ACC). b. Isolate feed flow to all ruptured S/G(s) as follows: <input type="checkbox"/> S/G 1D: 1) Close 1CA-42B (CA Pmp B Disch To S/G 1D Isol). 2) Close 1CA-38A (CA Pmp 1 Disch To S/G 1D Isol). c. <b>IF AT ANY TIME</b> ruptured S/G(s) N/R level is less than 11% (29% ACC), <b>THEN</b> perform Step 6.

Op Test No.:   NRC   Scenario #   3   Event #   6, 7 and 8   Page   31   of   37  

Event Description:   S/G 1D Tube Rupture with a stuck open S/G 1D PORV. Phase A fails to actuate Automatically.  

Time	Position	Applicant's Actions or Behavior
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	BOP	7. Verify at least one NC pump - ON.
	BOP	8. WHEN "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) is lit, THEN: a. Depress ECCS steam pressure "BLOCK" pushbuttons. b. Verify main steam isolation blocked status lights (1SI-13) - LIT. c. Maintain NC pressure less than 1955 PSIG using one of the following: <input type="checkbox"/> Pzr spray OR <input type="checkbox"/> Pzr PORV.
		<b>NOTE</b> <input type="checkbox"/> NC pump trip criteria based on NC subcooling does not apply after starting a controlled cooldown. <input type="checkbox"/> After the low steamline pressure main steam isolation signal is blocked Main Steam Isolation will occur if the high steam pressure rate setpoint is exceeded.
	RO	9. Initiate NC System cooldown as follows: a. Verify all ruptured S/G(s) pressure - GREATER THAN 320 PSIG. b. Determine required core exit temperature from the table below:
<b>NOTE TO EVALUATOR: The SRO and BOP will use the table in step 9 to determine target core exit temperature.</b>		
	RO	c. Ensure ruptured S/G(s) isolated as follows: 1) Verify the following valves on all ruptured S/G(s) - CLOSED: <input type="checkbox"/> MSIV <input type="checkbox"/> MSIV bypass valves. 2) Verify S/G PORV on ruptured S/G(s) - CLOSED OR ISOLATED.
<b>NOTE TO EVALUATOR: Step 9.c.3 will be N/A'd.</b>		

Op Test No.:   NRC   Scenario #   3   Event #   6, 7 and 8   Page   32   of   37  

Event Description:   S/G 1D Tube Rupture with a stuck open S/G 1D PORV. Phase A fails to actuate Automatically.  

Time	Position	Applicant's Actions or Behavior
	RO/BOP	d. Verify the condenser is available as follows: <ul style="list-style-type: none"> <li><input type="checkbox"/> "C-9-COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT</li> <li><input type="checkbox"/> MSIV on intact S/G(s) - OPEN.</li> </ul> e. Verify steam dumps - IN PRESSURE MODE. f. WHEN "P-12 LO-LO TAVG" status light (1SI-18) is lit, THEN place the steam dump interlock bypass switches in "BYP INTLK." g. Dump steam to condenser from intact S/G(s) at maximum rate while attempting to avoid a Main Steam Isolation. h. Verify main steam isolation blocked status lights (1SI-13) - LIT. i. <b>WHEN</b> core exit T/Cs are less than required temperature, <b>THEN</b> stabilize core exit T/Cs less than required temperature.
	RO	<b>10. Control intact S/G levels as follows:</b> <ul style="list-style-type: none"> <li>a. Verify N/R level in all intact S/Gs - GREATER THAN 11% (29% ACC).</li> <li>b. Throttle feed flow to maintain all intact S/G N/R levels between 16% (29% ACC) and 50%.</li> </ul>
	BOP	<b>11. Verify Pzr PORV and isolation valve status as follows:</b> <ul style="list-style-type: none"> <li>a. Power to all Pzr PORV isolation valves - AVAILABLE.</li> <li>b. All Pzr PORVs - CLOSED.</li> <li>c. At least one Pzr PORV isolation valve - OPEN.</li> <li>d. <b>IF AT ANY TIME</b> a Pzr PORV opens due to high pressure while in this procedure, <b>THEN</b> perform the following:                             <ul style="list-style-type: none"> <li>1) <b>WHEN</b> Pzr pressure decreases to less than 2315 PSIG, <b>THEN</b> ensure the valve closes or is isolated.</li> <li>2) <b>IF</b> Pzr PORV cannot be closed <b>OR</b> isolated, <b>THEN GO TO</b> EP/1/A/5000/ECA-3.1 (SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired).</li> </ul> </li> </ul>

Op Test No.:   NRC   Scenario #   3   Event #   6, 7 and 8   Page   33   of   37  

Event Description: S/G 1D Tube Rupture with a stuck open S/G 1D PORV. Phase A fails to actuate Automatically.

Time	Position	Applicant's Actions or Behavior
	BOP	<p><b>12. Ensure S/I - RESET:</b></p> <p>a. ECCS.</p> <p>b. D/G load sequencers.</p> <p>c. <b>IF AT ANY TIME</b> a B/O occurs, <b>THEN</b> restart S/I equipment previously on.</p>
	BOP	<p><b>13. Ensure the following containment isolation signals - RESET:</b></p> <p><input type="checkbox"/> Phase A</p> <p><input type="checkbox"/> Phase B.</p>
	BOP	<p><b>14. Establish VI to containment as follows:</b></p> <p><input type="checkbox"/> Ensure 1VI-77B-(VI-Cont Isol) - OPEN.</p> <p><input type="checkbox"/> Verify VI pressure - GREATER THAN 85 PSIG.</p>
	BOP	<p><b>15. Verify criteria to stop operating ND pumps as follows:</b></p> <p>a. At least one ND pump - ON.</p> <p>b. Verify ND pump(s) suction – ALIGNED TO FWST.</p> <p>c. NC pressure - GREATER THAN 285 PSIG.</p> <p>d. Stop ND pump(s) with suction aligned to FWST.</p> <p>e. <b>IF AT ANY TIME</b> NC pressure decreases to less than 285 PSIG in an uncontrolled manner, <b>THEN</b> restart ND pumps.</p>
	RO	<b>16. Verify ruptured S/G(s) - IDENTIFIED.</b>
	RO	<p><b>17. Verify if NC System cooldown should be stopped:</b></p> <p>a. Verify core exit T/Cs - LESS THAN REQUIRED TEMPERATURE.</p> <p>b. Stabilize core exit T/Cs - LESS THAN REQUIRED TEMPERATURE.</p>
<p><b>NOTE TO EVALUATOR: At this point the required temperature may not have been reached. The crew will hold per the RNO for step 17.a.</b></p>		
	SRO	17.a RNO Do not continue in this procedure until core exit T/Cs are less than required temperature.

Op Test No.:   NRC   Scenario #   3   Event #   6, 7 and 8   Page   34   of   37  Event Description:   S/G 1D Tube Rupture with a stuck open S/G 1D PORV. Phase A fails to actuate Automatically.  

Time	Position	Applicant's Actions or Behavior
	RO	<p><b>18. Verify ruptured S/G(s) pressure is under operator control as follows:</b></p> <p>a. All ruptured S/G(s) pressure - STABLE OR INCREASING.</p> <p>b. <b>IF AT ANY TIME</b> ruptured S/G(s) pressure is decreasing while in this procedure, <b>THEN</b> perform Step 18.</p>
	RO	<p><b>19. Verify NC subcooling based on core exit T/Cs - GREATER THAN 20°F.</b></p>
CRITICAL TASK	BOP	<p><b>20. Depressurize NC System using PZR Spray as follows:</b></p> <p>a. Verify normal Pzr spray flow - AVAILABLE.</p> <p>b. Verify Pzr level - LESS THAN 76% (73% ACC)</p> <p>c. Depressurize NC System with maximum available spray.</p> <p>d. <b>IF AT ANY TIME</b> during this step one of the following conditions exists:</p> <p><input type="checkbox"/> Spray valves are not effective in reducing NC pressure</p> <p>OR</p> <p><input type="checkbox"/> Ruptured S/G(s) NR level is approaching 83% (82% ACC).</p> <p><b>THEN GO TO</b> Step 21.</p> <p>e. Do not continue until at least one of the following conditions satisfied:</p> <p><input type="checkbox"/> NC subcooling based on core exit T/Cs - LESS THAN 0°F</p> <p>OR</p> <p><input type="checkbox"/> Pzr level - GREATER THAN 76% (73% ACC)</p> <p>OR</p> <p><input type="checkbox"/> Both of the following:</p> <p><input type="checkbox"/> NC pressure - LESS THAN RUPTURED S/G(s) PRESSURE</p> <p><b>AND</b></p> <p><input type="checkbox"/> Pzr level - GREATER THAN 11% (20% ACC).</p> <p>f. Close the following valve(s):</p> <p>1) Pzr spray valves.</p> <p>2) 1NV-37A (NV Supply To Pzr Aux Spray).</p>

Op Test No.:   NRC   Scenario #   3   Event #   6, 7 and 8   Page   35   of   37  Event Description:   S/G 1D Tube Rupture with a stuck open S/G 1D PORV. Phase A fails to actuate Automatically.  

Time	Position	Applicant's Actions or Behavior
		g. Observe Caution prior to Step 23 and <b>GO TO</b> Step 23.
		<b>CAUTION</b> S/I must be terminated when termination criteria are satisfied to prevent overfilling the ruptured S/G(s).
	RO/BOP	<p><b>23. Verify S/I termination criteria as follows:</b></p> <ul style="list-style-type: none"> <li>a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.</li> <li>b. Verify secondary heat sink as follows: <ul style="list-style-type: none"> <li><input type="checkbox"/> N/R level in at least one intact S/G - GREATER THAN 11% (29% ACC)</li> <li>OR</li> <li><input type="checkbox"/> Total feed flow available to S/G(s) - GREATER THAN 450 GPM.</li> </ul> </li> <li>c. NC pressure - STABLE OR INCREASING.</li> <li>d. Pzr level - GREATER THAN 11% (20% ACC).</li> </ul>
	BOP	<p><b>24. Stop S/I pumps as follows:</b></p> <ul style="list-style-type: none"> <li>a. Stop NI pumps.</li> <li>b. Ensure only one NV pump - ON.</li> </ul>
	BOP	<p><b>25. Isolate NV S/I flowpath as follows:</b></p> <ul style="list-style-type: none"> <li>a. Verify the following valves - OPEN: <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NV-252A (NV Pumps Suct From FWST)</li> <li><input type="checkbox"/> 1NV-253B (NV Pumps Suct From FWST).</li> </ul> </li> <li>b. Ensure the following valves - OPEN: <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NV-203A (NV Pumps A&amp;B Recirc Isol)</li> <li><input type="checkbox"/> 1NV-202B (NV Pmps A&amp;B Recirc Isol).</li> </ul> </li> <li>c. Close the following valves: <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NI-9A (NV Pmp C/L Inj Isol)</li> <li><input type="checkbox"/> 1NI-10B (NV Pmp C/L Inj Isol).</li> </ul> </li> </ul>
<b>END OF EVENTS 6 AND 7.</b>		
<b>END OF SCENARIO.</b>		

**Catawba Nuclear Station NRC Exam December 2010**

**ATTACHMENT 1**

<b>CREW CRITICAL TASK SUMMARY</b>			
<b>SAT</b>	<b>UNSAT</b>	<b>CT #</b>	<b>CRITICAL TASK</b>
		C-1	Close containment isolation valves such that at least one valve is closed on each critical phase-A penetration before the end of the scenario.
		C-2	Depressurize the RCS to meet SI termination criteria before S/G 1D reaches 92% narrow range level.

Comments:

## ATTACHMENT 2

<b>SHIFT TURNOVER INFORMATION</b>			
<b>Unit 1 Status</b>			
Power Level	Power History	NCS Boron	Xenon
50%	BOL	1412 PPM	per OAC
<b>Controlling Procedure</b>			
<ul style="list-style-type: none"> <li>• OP/1/A/6100/003 (Controlling Procedure for Unit Operation), Enclosure 4.1 (Power Increase). The steps through step 3.41 are complete.</li> </ul>			
<b>Other Information Needed to Assume the Shift</b>			
<ul style="list-style-type: none"> <li>• 1A LH pump is tagged out to repair a leak on the motor-cooler.</li> <li>• Maintenance estimates that repairs will take 10 hours to complete.</li> <li>• Direction for the crew is to increase reactor power to 100%.</li> </ul>			
<b>NLO's Available</b>			
Six NLO's are available as listed on the status board			
<b>METEOROLOGICAL CONDITIONS</b>			
<ul style="list-style-type: none"> <li>• Upper wind direction = 315 degrees, speed = 10 mph</li> <li>• Lower wind direction = 315 degrees, speed = 10.5 mph</li> <li>• Forecast calls for clear skies over the next 24 hours.</li> </ul>			

**HLP NRC EXAM  
SCENARIO #4**

## Catawba Nuclear Station NRC Exam December 2010

Facility:	Catawba NRC Exam 2010	Scenario No.:	Spare	Op Test No.:	1
Examiners	_____	Operators:	SRO		
	_____		RO		
	_____		BOP		
Initial Conditions: IC#144; Unit 1 is at 10-8 amps taking critical data during startup. 1A LH pump is tagged out.					
Turnover: 1A LH pump is tagged out to repair a leak on the motor cooler. Maintenance estimates that repairs will take 10 hours to complete. Direction for the crew is to increase reactor power to 10%.					
Event No.	Malf. No.	Event Type*	Event Description		
1		N-BOP N-SRO R-RO	Increase reactor power to 10%.		
2	RN059D	C-BOP TS-SRO	2A RN pump trips.		
3	ENB009B	I-RO TS-SRO	Intermediate range NI N-36 high voltage failure.		
4	SG098/99	I-RO I-SRO	W/R S/G 1C level failure.		
5	NCP003A	C-BOP C-SRO	Reactor Coolant pump 1A Hi/Hi vibration requiring reactor trip and pump trip		
6	NC013A	M-ALL	Large Break LOCA on A loop.		
7	ISE006A/B	C-RO	Main Steam Isolation failure.		
8	ND014/15	C-RO C-SRO	1A and 1B ND pumps trip causing a loss of emergency coolant recirc.		
9					
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

# Catawba Nuclear Station NRC Exam December 2010

## Scenario 1 - Summary

### Initial Condition

Unit 1 is at 10-8 amps taking critical data during startup. 1A LH pump is tagged out.

### Turnover:

1A LH pump is tagged out to repair a leak on the motor cooler. Maintenance estimates that repairs will take 10 hours to complete. Direction for the crew is to increase reactor power to 10%.

### Event 1

BOP performs an NC system dilution to offset Xenon buildup. RO withdraws control rods to establish a positive startup rate to increase reactor power.

### Event 2

2A RN pump trips. Crew will enter AP/0/A/5500/020 (Loss of Nuclear Service Water) to address this issue. TS evaluation by SRO is required.

### Event 3

Intermediate range nuclear instrument N-36 experiences a high voltage failure. Crew will enter AP/1/A/5500/016 (Malfunction of Nuclear Instrumentation System) Case 3 to remove this channel from service. TS evaluation by SRO is required.

### Event 4

2 of 3 W/R S/G level channels on 1C S/G begin to slowly fail to 40% level. This will cause the feedwater regulating bypass valve to slowly open up to maintain S/G level. This will cause an increase in actual level, and will require the RO to take manual control of the bypass valve to decrease S/G level back to program level. Crew will enter AP/1/A/5500/006 (Loss of S/G Feedwater) to address this issue.

### Event 5

Reactor coolant pump 1A vibration begins to increase to 30 mils on the shaft. This is above the trip criteria for the pump and will require the crew to trip the reactor and trip the reactor coolant pump.

### Event 6

As soon as the 1A reactor coolant pump is secured a large break LOCA occurs on A loop. Crew will enter E-0 (Reactor Trip or Safety Injection), make a transition to E-1 (Loss of Reactor or Secondary Coolant), and when FWST level decreases to 37% will transition to ES-1.3 (Transfer to Cold Leg Recirculation).

### Event 7

Automatic Main Steam Isolation trains 'A' and 'B' fails to actuate on containment pressure > 3 psig. This will require manual initiation by the RO.

### Event 8

At 45% FWST level, 1A ND pump will trip. When FWST level decreases to 37% (transfer to cold leg recirc setpoint), 1B ND pump trips. This will require the crew to transition from ES-1.3 to ECA-1.1 (Loss of Emergency Coolant Recirc) to address this issue.

**Critical task 1** – Trip all reactor coolant pumps on a loss of subcooling per E-0 Encl. 1 guidance within 5 minutes of criteria being met.

**Critical task 2** – Makeup to the FWST and minimize FWST outflow.

## Catawba Nuclear Station NRC Exam December 2010

### EXERCISE GUIDE WORKSHEET

1 INITIAL CONDITIONS:

1.1 Reset to IC 141

START TIME: \_\_\_\_\_

✓	✓	Instructor Action	Final	Delay	Ramp	Delete In	Event	
		MAL-NI004A (ESS HDR ISOL VLV NI9 FAILS TO OPEN)	ACTIVE					
		ANN-AD11-E03 (TRANSFORMER B TROUBLE)	ON					
		MAL-ISE006B (AUTO SM ISOL SIGNAL TRN B)	BLOCK					
		MAL-ISE006A (AUTO SM ISOL SIGNAL TRNA)	BLOCK					
		ANN-AD11-B03 (TRANSFORMER A TROUBLE)	ON					
		OVR-RN59D (RN PMP 2A PB (UNIT 2) OFF PB)	ON				1	
		LOA -ND014 (RACKOUT ND PMP 1A)	RACK-OUT				10	
		LOA-ND015 (RACKOUT ND PMP 1B)	RACK-OUT				11	
		XMT-SG098 (XCF_5631 S/G C W/R LVL CH 1 TO DCS/ELSEWHERE (CFAA5631))	40	120	210		3	
		MAL-ENB009B (LOSS OF I/R CH 36 HI VOLT)					3	
		XMT-SG099 (XCF_5632 S/G C W/R LVL CH 2 TO DCS/ELSEWHERE (CFAA5632))	40	120	210		3	
		MAL-NCP003A (NCP A VIBRATION)	30		180		7	
		MAL-NC013A (NC COLD LEG A LEAK)	27.5				9	
		LOA-CNT002 H2 ANALYZERS	BOTH				13	
		Ensure EVENT 9 = X10I151F						
		Ensure EVENT 10 = Ifw_5000 < 42						
		Ensure EVENT 11 = Ifw_5000 < 36.5						
		Place a red collar on 1A LH pump.						

## Catawba Nuclear Station NRC Exam December 2010

### 2 SIMULATOR BRIEFING

#### 2.1 Control Room Assignments:

Position	Name
CRS	
OATC	
BOP	

2.2 Give a copy of Attachment 2 (Shift Turnover Information) to the OSM.

### 3 EXERCISE PRESENTATION

#### 3.1 Familiarization Period

3.2 Allow examinees time to familiarize themselves with Control Board alignments.

3.3 **Scenario EVENT 1**, Increase reactor power to 10%.

3.4 **Scenario EVENT 2**, 2A RN pump trips.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> directed by the lead examiner, <b>THEN INSERT EVENT 1</b> to trip 2A RN pump.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>IF</b> an NEO is dispatched to investigate the loss of 2A RN pump <b>repeat</b> the order.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>IF</b> an NEO is dispatched to check out the RN pump that was started <b>wait</b> 3 minutes and <b>report</b> the pump is running normally.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>IF</b> asked what the flows on the unit 2 RN pumps are <b>refer</b> to the XtremeView RN graphic.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>IF</b> the SWM is called to investigate the loss of the 2A RN pump <b>repeat</b> the order.

## Catawba Nuclear Station NRC Exam December 2010

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	IF environmental chemistry is called for RN pump shift <b>repeat</b> back the information.

- 3.5 **Scenario EVENT 3**, Loss of N-36 high voltage and failure of S/G C W/R level to DCS.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> directed by the lead examiner, <b>THEN INSERT SIMULATOR EVENT 3</b> to fail N-36 high voltage and fail S/G C W/R level.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> the reactor group engineer is notified of the occurrence <b>repeat</b> back the information.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	IF the SWM is called to investigate the reason for the loss of N-36 <b>repeat</b> back the information.

- 3.6 **Scenario EVENT 4**, W/R S/G 1C level failure.

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>NOTE: SCENARIO EVENT 4</b> was activated by <b>SIMULATOR EVENT 3</b> .

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	IF the SWM is called to investigate the failure of the 1C S/G W/R level channels <b>repeat</b> back the orders.

- 3.7 **Scenario EVENT 5**, NCP 1A Hi-Hi vibration..

✓	<b>BOOTH INSTRUCTOR ACTION</b>
	<b>WHEN</b> directed by the lead examiner, <b>THEN INSERT SIMULATOR EVENT 7</b> to cause a Hi-Hi vibration on NCP 1A.

- 3.8 **Scenario EVENT 6**, and **7** will activate when the 1A NCP OFF PB is depressed. This will cause a LOCA and SM isolation failure.

## Catawba Nuclear Station NRC Exam December 2010

✓	BOOTH INSTRUCTOR ACTION
	<b>WHEN</b> dispatched to secure all ice condenser air handling units and place the H2 analyzers in service, <b>repeat</b> the order. <b>ACTIVATE EVENT 13</b> (LOA-CNT002 H2 ANALYZERS). <b>AFTER 5 minutes call and report</b> that the ice condenser AHUs are secured and the H2 analyzers are in service.

- 3.9 Scenario EVENT 8, both ND pumps trip will be automatically initiated by SIMULATOR EVENTS 10 and 11.

✓	BOOTH INSTRUCTOR ACTION
	<b>WHEN</b> an operator and maintenance are dispatched to determine and correct the cause of the ND pump failure <b>repeat</b> back the request. No reason for the trip will be given.

✓	BOOTH INSTRUCTOR ACTION
	<b>WHEN</b> an operator is dispatched to initiate makeup to the FWST <b>repeat</b> back the order.

✓	BOOTH INSTRUCTOR ACTION
	<b>WHEN</b> station management is notified to monitor shutdown margin <b>repeat</b> back the order. <b>WHEN</b> periodic NC boron samples are requested <b>repeat</b> back the request.

Op Test No.: NRC Scenario # Spare Event # 1 Page 8 of 37

Event Description: Increase reactor power to 10%.

Time	Position	Applicant's Actions or Behavior
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	CREW	Crew will begin increasing power to 1%, then to 100%.
<p><b>NOTE TO EVALUATOR:</b> The following actions are taken from OP/1/A/6100/001, Controlling Procedure for Unit Startup. The crew will start at step 2.167.</p>		
	RO	2.167 <b>WHEN</b> reactor power has been stabilized at 10-8 amps, ensure at least one power range channel is selected on 1ENCR5000 (Startup, Intermediate, & Power Range NIs).
		2.168 Ensure Steps 2.139 - 2.141 have been completed to ensure automatic steam dump control has been established.
	CREW	<p><b>NOTE:</b> 1. Control rod withdrawal shall <b>NOT</b> exceed the temporary rod withdrawal limits specified in Unit One R.O.D. Section 2.3.</p> <p>2. Refer to Unit One R.O.D. Section 2.4 for the rate at which reactor power can be changed.</p> <p>3. The throttling of a S/G bypass reg valve affects the other S/G bypass reg valves. Therefore, SM/CF ΔP needs to be monitored as the unit approaches POAH.</p> <p>4. If NC boron concentration is greater than 1000 ppmB, T-AVG control may be very sensitive above the POAH due to a positive MTC. Refer to Unit One R.O.D. Section 5.10 for the MTC at the current conditions.</p> <p>5. When approaching the beginning of the Power Range NI indication (.1% on the PR), a startup rate of &lt; 0.2 dpm is required. The &lt; .2 dpm rate shall <b>NOT</b> be exceeded, except when performing PT/0/A/4150/001 J (Zero Power Physics Testing), until the turbine is placed on line. (SOMP 01-02). (R.M.)</p>
	RO	2.169 Increase reactor power to 1%. (R.M.)
	CREW	2.170 Begin reviewing the items listed in Step 2.178 so that Unit 1 will <b>NOT</b> enter Mode 1 until all substeps of 2.178 are signed off.
	RO	2.171 <b>IF</b> necessary, continue heatup to no load T-AVG (557°F).
	BOP	2.172 Increase S/G blowdown flowrate as recommended by Secondary Chemistry for S/G chemist
	CREW	2.173 <b>WHILE</b> increasing reactor power coordinate with Chemistry to determine when blowdown flowrate can be subsequently reduced.

Op Test No.: NRC Scenario # Spare Event # 1 Page 9 of 37

Event Description: Increase reactor power to 10%.

Time	Position	Applicant's Actions or Behavior
	BOP	<p>2.174 Verify S/G(s) reverse purge flow by performing the following:</p> <p>2.174.1 Record the temperature for the following OAC points: (OAC Group Display GD OPCFTEMP)</p> <ul style="list-style-type: none"> <li>• C1A0141 (S/G A After CF Isol Vlv Line Temp)</li> <li>• C1A0148 (S/G A Inlet Temp (Feedwater))</li> <li>• C1A0125 (S/G B After CF Isol Vlv Line Temp)</li> <li>• C1A0154 (S/G B Inlet Temp (Feedwater))</li> <li>• C1A0275 (S/G C After CF Isol Vlv Line Temp)</li> <li>• C1A0160 (S/G C Inlet Temp (Feedwater))</li> <li>• C1A0815 (S/G D After CF Isol Vlv Line Temp)</li> <li>• C1A0166 (S/G D Inlet Temp (Feedwater))</li> </ul> <p>2.174.2 Compare the values recorded above to the values recorded in steps 2.79.15.7, 2.102.1, 2.116.1, 2.124.1 and 2.143.1 to verify reverse purge (increasing temperature).</p> <p>2.174.3 <b>IF</b> no sign of reverse purge, determine what is causing the loss of reverse purge and correct the problem.</p> <p>2.174.4 Monitor OAC Group Display OPCFTEMP for increasing temperatures as a sign of reverse purge while continuing with the procedure.</p>
<b>NOTE TO EVALUATOR: Step 2.175 and 176 will be N/A'd. 1A CFPT is in service in AUTO.</b>		
	BOP	<p>2.177 <b>WHEN</b> the CF bypass valves are approximately 40% open, unisolate the CF reg valves by opening the following valves:</p> <ul style="list-style-type: none"> <li>• S/G 1A 1CF-29 (S/G 1A CF C/V Otlt Isol) 1CF-27 (S/G 1A CF C/V Inlt Isol)</li> <li>• S/G 1B 1CF-38 (S/G 1B CF C/V Otlt Isol) 1CF-36 (S/G 1B CF C/V Inlt Isol)</li> <li>• S/G 1C 1CF-47 (S/G 1C CF C/V Otlt Isol) 1CF-45 (S/G 1C CF C/V Inlt Isol)</li> <li>• S/G 1D 1CF-56 (S/G 1D CF C/V Otlt Isol) 1CF-54 (S/G 1D CF C/V Inlt Isol)</li> </ul>
	BOP	2.178 Prior to entering Mode 1, do the following:

Op Test No.: NRC Scenario # Spare Event # 1 Page 10 of 37

Event Description: Increase reactor power to 10%.

Time	Position	Applicant's Actions or Behavior
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		<p><b>NOTE:</b> Appropriate Chemistry Supervisor shall confirm any administrative holds preventing a power increase.</p> <p>2.178.1 Ensure PT/1/A/4700/002 (Periodic Test Performance Verification For Mode Change) Premode 1 PT Checklist is completed.</p> <p>2.178.2 Verify with Primary Chemistry that NC System H2 concentration and Dose Equivalent Iodine are in spec to allow entry into Mode 1.</p> <p>Person notified _____</p> <p>2.178.3 Verify the PCMC data base has been reviewed for items required for Mode 1 entry.</p> <p>2.178.4 Review the OAC points that will be in alarm in Mode 1 by using the OAC "Plant Mode" application to perform an alarm look ahead.</p> <p>2.178.5 Ensure the CF temperatures between each feedwater isolation valve and S/G is greater than 107°F: (OAC-Group Display-GD OPCFTEMP)</p> <ul style="list-style-type: none"> <li>• S/G 1A:           <ul style="list-style-type: none"> <li>C1A0141 (S/G A After-CF Isol Vlv Line Temp)</li> <li>C1A0148 (S/G A Inlet Temp. (Feedwater))</li> </ul> </li> <li>• S/G 1B:           <ul style="list-style-type: none"> <li>C1A0125 (S/G B After CF Isol Vlv Line Temp)</li> <li>C1A0154 (S/G B Inlet Temp. (Feedwater))</li> </ul> </li> <li>• S/G 1C:           <ul style="list-style-type: none"> <li>C1A0275 (S/G C After CF Isol Vlv Line Temp)</li> <li>C1A0160 (S/G C Inlet Temp. (Feedwater))</li> </ul> </li> <li>• S/G 1D:           <ul style="list-style-type: none"> <li>C1A0815 (S/G D After CF Isol Vlv Line Temp)</li> <li>C1A0166 (S/G D Inlet Temp. (Feedwater))</li> </ul> </li> </ul>
	BOP	2.179 Prior to entering Mode 1, perform the following to ensure the primary to secondary leakage program inputs are current:

Op Test No.:   NRC   Scenario #   Spare   Event #   1   Page   11   of   37  

Event Description: Increase reactor power to 10%.

Time	Position	Applicant's Actions or Behavior
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		<ul style="list-style-type: none"> <li>• Notify RP to ensure EMF-33 background counts in the EMF-33 Background Spreadsheet is current. Person Notified _____</li> <li>• Notify Primary Chemistry to ensure the NC Xenon Equivalent in the Chemistry Database is current. Person Notified _____</li> <li>• Record current air ejector off gas flowrate. _____</li> <li>• Update "EMF33 Prim/Sec Leakage" program on the Unit 1 OAC.</li> </ul>
	SRO	2.180 Record Mode 1 entry time below: Mode 1 _____
		<b>END OF EVENT 1</b>

Op Test No.:	<u>NRC</u>	Scenario #	<u>Spare</u>	Event #	<u>2</u>	Page	<u>12</u>	of	<u>37</u>
Event Description:	2A RN pump trips.								
Time	Position	Applicant's Actions or Behavior							

<b>NOTE TO EVALUATOR: The booth operator may begin event 2 when directed by the lead evaluator.</b>		
INDICATIONS: 1AD12, A2 RN ESSENTIAL HDR A PRESSURE – LO 1AD12, A5 RN ESSENTIAL HDR B PRESSURE – LO		
	BOP	Recognize the loss of 2A RN pump.
	CREW	Crew enter AP/0/5500/020, Loss of Nuclear Service Water
<b>NOTE TO EVALUATOR: The following actions are taken from AP/0/5500/020, Loss of Nuclear Service Water, Case I.</b>		
	BOP	1. Start idle RN pump(s) as required.
	CREW	2. Ensure Unit 1 and Unit 2 OATC monitors Enclosure 1 (Foldout Page).
	BOP	3. Verify RN System - IN NORMAL DUAL SUPPLY HEADER ALIGNMENT.
	BOP	4. Verify each operating RN pump discharge flow - GREATER THAN 8,600 GPM.
	BOP	5. Verify each operating RN pump discharge flow - LESS THAN 23,000 GPM.
	BOP	6. Ensure RN pumps - IN OPERATION AS NEEDED.
	BOP	7. Ensure proper alignment of RN to KC Hxs as follows: a. Verify RN - ALIGNED TO IN SERVICE KC HX(S). b. Ensure KC Hx Oflt Mode switches - PROPERLY ALIGNED.
	BOP	8. Verify each operating RN pump discharge flow - GREATER THAN 8,600 GPM.
	BOP	9. Verify RN - AVAILABLE TO ALL UNIT 1 AND UNIT 2 D/G(S).
	BOP	10. Determine VC/YC status as follows: <input type="checkbox"/> Verify VC/YC - ALIGNED TO OPERATING RN TRAIN. <input type="checkbox"/> Verify YC Chiller - RUNNING.
	CREW	11. Determine and correct cause of loss of RN train.

Op Test No.:   NRC   Scenario #   Spare   Event #   2   Page   13   of   37  

Event Description: 2A RN pump trips.

Time	Position	Applicant's Actions or Behavior
	SRO	<p><b>12. Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> SLC 16.7-6 (RN Discharge Instrumentation)</li> <li><input type="checkbox"/> 3.6.5 (Containment Air Temperature)</li> <li><input type="checkbox"/> 3.6.6 (Containment Spray System)</li> <li><input type="checkbox"/> 3.6.17 (Containment Valve Injection Water System (CVIWS))</li> <li><input type="checkbox"/> 3.7.5 (Auxiliary Feedwater (AFW) System)</li> <li><input type="checkbox"/> 3.7.7 (Component Cooling Water (CCW) System)</li> <li><input type="checkbox"/> 3.7.8 (Nuclear Service Water System (NSWS))</li> <li><input type="checkbox"/> 3.7.10 (Control Room Area Ventilation System (CRAVS))</li> <li><input type="checkbox"/> 3.7.11 (Control Room Area Chilled Water System (CRACWS))</li> <li><input type="checkbox"/> 3.8.1 (A.C. Sources - Operating)</li> <li><input type="checkbox"/> 3.8.2 (A.C. Sources - Shutdown).</li> </ul>
<b>NOTE TO EVALUATOR: SRO should determine that entry into T.S. 3.7.8 is applicable.</b>		
	SRO	<p><b>13. Determine required notifications:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> REFER TO RP/0/A/5000/001 (Classification Of Emergency)</li> <li><input type="checkbox"/> REFER TO RP/0/B/5000/013 (NRC Notification Requirements)</li> </ul>
<b>NOTE TO EVALUATOR: SRO should determine that no notifications are required.</b>		
	BOP	<b>14. Notify Environmental Chemistry of any RN pump shifts that have occurred.</b>
	CREW	<b>15. Determine long term plant status. RETURN TO procedure in effect.</b>
<b>END OF EVENT 2</b>		

Op Test No.:   NRC   Scenario #   2   Event #   3   Page   14   of   37  

Event Description: Intermediate Range NI N-36 high voltage failure.

Time	Position	Applicant's Actions or Behavior
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**NOTE TO EVALUATOR: The booth operator may begin event 3 when directed by the lead evaluator.**

INDICATIONS: 1AD2, C1 I/R HI VOLTAGE FAILURE

N-36 INDICATION FAILS TO 10-11 AMPS.

	RO	RO recognize failure of N-36
	SRO	CREW ENTERS AP/1/A/5500/16, CASE 3

**NOTE TO EVALUATOR: The following actions are taken from AP/0/5500/016, Malfunction of Nuclear Instrumentation System, Case 3.**

		1. Verify reactor power - GREATER THAN 10%.
		1. RNO Stop any power increase.
		2. Verify 1AD-2, C/3 "I/R HI FLUX LEVEL ROD STOP" - DARK.
		3. Identify affected I/R channel: <input type="checkbox"/> N-35 OR <input type="checkbox"/> N-36.
		4. Verify affected I/R channel "CONTROL POWER ON" light - LIT
		<b>NOTE</b> 1AD-2, C/4 "N/I SYS S/R & I/R TRIP BYPASS" will actuate in the following step.
		5. At the affected I/R drawer, perform the following: a. Place the "LEVEL TRIP" switch for affected channel in "BYPASS". b. Verify the "LEVEL TRIP BYPASS" light on the affected I/R drawer - LIT.
		6. Verify the affected I/R channel trip bypass status light (1SI-19) - LIT.
		7. Verify 1AD-2, C/4 "N/I SYS S/R & I/R TRIP BYPASS" - LIT.
		8. Ensure operable I/R channel selected to record on "NIS RECORDER".
		9. WHEN the operable I/R channel is less than 10-10 Amps,

Op Test No.:	<u>NRC</u>	Scenario #	<u>2</u>	Event #	<u>3</u>	Page	<u>15</u>	of	<u>37</u>
Event Description: Intermediate Range NI N-36 high voltage failure.									
Time	Position	Applicant's Actions or Behavior							

		<b>THEN ensure S/R channels are reset.</b>
		<b>10. Determine and correct cause of I/R malfunction.</b>
		<b>11. Ensure compliance with Tech Spec 3.3.1 (Reactor Trip System (RTS) Instrumentation).</b>
<b>NOTE TO EVALUATOR: The SRO should determine that T.S. Table 3.3.1 item 4 is applicable and apply Actions F, G.</b>		
		<b>12. Determine required notifications:</b> <input type="checkbox"/> REFER TO RP/0/A/5000/001 (Classification Of Emergency) <input type="checkbox"/> REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
<b>NOTE TO EVALUATOR: No notifications are required at this time.</b>		
		<b>13. Notify Reactor Group Engineer of occurrence.</b>
		<b>CAUTION</b> Installing I/R fuses with any P/R channel inoperable or in a tripped condition, may result in a reactor trip on P/R rate trip due to voltage spikes.
		<b>14. WHEN the affected I/R channel is repaired, THEN ensure IAE returns the channel to service.</b>
		<b>15. Determine long term plant status. RETURN TO procedure in effect.</b>
<b>END OF EVENT 3</b>		

Op Test No.:   NRC   Scenario #   Spare   Event #   4   Page   16   of   37  Event Description:   W/R S/G 1C level failure  

Time	Position	Applicant's Actions or Behavior
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**NOTE TO EVALUATOR: The booth operator may begin event 4 when directed by the lead evaluator.**

INDICATIONS: 1C Level Channels 1 and 2 slowly fail to 40%.

S/G 1C FRVB begins to open.

S/G 1C Level begins to increase.

1AD4, E5, CFCV ISOL VLVS CLSD

	RO	Recognize the failure of S/G 1C level channels
	RO	Take manual control of the 1C FRV and FRVB and control S/G level at normal level.

**NOTE TO EVALUATOR: The following actions are taken from AP/1/A/5500/006, Loss of S/G Feedwater, Case 4 CF Control Not in Auto.**

		<p><b>1. IF AT ANY TIME S/G levels approaching:</b></p> <p><input type="checkbox"/> 83% N/R level (S/G HI-HI Level Turb Trip)</p> <p><b>OR</b></p> <p><input type="checkbox"/> 11% N/R level (S/G LO-LO Level Rx Trip).</p> <p><b>THEN:</b></p> <p>a. Manually trip reactor.</p> <p>b. <b>GO TO EP/1/A/5000/E</b></p>
		<p><b>2. Verify the following:</b></p> <p><input type="checkbox"/> At least one CF pump - IN SERVICE</p> <p><input type="checkbox"/> 1AD-3, C/6 "CF ISOL TRN A" - DARK</p> <p><input type="checkbox"/> 1AD-3, D/6 "CF ISOL TRN B" - DARK</p>
		<p><b>3. IF AT ANY TIME any CF Main Feed Reg valve in manual, THEN ensure associated Main Feed Reg Bypass valve in manual.</b></p>
		<p><b>4. Verify CF pump speed controller for in service CF pump(s):</b></p> <p><input type="checkbox"/> IN AUTO</p> <p><input type="checkbox"/> RESPONDING ADEQUATELY.</p>
		<p><b>5. Verify all S/G CF control valves:</b></p>

Op Test No.:   NRC   Scenario #   Spare   Event #   4   Page   17   of   37  

Event Description:   W/R S/G 1C level failure  

Time	Position	Applicant's Actions or Behavior
		<input type="checkbox"/> IN AUTO <input type="checkbox"/> RESPONDING ADEQUATELY.
		5. RNO a. Ensure affected controller(s) – IN MANUAL. b. <b>IF AT ANY TIME</b> S/G level not on program, <b>THEN</b> adjust CF flow to obtain a slight trend in the appropriate direction. c. <b>IF AT ANY TIME</b> control valve adjustment is required, <b>THEN</b> attempt to maintain CF/SM D/P constant during CF control valve adjustments.
		6. <b>Verify the following:</b> <ul style="list-style-type: none"> <li>• S/G level(s) – STABLE</li> <li>• S/G level(s) - APPROXIMATELY AT PROGRAM</li> <li>• Malfunction - CORRECTED.</li> </ul>
		6. RNO a. Continue to control CF/SM D/P and S/G CF Flow rates to stabilize level in affected S/G(s) approximately at program level. b. <b>WHEN</b> all the following conditions met: <ul style="list-style-type: none"> <li>• S/G level(s) - STABLE</li> <li>• S/G level(s) - APPROXIMATELY AT PROGRAM</li> <li>• Malfunction - CORRECTED.</li> </ul> <b>THEN GO TO</b> Step 7. c. Do not continue in this procedure until all conditions met.
<b>END OF EVENT 4.</b>		

Op Test No.:   NRC   Scenario #   Spare   Event #   5   Page   18   of   37  

Event Description: Reactor-Coolant Pump 1A Hi/Hi vibration requiring reactor trip and pump trip.

Time	Position	Applicant's Actions or Behavior
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**NOTE TO EVALUATOR: The booth operator may begin event 5 when directed by the lead evaluator.**

Indications: 1AD6, A5 NCP HI VIBRATION  
 1AD6,C5 NCP VIBRATION MON TROUBLE  
 1AD6, B5 NCP HI HI VIRATION

	BOP	Identifies the affected pump as 1A
	RO	Manually trip the reactor
		Manually trip the 1A NCP and ensure 1NC-27 is closed.

**NOTE TO EVALUATOR: The following actions are from the Supplementary Actions of ARP OP/1/B/6100/010G, Panel AD6.**

		1. Verify which pump has Hi-Hi vibration, from "REACTOR COOLANT PMP VIBRATION MONITOR PNL" (back of 1MC6).
		2. Read all 4 vibration channels for the alarming pump and compare readings to determine if a real vibration problem exists.
		3. <b>IF</b> a valid frame or shaft vibration indication exists, then perform the following: 3.1 <b>IF</b> in Modes 1 <b>OR</b> 2: 3.1.1 Trip reactor. 3.1.2 <b>WHEN</b> reactor power less than 5%, <b>THEN</b> trip the affected NC pump. 3.1.3 <b>IF A OR B</b> NCP is tripped, ensure that the spray valve associated with the pump is closed. 3.1.4 Go to EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).

**END OF EVENT 5.**


Op Test No.:	<u>NRC</u>	Scenario #	<u>Spare</u>	Event #	<u>6, 7 and 8</u>	Page	<u>19</u>	of	<u>37</u>
Event Description:	Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.								
Time	Position	Applicant's Actions or Behavior							

<b>NOTE TO EVALUATOR: EVENT 6, 7 and 8 will begin when the 1A NCP OFF pushbutton is depressed.</b>		
INDICATIONS: NC pressure rapidly decreases to 0 psig. Containment pressure increases rapidly. Safety Injection actuates.		
	RO/BOP	Perform E-0 immediate actions.
	SRO	Enter E-0.
<b>NOTE TO EVALUATOR: The following actions are from EP/1/A/5000/E-0.</b>		
	CREW	<b>1. Monitor Enclosure 1 (Foldout Page).</b>
	RO	<b>2. Verify Reactor Trip: (Immediate action step)</b> <input type="checkbox"/> All rod bottom lights – LIT <input type="checkbox"/> All reactor trip and bypass breakers – OPEN <input type="checkbox"/> I/R amps - DECREASING.
	RO	<b>3. Verify Turbine Trip: (Immediate action step)</b> <input type="checkbox"/> All turbine stop valves - CLOSED
	BOP	<b>4. Verify 1ETA and 1ETB - ENERGIZED. (Immediate action step)</b>
	BOP	<b>5. Verify S/I is actuated: (Immediate action step)</b> a. "SAFETY INJECTION ACTUATED" status light (1SI-13) - LIT. b. Both E/S load sequencer actuated status lights (1SI-14) - LIT.
<b>NOTE TO EVALUATOR: The following actions are from EP/1/A/5000/E-0, Enclosure 1. The crew should trip all NCPs when subcooling is lost and I/As are complete.</b>		
<b>CRITICAL STEP</b>		<b>2. NC Pump Trip Criteria:</b> <input type="checkbox"/> <b>IF</b> the following conditions are satisfied, <b>THEN</b> trip all NC pumps while maintaining seal injection flow: <input type="checkbox"/> At least one NV or NI pump - ON <input type="checkbox"/> NC subcooling based on core exit T/Cs - LESS THAN OR EQUAL TO 0°F.

Op Test No.:   NRC   Scenario #   Spare   Event #   6, 7 and 8   Page   20   of   37  

Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.

Time	Position	Applicant's Actions or Behavior
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**NOTE TO EVALUATOR: The following actions are from EP/1/A/5000/E-0.**

	RO	<b>6. Announce "Unit 1 Safety Injection".</b>
	SRO	<b>7. Determine required notifications:</b> <input type="checkbox"/> REFER TO RP/0/A/5000/001 (Classification Of Emergency) <input type="checkbox"/> REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
	RO	<b>8. Verify all Feedwater Isolation status lights (1SI-5) - LIT.</b>
	BOP	<b>9. Verify Phase A Containment Isolation status as follows:</b> a. Phase A "RESET" lights - DARK. b. Monitor Light Panel Group 5 St lights - LIT.
	BOP	<b>10. Verify proper Phase B actuation as follows:</b> a. Containment pressure – HAS REMAINED LESS THAN 3 PSIG. b. <b>IF AT ANY TIME</b> containment pressure exceeds 3 PSIG while in this procedure, <b>THEN</b> perform Step 10.a.
	RO	<b>11. Verify proper CA pump status as follows:</b> a. Motor driven CA pumps - ON. b. 3 S/G N/R levels - GREATER THAN 11%.
	BOP	<b>12. Verify all of the following S/I pumps - ON:</b> <input type="checkbox"/> NV pumps <input type="checkbox"/> ND pumps <input type="checkbox"/> NI pumps.
	BOP	<b>13. Verify all KC pumps - ON.</b>
	BOP	<b>14. Verify all Unit 1 and Unit 2 RN pumps - ON.</b>
	BOP	<b>15. Verify proper ventilation systems operation as follows:</b> <input type="checkbox"/> REFER TO Enclosure 2 (Ventilation System Verification). <input type="checkbox"/> Notify Unit 2 operator to perform Enclosure 3 (Opposite Unit Ventilation Verification).
	RO	<b>16. Verify all S/G pressures – GREATER THAN 775 PSIG.</b>

Op Test No.:   NRC   Scenario #   Spare   Event #   6, 7 and 8   Page   21   of   37  

Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.

Time	Position	Applicant's Actions or Behavior
	RO	<p><b>17. Verify proper S/I flow as follows:</b></p> <ul style="list-style-type: none"> <li>a. "NV S/I FLOW" - INDICATING FLOW.</li> <li>b. NC pressure - LESS THAN 1620 PSIG.</li> <li>c. NI pumps - INDICATING FLOW.</li> <li>d. NC pressure - LESS THAN 285 PSIG.</li> <li>e. ND pumps - INDICATING FLOW TO C-LEGS.</li> </ul>
	RO	<p><b>18. Control S/G levels as follows:</b></p> <ul style="list-style-type: none"> <li>a. Verify total CA flow - GREATER THAN 450 GPM.</li> <li>b. <b>WHEN</b> at least one S/G N/R level is greater than 11% (29% ACC), <b>THEN</b> throttle feed flow to maintain all S/G N/R levels between 11% (29% ACC) and 50%.</li> </ul>
	RO	<b>19. Verify all CA isolation valves - OPEN.</b>
	BOP	<b>20. Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.</b>
	RO	<b>21. Control NC temperature. REFER TO Enclosure 4 (NC Temperature Control).</b>
	BOP	<p><b>22. Verify Pzr PORV and Pzr spray valve status as follows:</b></p> <ul style="list-style-type: none"> <li>a. All Pzr PORVs - CLOSED.</li> <li>b. Normal Pzr spray valves - CLOSED.</li> <li>c. At least one Pzr PORV isolation valve - OPEN.</li> </ul>
	RO	<b>23. Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.</b>
	BOP	<p><b>23. RNO IF any NV OR NI pump is on, THEN:</b></p> <ul style="list-style-type: none"> <li>a. Ensure all NC pumps - OFF.</li> <li>b. Maintain seal injection flow.</li> </ul>
	RO	<p><b>24. Verify main steamlines are intact as follows:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> All S/G pressures - STABLE OR INCREASING</li> <li><input type="checkbox"/> ALL S/Gs - PRESSURIZED.</li> </ul>

Op Test No.:   NRC   Scenario #   Spare   Event #   6, 7 and 8   Page   22   of   37  

Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.

Time	Position	Applicant's Actions or Behavior
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	BOP	<p><b>25. Verify S/G tubes are intact as follows:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Verify the following EMF trip 1 lights - DARK:                             <ul style="list-style-type: none"> <li><input type="checkbox"/> 1EMF-33 (Condenser Air Ejector Exhaust)</li> <li><input type="checkbox"/> 1EMF-26 (Steamline 1A)</li> <li><input type="checkbox"/> 1EMF-27 (Steamline 1B)</li> <li><input type="checkbox"/> 1EMF-28 (Steamline 1C)</li> <li><input type="checkbox"/> 1EMF-29 (Steamline 1D).</li> </ul> </li> <li><input type="checkbox"/> All S/G levels - STABLE OR INCREASING IN A CONTROLLED MANNER.</li> </ul>
	BOP	<p><b>26. Verify NC System is intact as follows:</b></p> <p>a. Verify the following NC pump thermal barrier alarms - DARK:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1AD-6, E/1, "NCP A THERMAL BARRIER KC OUTLET HI/LO FLOW"</li> <li><input type="checkbox"/> 1AD-6, E/2, "NCP B THERMAL BARRIER KC OUTLET HI/LO FLOW"</li> <li><input type="checkbox"/> 1AD-6, E/3, "NCP C THERMAL BARRIER KC OUTLET HI/LO FLOW"</li> <li><input type="checkbox"/> 1AD-6, E/4, "NCP D THERMAL BARRIER KC OUTLET HI/LO FLOW".</li> </ul> <p>b. Verify NC System is intact as follows:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Containment pressure - LESS THAN 1 PSIG.</li> </ul>
	BOP	<p><b>26b RNO</b> 1) Energize H2 igniters.</p> <p>2) Dispatch operator to perform the following:</p> <ul style="list-style-type: none"> <li>a) Secure all ice condenser air handling units. <b>REFER TO</b> Enclosure 13 (Securing All Ice Condenser Air Handling Units).</li> <li>b) Place containment H2 analyzers in service. <b>REFER TO</b> OP/1/A/6450/010 (Containment Hydrogen Control Systems).</li> </ul> <p>3) <b>IF</b> both the following conditions exist:</p>

Op Test No.:	<u>NRC</u>	Scenario #	<u>Spare</u>	Event #	<u>6, 7 and 8</u>	Page	<u>23</u>	of	<u>37</u>
Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.									
Time	Position	Applicant's Actions or Behavior							

<b>NOTE TO EVALUATOR: Step 26.b.3) will be N/A'd.</b>		
		26.b RNO 4) Concurrently: <input type="checkbox"/> Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). <input type="checkbox"/> <b>GO TO EP/1/A/5000/E-1 (Loss Of Reactor Or Secondary Coolant).</b>
<b>NOTE TO EVALUATOR: The following actions are from EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant).</b>		
	CREW	<b>1. Monitor Enclosure 1 (Foldout Page).</b>
	RO	<b>2. Verify main steamlines are intact as follows:</b> <input type="checkbox"/> All S/G pressures - STABLE OR INCREASING <input type="checkbox"/> All S/Gs - PRESSURIZED.
	RO	<b>3. Control intact S/G levels as follows:</b> a. Verify N/R level in all intact S/Gs - GREATER THAN 11% (29% ACC). b. Throttle feed flow to maintain all intact S/G N/R levels between 11% (29% ACC) and 50%.
	BOP	<b>4. Verify secondary radiation is normal as follows:</b> a. Ensure the following signals - RESET: 1) Phase A Containment Isolations 2) CA System valve control 3) KC NC NI NM St signals. b. Align all S/Gs for Chemistry sampling. c. Perform at least one of the following: <input type="checkbox"/> Notify Chemistry to sample all S/Gs for activity. OR <input type="checkbox"/> Notify RP to frisk all-cation columns for activity. d. Verify the following EMF trip 1 lights - DARK: <input type="checkbox"/> 1EMF-33 (Condenser Air Ejector Exhaust) <input type="checkbox"/> 1EMF-26 (Steamline 1A) <input type="checkbox"/> 1EMF-27 (Steamline 1B) <input type="checkbox"/> 1EMF-28 (Steamline 1C) <input type="checkbox"/> 1EMF-29 (Steamline 1D).

Op Test No.:   NRC   Scenario #   Spare   Event #   6, 7 and 8   Page   24   of   37  

Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.

Time	Position	Applicant's Actions or Behavior
		e. <b>WHEN</b> activity results are reported, <b>THEN</b> verify all S/Gs indicate no activity.
	BOP	<p><b>5. Verify Pzr PORV and isolation valve status as follows:</b></p> <p>a. Power to all Pzr PORV isolation valves - AVAILABLE.</p> <p>b. All Pzr PORVs - CLOSED.</p> <p>c. At least one Pzr PORV isolation valve - OPEN.</p> <p>d. <b>IF AT ANY TIME</b> a Pzr PORV opens due to high pressure, <b>THEN</b>, after Pzr pressure decreases to less than 2315 PSIG, ensure the valve closes or is isolated.</p>
	CREW	<p><b>6. Verify S/I termination criteria as follows:</b></p> <p>a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.</p>
	SRO	6.a RNO <b>GO TO</b> Step 6.f.
	CREW	<p>6f. Monitor S/I termination criteria. <b>REFER TO</b> Enclosure 2 (S/I Termination Criteria).</p> <p>6g. <b>IF AT ANY TIME</b> S/I termination criteria is met while in this procedure, <b>THEN RETURN TO</b> Step 6.</p>
	BOP	<p><b>7. Verify proper NS pump operation as follows:</b></p> <p>a. At least one NS pump - ON.</p> <p>b. Verify the following valves - OPEN:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1FW-27A (ND Pump 1A Suct From FWST)</li> <li><input type="checkbox"/> 1FW-55B (ND Pump 1B Suct From FWST).</li> </ul> <p>c. Containment pressure - LESS THAN 2.4 PSIG.</p>
	BOP	<p>7. d. Verify operating NS pump(s) – HAVE REMAINED RUNNING SINCE INITIAL PHASE B SIGNAL.</p> <p>e. Ensure S/I - RESET:</p> <ol style="list-style-type: none"> <li>1) ECCS.</li> <li>2) D/G load sequencers.</li> <li>3) <b>IF AT ANY TIME</b> a B/O occurs, <b>THEN</b> restart S/I equipment previously on.</li> </ol> <p>f. Reset NS.</p> <p>g. Stop NS pumps.</p> <p>h. Close the following valves:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NS-29A (NS Spray Hdr 1A Cont Isol)</li> <li><input type="checkbox"/> 1NS-32A (NS Spray Hdr 1A Cont Isol)</li> </ul>

Op Test No.:   NRC   Scenario #   Spare   Event #   6, 7 and 8   Page   25   of   37  

Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.

Time	Position	Applicant's Actions or Behavior
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		<input type="checkbox"/> 1NS-15B (NS Spray Hdr 1B Cont Isol) <input type="checkbox"/> 1NS-12B (NS Spray Hdr 1B Cont Isol).
	BOP	<b>8. Verify criteria to stop operating ND pumps as follows:</b> a. NC pressure - GREATER THAN 285 PSIG.
	SRO	8.a. RNO <b>GO TO</b> Step 10.
	BOP	<b>10. Verify conditions to stop operating D/Gs as follows:</b> a. At least one D/G - ON. b. Verify 1ETA is energized by offsite power as follows: <input type="checkbox"/> "D/G 1A BKR TO ETA" – OPEN <input type="checkbox"/> 1ETA - ENERGIZED. c. <b>WHEN</b> S/I is reset, <b>THEN</b> dispatch operator to stop 1A D/G and place in standby readiness. <b>REFER TO</b> OP/1/A/6350/002 (Diesel Generator Operation). d. Verify 1ETB is energized by offsite power as follows: <input type="checkbox"/> "D/G 1B BKR TO ETB" – OPEN <input type="checkbox"/> 1ETB - ENERGIZED. e. <b>WHEN</b> S/I is reset, <b>THEN</b> dispatch operator to stop 1B D/G and place in standby readiness. <b>REFER TO</b> OP/1/A/6350/002 (Diesel Generator Operation). f. Ensure S/I - RESET: 1) ECCS. 2) D/G load sequencers. 3) <b>IF AT ANY TIME</b> a B/O occurs, <b>THEN</b> restart S/I equipment previously on.

Op Test No.:   NRC   Scenario #   Spare   Event #   6, 7 and 8   Page   26   of   37  

Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.

Time	Position	Applicant's Actions or Behavior
	BOP	<p><b>11. Obtain containment H2 concentration as follows:</b></p> <ul style="list-style-type: none"> <li>a. Ensure operator has been dispatched to secure all ice condenser air handling units. <b>REFER TO</b> Enclosure 3 (Securing All Ice Condenser Air Handling Units).</li> <li>b. Verify containment H2 analyzers – IN SERVICE.</li> <li>c. Verify containment H2-concentration - LESS THAN 6%.</li> <li>d. Verify containment H2 concentration - d. Dispatch operator to place H2 LESS THAN 0.5%.</li> <li>e. <b>WHEN</b> the ice-condenser air handling units are off <b>AND</b> H2 concentration is less than 6%, <b>THEN</b> energize the H2 igniters (1MC-7).</li> </ul>
	BOP	<p><b>12. Initiate evaluation of plant status as follows:</b></p> <ul style="list-style-type: none"> <li>a. Verify S/I systems - ALIGNED FOR INJECTION MODE.</li> <li>b. Verify Cold Leg Recirc-capability as follows: <ul style="list-style-type: none"> <li>1) At least one ND pump - AVAILABLE.</li> <li>2) Verify power to all of the following valves - AVAILABLE: <ul style="list-style-type: none"> <li><input type="checkbox"/> 1FW-27A (ND Pump 1A Suct From FWST)</li> <li><input type="checkbox"/> 1NI-185A (ND Pump 1A Cont Sump Suct)</li> <li><input type="checkbox"/> 1ND-28A (ND Supply To NV &amp; 1A NI Pmps)</li> <li><input type="checkbox"/> 1FW-55B (ND Pump 1B Suct From FWST)</li> <li><input type="checkbox"/> 1NI-184B (ND Pump 1B-Cont Sump Suct)</li> <li><input type="checkbox"/> 1NI-332A (NI Pump Suct X-Over From ND)</li> <li><input type="checkbox"/> 1NI-333B (NI Pump Suct From ND)</li> <li><input type="checkbox"/> 1NI-334B (NI Pump Suct X-Over From ND)</li> <li><input type="checkbox"/> 1NI-136B (ND Supply To NI Pump 1B).</li> </ul> </li> <li>3) Verify power to all of the following valves - AVAILABLE: <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NI-115A (NI Pump 1A Miniflow Isol)</li> <li><input type="checkbox"/> 1NI-144A (NI Pump 1B Miniflow Isol)</li> <li><input type="checkbox"/> 1NI-147B (NI Pump Miniflow Hdr To FWST Isol).</li> </ul> </li> <li>4) Verify the "ENABLE" lights for the following switches - LIT: <ul style="list-style-type: none"> <li><input type="checkbox"/> "C-LEG RECIR FWST TO-CONT SUMP SWAP TRN A"</li> <li><input type="checkbox"/> "C-LEG RECIR FWST TO CONT SUMP SWAP TRN B".</li> </ul> </li> </ul> </li> </ul>

Op Test No.:   NRC   Scenario #   Spare   Event #   6, 7 and 8   Page   27   of   37  

Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.

Time	Position	Applicant's Actions or Behavior
	BOP/SRO	<p>c. Verify auxiliary building radiation is normal as follows:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> EMF-41 (Aux Bldg Ventilation) trip 1light – DARK</li> <li><input type="checkbox"/> All area monitor EMF trip 1 lights - DARK.</li> </ul> <p>d. <b>WHEN</b> the TSC is activated <b>AND</b> staffed, <b>THEN</b>:</p> <ol style="list-style-type: none"> <li>1) Notify the Reactor Engineer to assess core damage. <b>REFER TO</b> RP/0/A/5000/015 (Core Damage Assessment).</li> <li>2) Notify Chemistry to obtain current NC boron concentration.</li> <li>3) <b>WHEN</b> ND is aligned for Cold Leg Recirc, <b>THEN</b> notify Chemistry to obtain current containment sump boron concentration.</li> <li>4) Notify Operating Engineer of the following:               <ol style="list-style-type: none"> <li>a) VA is required to be aligned to normal <b>AND</b> filter mode within 72 hours of the event.</li> <li>b) Evaluate aligning VA to normal <b>AND</b> filter mode. <b>REFER TO</b> OP/0/A/6450/003 (Auxiliary Building Ventilation System).</li> </ol> </li> <li>e. Notify station management to evaluate starting additional plant equipment to assist in recovery.</li> </ol>
	BOP	<p>13. <b>Verify NC System cooldown and depressurization is required as follows:</b></p> <ol style="list-style-type: none"> <li>a. NC pressure - <b>GREATER THAN 285 PSIG.</b></li> </ol>
	SRO/BOP	<p>13.a RNO <b>IF</b> ND flow to C-Legs is greater than 675 GPM, <b>THEN GO TO</b> Step 14.</p>
	SRO	<p>14. <b>Verify transfer to Cold Leg Recirc as follows:</b></p> <ol style="list-style-type: none"> <li>a. FWST level - <b>LESS THAN 37%</b> (1AD-9, D/8 "FWST 2/4 LO LEVEL" - LIT).</li> <li>b. S/I systems - <b>ALIGNED FOR COLD LEG RECIRC.</b></li> </ol>
<p><b>NOTE TO EVALUATOR:</b> Depending on the speed of the crew, if FWST level has reached 37% prior to this step they will have transferred to ES-1.3. If not at 37%, they will enter step 14.a RNO and loop back to step 11 until FWST is at 37%.</p>		

Op Test No.:   NRC   Scenario #   Spare   Event #   6, 7 and 8   Page   28   of   37  

Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.

Time	Position	Applicant's Actions or Behavior
<b>NOTE TO EVALUATOR: The following actions are from EP/1/A/5000/ES-1.3, Transfer to Cold Leg Recirculation</b>		
	CREW	<b>1. Monitor Enclosure 1 (Foldout Page).</b>
		<b>CAUTION S/I recirculation flow to NC System must be maintained at all times.</b> <b>NOTE</b> <input type="checkbox"/> Steps 2 through 8 should be performed without delay. <input type="checkbox"/> CSF should not be implemented until directed by this procedure.
	BOP	<b>2. Verify at least one of the following annunciators - LIT:</b> <input type="checkbox"/> 1AD-20, B/3 "CONT. SUMP LEVEL >3.3 ft" OR <input type="checkbox"/> 1AD-21, B/3 "CONT. SUMP LEVEL >3.3 ft"
	BOP	<b>3. Verify KC flow to ND heat exchangers - GREATER THAN 5000 GPM.</b>
	BOP	<b>4. Ensure S/I - RESET:</b> a. ECCS. b. D/G load sequencers. c. <b>IF AT ANY TIME</b> a B/O occurs, <b>THEN</b> restart S/I equipment previously on.
	BOP	<b>5. Align S/I system for recirc as follows:</b> a. Verify following valves - OPEN: <input type="checkbox"/> 1NI-185A (ND Pump 1A Cont Sump Suct) <input type="checkbox"/> 1NI-184B (ND Pump 1B Cont Sump Suct).
	BOP	5. b. Verify following valves - CLOSED: <input type="checkbox"/> 1FW-27A (ND Pump 1A Suct From FWST) <input type="checkbox"/> 1FW-55B (ND Pump 1B Suct From FWST). c. Verify ND pumps - ON.

Op Test No.:   NRC   Scenario #   Spare   Event #   6, 7 and 8   Page   29   of   37  

Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.

Time	Position	Applicant's Actions or Behavior
	BOP	5.c RNO c. Perform the following: <ol style="list-style-type: none"> <li>1) Start ND pump(s) with suction aligned to an open containment sump suction valve.</li> <li>2) <b>IF</b> no ND pump can be started <b>OR</b> no ND train can be aligned for recirc, <b>THEN</b>:               <ol style="list-style-type: none"> <li>a) <b>IF</b> a valid red <b>OR</b> orange path procedure is in effect, <b>THEN RETURN TO</b> procedure in effect.</li> <li>b) <b>GO TO</b> EP/1/A/5000/ECA-1.1 (Loss Of Emergency Coolant Recirculation).</li> </ol> </li> </ol>
NOTE TO EVALUATOR: At this step the crew will transition to ECA-1.1, Loss of Emergency Coolant Recirculation.		
NOTE TO EVALUATOR: The following actions are from ECA-1.1.		
	CREW	1. <b>IF</b> loss of Emergency Coolant Recirculation is due to sump blockage, <b>THEN GO TO</b> EP/1/A/5000/ECA-1.3 (Containment Sump Blockage).
	CREW	2. <b>Monitor Enclosure 1 (Foldout Page).</b>
	BOP	3. <b>Restore recirc capability as follows:</b> <ol style="list-style-type: none"> <li>a. Verify all of the following pumps - AVAILABLE TO BE OPERATED FROM THE CONTROL ROOM:               <ul style="list-style-type: none"> <li><input type="checkbox"/> ND pumps</li> <li><input type="checkbox"/> NV pumps</li> <li><input type="checkbox"/> NI pumps.</li> </ul> </li> </ol>
	BOP	3.a RNO If power is available to the affected essential bus(s), <b>THEN</b> dispatch operator and maintenance to determine and correct cause of pump failure. <b>REFER TO</b> EM/1/A/5200/005 (Troubleshooting Cause For ND, NI, or NV Pump(s) Failing to Start).

Op Test No.:   NRC   Scenario #   Spare   Event #   6, 7 and 8   Page   30   of   37  

Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.

Time	Position	Applicant's Actions or Behavior
	BOP	<p>3.b. Verify the following valves - AVAILABLE TO BE OPERATED FROM THE CONTROL ROOM:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NI-185A (ND Pump 1A Cont Sump Suct)</li> <li><input type="checkbox"/> 1NI-184B (ND Pump 1B Cont Sump Suct).</li> </ul> <p>c. Verify containment sump level adequate as follows:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1AD-20, B/2 "CONT. SUMP LEVEL &gt;2.5 ft" - LIT OR</li> <li><input type="checkbox"/> 1AD-21, B/2 "CONT. SUMP LEVEL &gt;2.5 ft" - LIT OR</li> <li><input type="checkbox"/> All of the following: <ul style="list-style-type: none"> <li><input type="checkbox"/> FWST level - LESS THAN 8%</li> <li><input type="checkbox"/> NC temperature - GREATER THAN 200°F</li> <li><input type="checkbox"/> Containment Spray - PREVIOUSLY IN SERVICE</li> <li><input type="checkbox"/> Indicated containment sump level - GREATER THAN 0.5 FT.</li> </ul> </li> </ul> <p>d. Verify Cold Leg Recirc capability - RESTORED.</p>
	BOP	<p>3.d RNO Perform the following:</p> <p>1) Continue attempts to restore recirc capability as follows:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Power restoration</li> <li><input type="checkbox"/> Local valve operation</li> <li><input type="checkbox"/> Obtain maintenance assistance as required. <b>REFER TO</b> EM/1/A/5200/006 (Troubleshooting Cause For FW, ND, NI, or NV Valves(s) Failing to Operate).</li> <li><input type="checkbox"/> Other actions as specified by station management.</li> </ul> <p>2) <b>WHEN</b> emergency coolant recirc capability is restored during this procedure, <b>THEN</b>:</p> <p>a) <b>IF</b> transfer to Cold Leg Recirc is required, <b>THEN</b> perform the following:</p> <p>(1) Ensure the following valves - OPEN:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1NS-29A (NS Spray Hdr 1A Cont Isol)</li> <li><input type="checkbox"/> 1NS-32A (NS Spray Hdr 1A Cont Isol)</li> <li><input type="checkbox"/> 1NS-15B (NS Spray Hdr 1B Cont Isol)</li> <li><input type="checkbox"/> 1NS-12B (NS Spray Hdr 1B Cont Isol).</li> </ul> <p>(2) <b>GO TO</b> EP/1/A/5000/ES-1.3 (Transfer To Cold Leg Recirculation).</p>

Op Test No.:   NRC   Scenario #   Spare   Event #   6, 7 and 8   Page   31   of   37  

Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.

Time	Position	Applicant's Actions or Behavior
		<p>b) RETURN TO procedure and step in effect.</p> <p>3) GO TO Step 4.</p>
	BOP	<p>4. Ensure S/I - RESET:</p> <p>a. ECCS.</p> <p>b. D/G load sequencers.</p> <p>c. IF AT ANY TIME a B/O occurs, THEN restart S/I equipment previously on.</p>
	BOP	<p>5. Depress the "DEFEAT" pushbuttons on the following switches:</p> <p><input type="checkbox"/> "C-LEG RECIR FWST TO-CONT SUMP SWAP TRN A"</p> <p><input type="checkbox"/> "C-LEG RECIR FWST TO-CONT SUMP SWAP TRN B".</p>
	BOP	<p>6. Verify adequate FWST level as follows:</p> <p>a. FWST level - GREATER THAN 5%.</p> <p>b. IF AT ANY TIME FWST level is less than 5%, THEN GO TO Step 33.</p>
	BOP	<p>7. Determine NS requirements as follows:</p> <p>a. Verify following NS pump suction valves - OPEN:</p> <p><input type="checkbox"/> 1NS-20A (NS Pump 1A Suct From FWST)</p> <p><input type="checkbox"/> 1NS-3B (NS Pump 1B Suct From FWST).</p> <p>b. Determine number of NS pumps required from the following table:</p> <p>c. Verify the number of NS pumps on - EQUAL TO NUMBER REQUIRED.</p>
	BOP	<p>8. Verify criteria to align NS for recirc as follows:</p> <p>a. Any NS pump - ON.</p>
	SRO	8.a RNO GO TO Step 9.
	BOP	<p>9. Align NS spray valves as follows:</p> <p>a. Verify NS Pump 1A - ON.</p>

Op Test No.: NRC Scenario # Spare Event # 6, 7 and 8 Page 32 of 37

Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.

Time	Position	Applicant's Actions or Behavior
	BOP	9.a RNO Perform the following: 1) Ensure NS Train A - RESET. 2) Close the following valves: <input type="checkbox"/> 1NS-29A (NS Spray Hdr 1A Cont Isol) <input type="checkbox"/> 1NS-32A (NS Spray Hdr 1A Cont Isol).
	BOP	9.b. Verify NS Pump 1B - ON.
	BOP	9.b RNO Perform the following: 1) Ensure NS Train B - RESET. 2) Close the following valves: <input type="checkbox"/> 1NS-15B (NS Spray Hdr 1B Cont Isol) <input type="checkbox"/> 1NS-12B (NS Spray Hdr 1B Cont Isol).
	CREW	c. <b>IF AT ANY TIME</b> NS pumps are stopped or started, <b>THEN</b> : <input type="checkbox"/> Ensure associated NS Train - RESET. <input type="checkbox"/> Close associated spray valves after securing a pump. <input type="checkbox"/> Open associated spray valves prior to starting a pump.
CRITICAL STEP	BOP	<b>10. Initiate makeup to FWST. REFER TO OP/1/A/6200/014 (Refueling Water System).</b>
	RO	<b>11. Control intact S/G levels as follows:</b> a. Verify N/R level in all intact S/Gs - GREATER THAN 11% (29% ACC). b. Throttle feed flow to maintain all intact S/G N/R levels between 11% (29% ACC) and 50%.
	CREW	<b>12. Monitor shutdown margin during cooldown as follows:</b> a. Notify station management to monitor shutdown margin during NC System cooldown. b. Request periodic NC boron samples from Primary Chemistry. c. <b>WHEN</b> each NC boron sample obtained, <b>THEN</b> : 1) Perform shutdown margin calculation. <b>REFER TO</b> OP/0/A/6100/006 (Reactivity Balance Calculation). 2) Verify NC boron concentration - GREATER THAN OR EQUAL TO REQUIRED BORON CONCENTRATION.

Op Test No.:   NRC   Scenario #   Spare   Event #   6, 7 and 8   Page   33   of   37  

Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.

Time	Position	Applicant's Actions or Behavior
	BOP	<p>13. <b>WHEN "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) is lit, THEN:</b></p> <ul style="list-style-type: none"> <li>a. Depress ECCS steam pressure "BLOCK" pushbuttons.</li> <li>b. Verify main steam isolation blocked status lights (1SI-13) - LIT.</li> </ul>
		<p><b>NOTE</b> <input type="checkbox"/> After low steamline pressure main steam isolation signal is blocked, maintaining steam pressure negative rate less than 2 PSIG per second will prevent a Main Steam Isolation.</p> <p><input type="checkbox"/> OAC graphic SMRATES to monitor S/G pressure rates can be accessed via a hot button in the center of the SM graphic.</p>
	RO	<p>14. <b>Initiate NC System cooldown to Cold Shutdown as follows:</b></p> <ul style="list-style-type: none"> <li>a. Verify "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT.</li> </ul>
	RO	<ul style="list-style-type: none"> <li>b. Verify MSIVs on all intact S/Gs - OPEN.</li> </ul>
	RO	<p>14.b.2 RNO 2) Reset Main Steam Isolation signal as follows:</p> <ul style="list-style-type: none"> <li>a) Ensure manual loaders for all MSIV bypass valves - ADJUSTED TO 0%.</li> <li>b) Reset SM Isolation.</li> <li>c) Reset S/G PORVs.</li> </ul> <p>3) Place steam dumps in pressure mode as follows:</p> <ul style="list-style-type: none"> <li>a) Place "STM DUMP CTRL" in manual.</li> <li>b) Manually adjust the "STM DUMP CTRL" to 0% demand.</li> <li>c) Place steam dumps in pressure mode.</li> </ul> <p>4) Perform the following to equalize pressure across MSIVs on intact S/Gs:</p> <ul style="list-style-type: none"> <li>a) Open MSIV bypass valve on intact S/Gs.</li> <li>b) <b>IF AT ANY TIME</b> pressure does not equalize as required, <b>THEN</b> isolate steam loads off main steam header. <b>REFER TO</b> Enclosure 8 (Equalizing Across MSIVs).</li> <li>5) <b>WHEN</b> all intact S/Gs pressure is within 50 psig of steam header pressure, <b>THEN:</b> <ul style="list-style-type: none"> <li>a) Open all MSIVs on intact S/Gs.</li> <li>b) Close all MSIV bypass valves.</li> <li>c) Perform Steps 14.c through 14.e.</li> </ul> </li> </ul>

Op Test No.:   NRC   Scenario #   Spare   Event #   6, 7 and 8   Page   34   of   37  

Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.

Time	Position	Applicant's Actions or Behavior
		6) <b>GO TO</b> Step 15.
	RO	14. c. <b>WHEN</b> "P-12 LO-LO TAVG" status light (1SI-18) is lit, <b>THEN</b> place the steam dump interlock bypass switches in "BYP INTLK." d. Verify steam dumps - IN PRESSURE MODE. e. Dump steam to condenser while e. Perform the following: maintaining cooldown rate based on NC T-Colds as close as possible without exceeding 100°F in an hour.
	BOP	15. <b>Verify S/I aligned by one of the following:</b> <input type="checkbox"/> 1NI-9A (NV Pmp C/L Inj Isol) - OPEN OR <input type="checkbox"/> 1NI-10B (NV Pmp C/L Inj Isol) - OPEN OR <input type="checkbox"/> At least one ND pump on with suction aligned to either of the following: <input type="checkbox"/> FWST OR <input type="checkbox"/> Containment sump. OR <input type="checkbox"/> At least one NI pump - ON.
	BOP	16. <b>Establish one train of S/I flow as follows:</b> a. Verify only one NV pump - ON.
	BOP	16.a RNO Perform the following: 1) <b>IF</b> both NV pumps are on, <b>THEN</b> stop one NV pump.
	BOP	16. b. Verify only one NI pump - ON.
	BOP	16.b RNO Perform the following: 1) <b>IF</b> both NI pumps are on, <b>THEN</b> stop one NI pump.
	RO	16. c Verify NC pressure - LESS THAN 285 PSIG. d. Verify only one ND pump - ON.

Op Test No.:   NRC   Scenario #   Spare   Event #   6, 7 and 8   Page   35   of   37  

Event Description: Large Break LOCA with a failure of the Main Steam Isolation and loss of Emergency recirc capability.

Time	Position	Applicant's Actions or Behavior
	BOP	16.d RNO Perform the following: 1) IF both ND pumps are on, THEN stop one ND pump. 2) IF both ND pumps are off AND available suction source is aligned, THEN start one ND pump.
	BOP	17. Verify no backflow from FWST to containment sump as follows: a. A Train: 1) Verify 1NI-185A (ND Pump 1A Cont Sump Suct) - OPEN. 2) Verify 1FW-27A (ND Pump 1A Suct From FWST) - CLOSED. b. B Train: 1) Verify 1NI-184B (ND Pump 1B Cont Sump Suct) - OPEN. 2) Verify 1FW-55B (ND Pump 1B Suct From FWST) - CLOSED.
	BOP	18. Verify NC pump status as follows: a. All NC pumps - OFF. b. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.
	SRO	18.b RNO GO TO Step 19.
	RO	19. Verify S/I termination criteria as follows: a. Verify RVLIS indication is adequate as follows: <input type="checkbox"/> IF all NC pumps are off, THEN verify "REACTOR VESSEL LR LEVEL" - GREATER THAN 61%.
	SRO	19.a RNO GO TO Step 26.
<b>END OF SCENARIO</b>		

**Catawba Nuclear Station NRC Exam December 2010**

**ATTACHMENT 1**

<b>CREW CRITICAL TASK SUMMARY</b>			
<b>SAT</b>	<b>UNSAT</b>	<b>CT #</b>	<b>CRITICAL TASK</b>
		C-1	Trip all reactor coolant pumps on a loss of subcooling per E-0 Encl. 1 guidance within 5 minutes of criteria being met.
		C-2	Makeup to the FWST and minimize FWST outflow.

Comments:

## ATTACHMENT 2

<b>SHIFT TURNOVER INFORMATION</b>			
<b>Unit 1 Status</b>			
Power Level	Power History	NCS Boron	Xenon
10-8 amps	Per IC	680 PPM	per OAC
<b>Controlling Procedure</b>			
<ul style="list-style-type: none"> <li>• OP/1/A/6100/001 (Controlling Procedure for Unit Startup), Enclosure 4.1 (Unit Startup). Begin at step 2.167.</li> </ul>			
<b>Other Information Needed to Assume the Shift</b>			
<ul style="list-style-type: none"> <li>• 1A LH pump is tagged out to repair a leak on the motor cooler. Maintenance estimates that repairs will take 10 hours to complete.</li> <li>• Direction for the crew is to increase reactor power to 10%.</li> </ul>			
<b>NLO's Available</b>			
Six NLO's are available as listed on the status board			
<b>METEOROLOGICAL CONDITIONS</b>			
<ul style="list-style-type: none"> <li>• Upper wind direction = 315 degrees, speed = 10 mph</li> <li>• Lower wind direction = 315 degrees, speed = 10.5 mph</li> <li>• Forecast calls for clear skies over the next 24 hours.</li> </ul>			