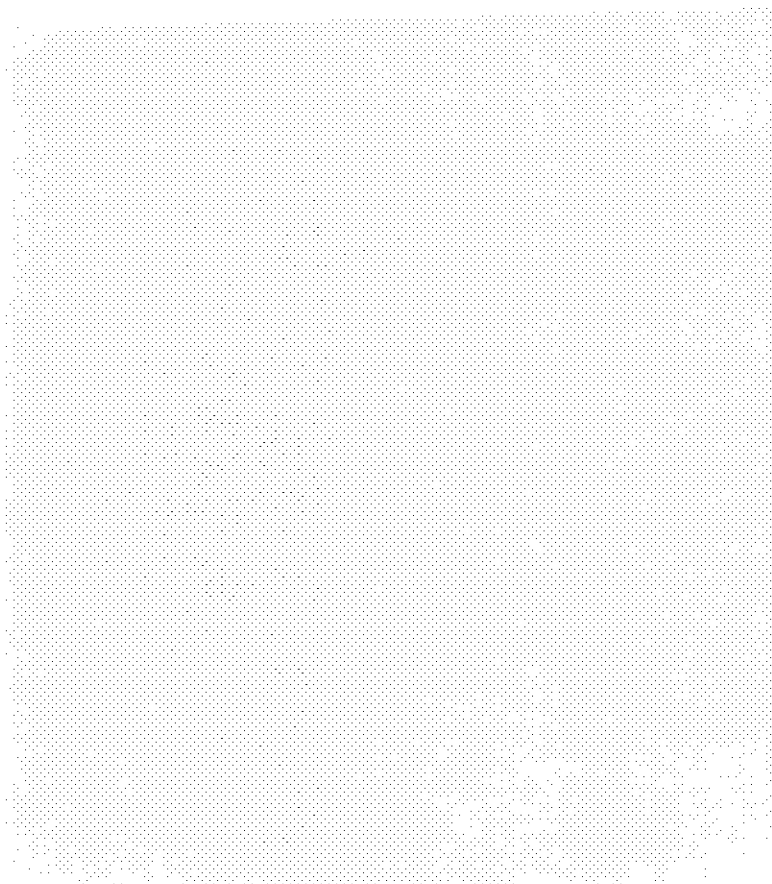


**Final Submittal**  
(Blue Paper)

1. As Given Simulator Scenario Operator Actions ES-D-2

**CATAWBA OCTOBER 2004**

**EXAM 50-413, 414/2004-301  
OCTOBER 4 - 8, 2004 &  
OCTOBER 13, 2004 (WRITTEN)**



Simulation Facility: CatawbaScenario No.: NRC-2Op-Test No: 1

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_

\_\_\_\_\_

**Objectives:** To evaluate the applicants' ability to mitigate individual component and instrument failures: Pressurizer PORV failures requiring closure of the block valve, main generator exciter failure, Channel I Impulse pressure fails which requires manual control of the control rods. The crew will diagnose and enter procedures for a steam generator tube leak within the capacity of the makeup system. The BOP position will respond by increasing makeup capacity while the unit is rapidly reduced to less than 50% power by the RO position. An additional component failure for the BOP to respond to will require restoration of reactor coolant pumps cooling. The crew will receive an increase in steam generator leak size diagnosed only by decreasing pressurizer level. A reactor trip and safety injection is required. Additional failures after the trip include a failed shutdown of ventilation system fans and a steam generator PORV fails open during the cooldown procedure. The crew responds to the tube rupture and cooldown and depressurizes to equalize primary and secondary pressures. When safety injection termination criteria are met the scenario objectives are complete.

**Initial Conditions:** 90% power, EOL, Equilibrium Xe.  
NCS Boron Concentration 80 ppm.

**Turnover:**

- Safety Injection pump 1A is tagged for a coupling alignment problem. It has been tagged for 24 hours and not expected to be back before tomorrow.
- DFCS trouble alarm due to S/G 1B feedwater flow channel II (ICFP5020) transmitter reading 3%. IAE is investigating. An OAC point value had been inserted for the failed transmitter.
- NC Loop "A" flow channel III (INCP5020) has failed to 23%. IAE is investigating. An OAC point value had been inserted for the failed transmitter.
- Hurricane Holly has been downgraded to a tropical depression. York County is under a severe thunderstorm watch.
- Repairs were completed on turbine control valve #3 servo-valve hydraulic lines. Waiting for paperwork before increasing power to 100%.

Event No.	Malf. No.	Event Type*	Event Description (IC 111)
1	VLV-NC009F = 50 Trigger 1	C-BOP	Pressurizer PORV 1NV-36B fails 50% open and will not close. Block valve must be used.
2	MAL-EGB001 = 125 Trigger 3	C-RO	Generator Voltage regulator failure. DC Voltage regulator set for an undervoltage condition on essential busses. (Pre-inserted)
3	XMT-MT026 = 0 Trigger 5	I-RO	Turbine Impulse pressure transmitter fails low causing control rods to insert.
4	MAL-SG001C = 75 Trigger 7	C-BOP	S/G Tube Leak on 1C S/G at 75 GPM.
5		R-RO	Rapid load reduction to less than 50% at 40%/hr (AP-09). (requires manual rod insertion)
6	OVR-KC026D = 1 Trigger 9	C-BOP	Component Cooling valve failure to reactor coolant pumps.
7	Recall MAL- SG001C = 500 VLV-SM002A = 100	M-ALL	Ruptured Steam Generator (1C). 1C Steam Generator Main Steam Isolation valve fails open (Pre-inserted)
8	MAL-ISE011B	C-BOP	Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection. (Pre-inserted)
9	MAL-SM002A = 100 Trigger 11	C-RO	Steam Generator 1A PORV fails open during cooldown.

\* (N)ormal,  
NUREG-1021

(R)eactivity,

(I)nstrument,  
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(C)omponent,

(M)ajor  
Draft Revision 9

2004 NRC OPERATING EXAMINATION  
SCENARIO 2

TURNOVER INFORMATION

**Initial Conditions:** 90% power, EOL, Equilibrium Xe.  
NCS Boron Concentration 80 ppm

**Turnover:**

- Safety Injection pump 1A is tagged for a coupling alignment problem. It has been tagged for 24 hours and not expected to be back before tomorrow.
- DFCS trouble alarm due to S/G 1B feedwater flow channel II (1CFP5020) transmitter reading 3%. IAE is investigating. An OAC point value had been inserted for the failed transmitter.
- NC Loop "A" flow channel III (1NCP5020) has failed to 23%. IAE is investigating. An OAC point value had been inserted for the failed transmitter.
- Hurricane Holly has been downgraded to a tropical depression. York County is under a severe thunderstorm watch.
- Repairs were completed on turbine control valve #3 servo-valve hydraulic lines. Waiting for paperwork before increasing power to 100%.

**SCENARIO 2**  
**Simulator Operator Actions and Phone Call Instructions.**

**EVENT**

**START THE DATA RECORDING FILES (CDF)**

1. When examiner directs: Insert **Trigger 1** (VLV-NC009F NC-36B FAILS TO 50% VALUE = 50). No further action required.  
  
**NO** scripted communications are anticipated. Any phone calls would be to Shift Work Manager about getting SPOC support and getting work requests started.
2. When examiner directs: Insert **Trigger 3** (MAL-EGB001, EXCITATION FAILURE VALUE = 125).  
  
**IF the Dispatcher is called** about directions for voltage control or VARS, state that you will call back later with instructions.
3. When examiner directs: Insert **Trigger 5** (XMT-MT026, IMPULSE CHANNEL FAILS LOW VALUE = 0).  
  
**NO** scripted communications are anticipated. Any phone calls would be to Shift Work Manager about getting SPOC support and getting work requests started.
4. When examiner directs: Insert **Trigger 7** (MAL-SG001C, 1C SGTR VALUE = 75)  
  
**When Secondary Chemistry is called** to sample, state that you will sample all steam generators. Do not report the sample results.  
  
Addition calls that are for notifications such as when the polishers are bypassed should be acknowledged without any scripted response.  
  
**When Radiation Protection is called** to confirm tube leak location, ensure that crews has already determined leak in 1C S/G, wait 5 minutes, then state that CAT COLUMN FRISK shows activity on 1C S/G.  
  
**When Radiation Protection is called** to perform their HP procedure, only acknowledge the instruction.  
  
**When the NLO is dispatched** to perform AP/10 Enclosure 5, acknowledge without any additional scripted response.  
  
**When Reactor Group is called**, only acknowledge the shutdown requirement.
5. **NO** scripted communications are anticipated.
6. **INSTRUCTOR NOTE: The following malfunction (OVR-KC026D) should be deleted immediately after the trigger is actuated to allow manual operation of the valve.**

When examiner directs: Insert **Trigger 9** (OVR-KC026D, KC VALVE KC-338B CLSD PUSHBUTTON).

**NO** scripted communications are anticipated, an NLO may be dispatched, but no response will be provided.

7. When examiner directs: **RECALL MAL-SG001C** and set **VALUE = 500**

**IF Radiation Protection is called** to confirm tube leak location, ensure that crews has already determined leak in 1C S/G, wait 5 minutes, then state that CAT COLUMN FRISK shows activity on 1C S/G.

**IF Secondary Chemistry is called** for sample results, report that sampling continues and no results are available.

**When NLO is dispatched to secure NF glycol pumps, Insert LOA-CNT003 VALUE="PMP OFF"**. Report back after 5 minutes and state that NF glycol pumps are secured.

**When the NLOs are dispatched to close 1SA-4 Insert: LOA-CA012 VALUE = 0**  
Report back after 10 minutes and state that 1SA-4 is closed.

9. **WHEN** the RO opens 1A S/G PORV to start the cooldown, wait until the initial rapid pressure drop in steam generator pressure has occurred; **THEN INSERT: Trigger 11** (MAL-SM002A 1A PORV FAILS OPEN VALUE = 100)

Op-Test No.: NRC Scenario No.: 2 Event No.: 1		
Event Description: Pressurizer PORV 1NC-36B fails 50% open		
Time	Position	Applicant's Actions or Behavior
	BOP	Recognize 1NC-36B indicates intermediate and informs SRO.
	SRO	<b>Enter AP/1/A/5500/11 (Pressurizer Pressure Anomalies) Case I (Pressurizer Pressure Decreasing) and direct actions.</b>
		<b>EXAMINER NOTE: Steps 1 and 2 are Immediate Action steps and are required to be performed from memory.</b>
Step 1	BOP	Verify all Pzr pressure channels – INDICATING THE SAME
Step 2	BOP	Verify all Pzr PORVs - CLOSED. BOP notes that 1NC-36B is not closed and informs SRO.
	SRO	Transitions to Step 2 RNO and directs actions.
Step 2 RNO	BOP	a. Manually close Pzr PORV(s) BOP notes valve 1NC-36B will not close and informs SRO.  b. <u>IF</u> any Pzr PORV cannot be closed, <u>THEN</u> :  1) Close the affected PORV(s) isolation valve. BOP closed 1NC-35B and informs SRO.  2) <u>IF</u> the Pzr PORV isolation valve cannot be closed, <u>THEN</u> ...  Step does not apply.
		SRO transitions to Step 3 A/ER and directs actions.
Step 3	BOP	Verify Pzr spray valve(s) - CLOSED.
Step 4	BOP	Verify all Pzr heaters – ENERGIZED.
Step 5	BOP	Ensure 1NV-37A (NV Supply To Pzr Aux Spray) - CLOSED.

Op-Test No.: NRC Scenario No.: 2 Event No.: 1		
Event Description: Pressurizer PORV 1NC-36B fails 50% open		
Time	Position	Applicant's Actions or Behavior
Step 6	RO/BOP	Verify NC pressure - STABLE OR INCREASING.
Step 7	SRO BOP	IF a Pzr pressure channel is failed high, <u>THEN</u> ...  Step does not apply.
Step 8	SRO	Ensure compliance with appropriate Tech Specs: <ul style="list-style-type: none"> <li>• 3.3.1 (Reactor Trip System (RTS) Instrumentation)</li> <li>• 3.3.2 (Engineered Safety Features Actuation System (ESFAS) Instrumentation)</li> <li>• 3.3.3 (Post Accident Monitoring (PAM) Instrumentation)</li> <li>• 3.3.4 (Remote Shutdown System)</li> <li>• 3.4.1 (RCS Pressure, Temperature, and Flow Departure From Nucleate Boiling (DNB) Limits)</li> <li>• 3.4.4 (RCS Loops - MODES 1 and 2)</li> <li>• 3.4.5 (RCS Loops - MODE 3)</li> <li>• 3.4.6 (RCS Loops - MODE 4)</li> <li>• 3.4.9 (Pressurizer)</li> <li>• 3.4.10 (Pressurizer Safety Valves)</li> <li>• 3.4.11 (Pressurizer Power Operated Relief Valves (PORVs))</li> <li>• 3.4.13 (RCS Operational Leakage).</li> </ul>
Step 9	BOP	Ensure "PZR PRESS REC SELECT" is selected to an operable channel.
Step 10	SRO	Determine long term plant status. <u>RETURN TO</u> procedure in effect.



Op-Test No.: NRC Scenario No.: 2 Event No.: 2		
Event Description: Generator Voltage Regulator failure		
Time	Position	Applicant's Actions or Behavior
	RO	Notes the following alarms and informs SRO: <b>1AD-1, D/2 (EXCESSIVE GEN V/H OR OVER VOLTS)</b> <b>1AD-1, E/10 (REG AUTO TO MANUAL TRIP)</b> <b>EXAMINER NOTE: Copies of 1AD-1 D/2 and E/10 are attached. Other alarms will also be generated on 1AD-11 but will clear once the RO adjusts voltage.</b>
	SRO	Directs the restoration of voltage control using the DC (manual) voltage regulator.
	RO	Per annunciator response immediate actions the RO should control generator voltage at ~22,000 volts using the DC regulator. D/2 Step 6 <u>IF</u> transfer from AC to DC regulator occurs <u>AND</u> generator does <u>NOT</u> trip, manually control excitation to produce 22KV at gen. terminal. E/10 step 2 <u>IF NOT</u> due to trip of exciter field breaker, ensure regulator has swapped to manual and voltage is being controlled at ~ 22 KV.
		<b>EXAMINER NOTE: Based on this situation and the alarm responses the Transmissions Department may be called. If so, the guidance provided will be the same as that in the annunciator response. "Adjust generator voltage to ~ 22 KV."</b>

Op-Test No.: NRC Scenario No.: 2 Event No.: 3		
Event Description: Turbine Impulse pressure transmitter fails low causing control rods to insert.		
Time	Position	Applicant's Actions or Behavior
	RO	RO notes Control rods are inserting and informs SRO. Determines that rod motion is not required
	ALL	<b>Enters AP/1/A/5500/15 (Control Rod Malfunctions), Case II (Continuous Rod Movement).</b>
		<b>EXAMINER NOTE: Steps 1 and 2 are immediate action steps and are required to be performed from memory.</b>
Step 1	RO	Ensure "CRD BANK SELECT" switch – in MANUAL.
Step 2	RO	Verify all rod motion – STOPS.
Step 3	RO	Manually adjust control rods as necessary to maintain T-Avg within 1 degree F of T-Ref.
Step 4	ALL	Determine and correct cause of continuous rod movement.
Step 5	SRO	Ensure compliance with appropriate Tech Specs: <ul style="list-style-type: none"> <li>• 3.1.1 (Shutdown Margin (SDM))</li> <li>• 3.1.4 (Rod Group Alignment Limits)</li> <li>• 3.1.5 (Shutdown Bank Insertion Limits)</li> <li>• 3.1.6 (Control Bank Insertion Limits)</li> <li>• 3.3.2 (ESFAS Instrumentation)</li> </ul>
Step 6	SRO	Determine required notifications: <ul style="list-style-type: none"> <li>• <u>REFER TO RP/0/A/5000/001</u> (Classification of Emergency)</li> <li>• <u>REFER TO RP/0/B/5000/013</u> (NRC Notification Requirements)</li> </ul>
Step 7	SRO	Determine long term plant status. <u>RETURN TO</u> procedure in effect.

Op-Test No.: NRC Scenario No.: 2 Event No.: 4		
Event Description: 1C Steam Generator Tube Leak (75 gpm)		
Time	Position	Applicant's Actions or Behavior
	ALL	Recognize symptoms of a Steam Generator Tube Leak: <ul style="list-style-type: none"> <li>• Charging flow increasing</li> <li>• EMF 31, 33, 72, 73, 28 in alarm</li> <li>• OAC Pt C1P0187 (Estimated Total Pri To Sec Leakrate)</li> </ul>
	SRO	<b>Implements AP/1/A/5500/10 (Reactor Coolant Leak) Case I (Steam Generator Tube Leak) and directs actions.</b>
Step 1	ALL	Monitor Enclosure 1 (Case I Steam Generator Tube Leak Foldout Page).
Step 2	RO/ BOP	Verify Pzr level – STABLE OR INCREASING. Notes Pzr level is decreasing and informs SRO.
	SRO	Transitions to Step 2 RNO and directs actions.
Step 2 RNO	BOP	Perform the following: <ol style="list-style-type: none"> <li>Maintain charging flow less than 180 GPM.</li> <li>Manually throttle 1NV-294 (NV Pmps A&amp;B Disch Flow Ctrl) to stabilize Pzr level.</li> <li><u>IF</u> Pzr level is stable <u>OR</u> increasing, <u>THEN GO TO</u> Step 3.</li> </ol> Notes Pzr level is still decreasing and informs SRO.

Op-Test No.: NRC Scenario No.: 2 Event No.: 4		
Event Description: 1C Steam Generator Tube Leak (75 gpm)		
Time	Position	Applicant's Actions or Behavior
Step 2 RNO	BOP	<p>d. <u>IF</u> Pzr level continues to decrease, <u>THEN</u> ...</p> <p>1) Reduce letdown flow to 45 GPM as follows:</p> <p>a) Manually control 1NV-148 (Letdn Press Control) to maintain letdown pressure at 350 PSIG.</p> <p>b) <u>IF</u> 1NV-13A (Letdn Orif 1A Otlf Cont Isol) open, <u>THEN</u>...</p> <p>Step does not apply.</p> <p>c) <u>IF</u> 1NV-10A (Letdn Orif 1B Otlf Cont Isol) open, <u>THEN</u> throttle 1NV-849 (Letdn Flow Var Orif Ctr!) until letdown flow is 45 GPM.</p> <p>d) <u>WHEN</u> letdown pressure is stable at 350 PSIG, <u>THEN</u> place 1NV-148 (Letdn Press Control) in "AUTO".</p> <p>2) <u>IF</u> Pzr level continues to decrease, <u>THEN</u>:...</p> <p>Step does not apply at this time.</p> <p>3) <u>IF</u> Pzr level stable <u>OR</u> increasing, <u>THEN GO TO</u> Step 3.</p>
	SRO	Transitions to Step 3 A/ER and directs actions.
Step 3	ALL	<u>IF AT ANY TIME</u> Pzr level decreases in an uncontrolled manner or cannot be maintained greater than 4%, <u>THEN</u> perform Step 2.

Op-Test No.: NRC Scenario No.: 2 Event No.: 4		
Event Description: 1C Steam Generator Tube Leak (75 gpm)		
Time	Position	Applicant's Actions or Behavior
Step 4	ALL	<p>Identify the affected S/G(s) as follows:</p> <p>a. Notify RP to frisk all cation columns.</p> <p>b. Any S/G N/R level - INCREASING IN AN UNCONTROLLED MANNER.</p> <p><u>NOTE:</u> The S/G Leakage EMFs are highly sensitive which may cause the EMFs located in the adjacent steamline to be increasing or in alarm.</p> <p>c. Verify any of the following S/G leakage EMF indication(s) - INCREASING OR IN ALARM:</p> <ul style="list-style-type: none"> <li>• 1EMF-71 (S/G A Leakage)</li> <li>• 1EMF-72 (S/G B Leakage)</li> <li>• 1EMF-73 (S/G C Leakage)</li> <li>• 1EMF-74 (S/G D Leakage)</li> </ul> <p>d. Verify any of the following S/G steamline EMF indication(s) - INCREASING OR IN ALARM:</p> <ul style="list-style-type: none"> <li>• 1EMF-26 (Steamline 1A)</li> <li>• 1EMF-27 (Steamline 1B)</li> <li>• 1EMF-28 (Steamline 1C)</li> <li>• 1EMF-29 (Steamline 1D)</li> </ul> <p>e. Verify CF flow - LOWER TO ANY S/G AS COMPARED TO OTHERS.</p> <p>f. Notify Secondary Chemistry to determine affected S/G by sampling.</p>

Op-Test No.: NRC Scenario No.: 2 Event No.: 4		
Event Description: 1C Steam Generator Tube Leak (75 gpm)		
Time	Position	Applicant's Actions or Behavior
Step 5	BOP	<p>Verify VCT level able to be maintained by normal makeup as follows:</p> <p>a. One of the following conditions exists:</p> <ul style="list-style-type: none"> <li>• S/G tube leak is less than 90 gpm.</li> </ul> <p><u>OR</u></p> <ul style="list-style-type: none"> <li>• Automatic makeup stabilizes or increases VCT level.</li> </ul> <p><u>OR</u></p> <ul style="list-style-type: none"> <li>• Manual makeup stabilizes or increases VCT level.</li> </ul> <p>b. <u>IF AT ANY TIME</u> the following conditions exist:</p> <ul style="list-style-type: none"> <li>• 1AD-7, I/1 "VCT LO LVL" alarm is lit</li> </ul> <p><u>AND</u></p> <ul style="list-style-type: none"> <li>• Reactor trip breakers are closed.</li> </ul> <p><u>THEN</u> perform Step 5.a RNO.</p> <p>Step does not apply.</p>
Step 6	ALL	<p>Minimize Secondary contamination as follows:</p> <p>a. Remove CM polishing demineralizers from service as follows:</p> <ol style="list-style-type: none"> <li>1) Ensure "POLSH DEMIN BYP CTRL" - PLACED IN MANUAL.</li> <li>2) Ensure "POLSH DEMIN BYP CTRL" - OPEN.</li> <li>3) Notify Secondary Chemistry CM polishing demineralizers have been bypassed.</li> </ol> <p>b. Align auxiliary systems to minimize secondary side contamination as follows:</p> <ol style="list-style-type: none"> <li>1) Transfer turbine steam supply to AS as follows: <ol style="list-style-type: none"> <li>a) Open 1TL-8 (Aux Stm To Stm Seal Reg).</li> <li>b) Close 1TL-2 (Main Stm To Stm Seal Reg).</li> </ol> </li> <li>2) Dispatch operator(s) to align auxiliary systems. <u>REFER TO</u> Enclosure 5 (Auxiliary System Alignment).</li> </ol> <p>c. Stop any transfer of water between both Units' CSTs.</p>

Op-Test No.: NRC Scenario No.: 2 Event No.: 4		
Event Description: 1C Steam Generator Tube Leak (75 gpm)		
Time	Position	Applicant's Actions or Behavior
		<u>NOTE</u> <ul style="list-style-type: none"><li>• Tritium sampling may be the most effective method for determining leak rate for small tube leaks when in Mode 2 or 3.</li><li>• The OAC calculated leak rate may be invalid during mode changes and/or transient conditions unless there is current, coordinated sampling data available.</li></ul>

Op-Test No.: NRC Scenario No.: 2 Event No.: 4

Event Description: 1C Steam Generator Tube Leak (75 gpm)

Time	Position	Applicant's Actions or Behavior
Step 7	RO	<p>Determine S/G leak rate by any of the following methods:</p> <ul style="list-style-type: none"> <li>• Monitor the following computer points: <ul style="list-style-type: none"> <li>• C1P0187 (Estimated Total Pri To Sec Leakrate)</li> <li>• C1P0189 (Pri To Sec Leakrate 15 Min Running Avg)</li> <li>• EROSLEAK (Primary To Secondary Leakage).</li> </ul> </li> </ul> <p><u>OR</u></p> <p><u>NOTE</u> The S/G Leakage EMFs are highly sensitive which may cause the EMFs located on the adjacent steamline to be increasing or in alarm.</p> <ul style="list-style-type: none"> <li>• S/G leakage EMF indication(s): <ul style="list-style-type: none"> <li>• 1EMF-71 (S/G A Leakage)</li> <li>• 1EMF-72 (S/G B Leakage)</li> <li>• 1EMF-73 (S/G C Leakage)</li> <li>• 1EMF-74 (S/G D Leakage).</li> </ul> </li> </ul> <p><u>OR</u></p> <ul style="list-style-type: none"> <li>• Compare charging flow and letdown flow</li> </ul> <p><u>OR</u></p> <ul style="list-style-type: none"> <li>• Monitor OAC NV Graphic</li> </ul> <p><u>OR</u></p> <ul style="list-style-type: none"> <li>• Initiate OAC Program "NSNCLEAK"</li> </ul> <p><u>OR</u></p> <ul style="list-style-type: none"> <li>• Monitor OAC point C1P0976 (Gross NC System Leak Rate, Ten Min Run Avg).</li> </ul> <p><u>OR</u></p> <ul style="list-style-type: none"> <li>• Secondary Chemistry performance of PT/1/B/4600/028 (Determination of Steam Generator Tube Leak For Unit 1).</li> </ul> <p><b>EXAMINER NOTE: NV OAC graphic displays the difference between charging and letdown flows for a good approximation of the leak size when Pzr level is approximately stable.</b></p>



Op-Test No.: NRC Scenario No.: 2 Event No.: 4		
Event Description: 1C Steam Generator Tube Leak (75 gpm)		
Time	Position	Applicant's Actions or Behavior
Step 8	SRO	Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual: <ul style="list-style-type: none"> <li>• 3.4.13 (RCS Operational Leakage)</li> <li>• 3.4.14 (RCS Pressure Isolation Valve (PIV) Leakage)</li> <li>• 3.5.5 (Seal Injection Flow)</li> <li>• 3.7.17 (Secondary Specific Activity)</li> <li>• SLC 16.7-9 (Standby Shutdown System).</li> </ul>
Step 9	ALL	Verify Unit in Mode 1.
		NOTE: <ul style="list-style-type: none"> <li>• The following leak rates are based on leakage in one S/G.</li> <li>• In the event of an oscillating leak, the leak rate shall be determined based on the peak value of the spike.</li> </ul>
Step 10	BOP	Verify leak rate - GREATER THAN OR EQUAL TO 5 GPD.
Step 11	BOP	Verify leak rate - GREATER THAN OR EQUAL TO 40 GPD.
Step 12	ALL	Verify at least one of the following: <ul style="list-style-type: none"> <li>• Leak rate is greater than or equal to 125 gpd</li> </ul> <u>OR</u> <ul style="list-style-type: none"> <li>• Leak rate greater than or equal to 100 gpd has been sustained for at least 1 hour.</li> </ul> <u>OR</u> <ul style="list-style-type: none"> <li>• All of the following: <ul style="list-style-type: none"> <li>• Leak Rate is greater than or equal to 100 gpd</li> <li>• C1P0187 (Estimated Total Pri To Sec Leakrate) – INVALID.</li> <li>• Any main steam line N-16 radiation monitor – INOPERABLE.</li> </ul> </li> </ul>

Op-Test No.: NRC Scenario No.: 2 Event No.: 4

Event Description: 1C Steam Generator Tube Leak (75 gpm)

Time	Position	Applicant's Actions or Behavior
Step 13	ALL	<p>Perform the following:</p> <p><u>NOTE</u> 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>• 1EMF-71 (S/G A Leakage)</li> <li>• 1EMF-72 (S/G B Leakage)</li> <li>• 1EMF-73 (S/G C Leakage)</li> <li>• 1EMF-74 (S/G D Leakage)</li> </ul> <p><u>NOTE</u> Unit shutdown should not be postponed while waiting for chemistry calculation results.</p> <p>b. <u>IF AT ANY TIME</u> Chemistry calculations contradict leakage indications, <u>THEN</u> perform the following:</p> <ul style="list-style-type: none"> <li>• Unit shutdown may be suspended</li> <li>• <u>RETURN TO</u> Step 8.</li> </ul> <p>Step does not apply.</p> <p><u>NOTE</u> EMFs should be monitored every 15 minutes.</p> <p>c. Monitor the following EMFs:</p> <ul style="list-style-type: none"> <li>• 1EMF-33 (Condenser Air Ejector Exhaust)</li> <li>• 1EMF-71 (S/G A Leakage)</li> <li>• 1EMF-72 (S/G B Leakage)</li> <li>• 1EMF-73 (S/G C Leakage)</li> <li>• 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>

Op-Test No.: NRC Scenario No.: 2 Event No.: 4

Event Description: 1C Steam Generator Tube Leak (75 gpm)

Time	Position	Applicant's Actions or Behavior
Step 14	ALL	<p>Determine unit shutdown requirements as follows:</p> <p>a. <b>IF AT ANY TIME</b> leak rate is greater than or equal to 125 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>
Step 15	ALL	<p><b>NOTE</b> EMF indications may decrease during unit shutdown. Unit shutdown should not be suspended based solely on decreasing radiation monitor indications.</p> <p>Shutdown the Unit as follows:</p> <ol style="list-style-type: none"> <li>a. Notify Reactor Group Engineer of occurrence</li> <li>b. Verify reactor power – <b>GREATER THAN 15%</b></li> <li>c. Initiate unit shutdown. <b>REFER TO:</b></li> </ol> <ul style="list-style-type: none"> <li>• OP/1/A/6100/003 (Controlling Procedure For Unit Operation)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• AP/1/A/5500/009 (Rapid Downpower)</li> </ul>
		<p><b>EXAMINER NOTE:</b> Based on leak size and time restraints, the crew should go to AP/1/A/5500/009 (Rapid Downpower) to reduce power to &lt;50% in an hour. This is event 5.</p> <p><b>EXAMINER NOTE:</b> AP/1/A/5500/010 (Reactor Coolant Leak) will continue to be monitored concurrently. Following Events 5 and 6 the leak will be increased. Additional AP/1/A/5500/010 actions are listed at that point in this document.</p>

Op-Test No.: NRC Scenario No.: 2 Event No.: 5		
Event Description: Rapid Load Reduction to less than 50% at 40%/hour per AP-09.		
Time	Position	Applicant's Actions or Behavior
Step 1	ALL	Monitor Enclosure 1 (Foldout Page).
Step 2	SRO	Determine required notifications: <ul style="list-style-type: none"> <li>• REFER TO RP/0/A/5000/001 (Classification Of Emergency)</li> <li>• REFER TO RP/0/B/5000/013 (NRC Notification Requirements).</li> </ul>
Step 3	ALL	<u>IF AT ANY TIME</u> prompt separation from the grid is required, <u>THEN</u> GO TO Step 25.  Step will not apply.
Step 4	ALL	<u>IF</u> load reduction is due to grid instability, <u>THEN</u> ...  Step does not apply.
Step 5	RO	Verify Turbine Control in - AUTO.
Step 6	ALL	Verify the following load reduction criteria – KNOWN: <ul style="list-style-type: none"> <li>• Time required to reduce load</li> <li>• Target load power level.</li> </ul> <p><b>EXAMINER NOTE: Time is 1 hour and target load is 50% power.</b></p>
Step 7	SRO	Verify time required to reduce load - <u>GREATER THAN OR EQUAL TO</u> 15 MINUTES.
Step 8	SRO	<u>NOTE</u> The following tables are estimates only and can be used for rapid entry into the turbine control panel.  Determine the required power reduction rate (MW/Min) from the table below: ...  <b>EXAMINER NOTE: Based on time and load requirements, the reduction rate should be at least 8 MW/min.</b>
Step 9	SRO	Determine the target load from the table below: ...  <b>EXAMINER NOTE: Based on the requirements for load reduction the target load should be less than or equal to 600 MW.</b>

Op-Test No.: NRC Scenario No.: 2 Event No.: 5

Event Description: Rapid Load Reduction to less than 50% at 40%/hour per AP-09.

Time	Position	Applicant's Actions or Behavior
Step 10	RO	<p>Initiate turbine load reduction as follows:</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• Any load reduction rate of greater than 25 MW/Min must be performed in the "MANUAL" mode.</li> <li>• Unloading rates greater than 60 MW/Min (5%/minute) will meet C-7A interlock and may result in steam dump actuation.</li> </ul> <p>Neither note applies.</p> <p>a. Verify automatic turbine load reduction – DESIRED.</p> <p>b. Enter the desired "LOAD RATE" on the turbine control panel.</p> <p>c. Enter the desired "TARGET" on the turbine control panel.</p> <p>d. Depress the "GO" pushbutton on the turbine control panel.</p> <p>e. Verify turbine load - DECREASING AS REQUIRED.</p> <p>f. <u>IF AT ANY TIME</u> the turbine controls fail to respond properly, <u>THEN</u> perform Step 10.e.</p> <p>This step will not apply.</p>
Step 11	RO	<u>IF AT ANY TIME</u> the turbine load reduction rate <u>OR</u> the target load must be changed, <u>THEN RETURN TO</u> Step 5.
Step 12	RO	Adjust power factor as necessary. <u>REFER TO</u> Unit 1 Revised Data Book Figure 43.
Step 13.a	RO	<p>Attempt to control T-Avg as follows:</p> <p>a. Verify T-Ref instrumentation – AVAILABLE</p> <p>RO notes T-Ref is not available and informs SRO.</p>
		SRO transitions to Step 13.a RNO and directs actions.

Op-Test No.: NRC Scenario No.: 2 Event No.: 5		
Event Description: Rapid Load Reduction to less than 50% at 40%/hour per AP-09.		
Time	Position	Applicant's Actions or Behavior
Step 13.a RNO	RO	IF T-Avg Coastdown is in progress, <u>THEN</u> ...  Step does not apply.
		SRO transitions to Step 13.b A/ER and directs actions.
Step 13b.	RO SRO	b. Verify control rods - IN AUTO AND STEPPING IN.  RO notes rods are in manual and informs SRO.
		SRO transitions to Step 13.b RNO and directs actions.
Step 13.b RNO		IF T-Avg is greater than 1.5°F higher than T-Ref, <u>THEN</u> manually insert control rods as required to maintain T-Avg within 1°F of T-Ref.  <b>EXAMINER NOTE: This step may or may not apply depending on current NC T-Avg temperature versus required temperature.</b>
		SRO transitions to Step 13.c A/ER and directs actions.
Step 13c.	RO	c. Maintain T-Avg greater than or equal to 551°F.
Step 13.d & e.	BOP	<u>NOTE</u> <ul style="list-style-type: none"> <li>• The boric acid added to the NC System should be added in several increments.</li> <li>• The boric acid added to the NC System should be added only during the first hour of the downpower event.</li> </ul> <p>d. Borate NC System as required. <u>REFER TO</u> R.O.D. book (section 4.8).</p> <p>e. Ensure operator monitors Enclosure 2 (Rod Insertion Limit Boration).</p>
Step 14	BOP	Verify all Pzr PORVs - CLOSED.  BOP notes that 1NC-36B is not closed and informs SRO.  <b>EXAMINER NOTE: The crew may determine that previous actions meet the intent of this step and not transition to this RNO.</b>
	SRO	Transitions to Step 14.a RNO and directs actions.

Op-Test No.: NRC Scenario No.: 2 Event No.: 5		
Event Description: Rapid Load Reduction to less than 50% at 40%/hour per AP-09.		
Time	Position	Applicant's Actions or Behavior
Step 14.a RNO	BOP	<p>a. <u>IF</u> Pzr pressure is less than 2315 PSIG, <u>THEN</u>:</p> <p>1) Manually close Pzr PORV(s)</p> <p>BOP notes valve 1NC-36B is not closed and informs SRO.</p> <p>2) <u>IF</u> any Pzr PORV cannot be closed, <u>THEN</u> close its isolation valve.</p> <p>BOP notes 1NC-35B closed and informs SRO.</p> <p>3) <u>IF</u> Pzr PORV isolation valve cannot be closed, <u>THEN</u>...</p> <p>Step does not apply.</p>
		SRO transitions to Step 14.b A/ER and directs actions.
Step 14.b	BOP	b. Normal Pzr spray valves - CLOSED.
Step 15	BOP	Operate RC pumps and fans as necessary to maintain RC temperature greater than 60°F. REFER TO OP/1/B/6400/001A (Condenser Circulating Water System).
Step 16	RO	Verify reactor power - LESS THAN 85%.
		<b>EXAMINER NOTE: At this point the scenario should proceed to Event 6.</b>

Time	Position	Applicant's Actions or Behavior
Op-Test No.: NRC Scenario No.: 2 Event No.: 6		
Event Description: Component Cooling valve failure to the reactor coolant pumps.		
	BOP	Notes the following annunciators and notifies SRO: <b>1AD-20, A/1 (KC SUPPLY HDR FLOW TO NCP BRGS LOW)</b> <b>1AD-21, A/1 (KC SUPPLY HDR FLOW TO NCP BRGS LOW)</b> <b>EXAMINER NOTE: Copies of the annunciator response procedure for these 2 alarms are attached. Several other KC related annunciators alarm as well.</b> Annunciator response directs entry to AP/1/A/5500/21, Loss of Component Cooling.
		<b>EXAMINER NOTE: BOP may take actions to reopen 1KC-338B per OMP 1-8 (Authority and Responsibility of On-Shift Operations Personnel).</b>
	SRO	<b>Enters AP/1/A/5500/021 (Loss of Component Cooling)</b>
	ALL	<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.
Step 1	RO/BOP	Monitor Enclosure 1 (Foldout Page).
Step 2	BOP	Verify at least one KC pump - ON.
Step 3	ALL	<b>IF AT ANY TIME</b> all KC pumps are lost, <b>THEN ...</b> Step does not apply.
Step 4	BOP	Verify both KC surge tank levels - 50% - 90% AND STABLE.
Step 5	BOP	Start additional KC pump(s) as necessary to supply any KC loads presently in service.
		<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. <b>EXAMINER NOTE: This caution does not apply due to NV pump seal injection flow being available.</b>



Op-Test No.: NRC Scenario No.: 2 Event No.: 6		
Event Description: Component Cooling valve failure to the reactor coolant pumps.		
Time	Position	Applicant's Actions or Behavior
Step 6	BOP	Verify KC flow to NC pumps as follows: <ul style="list-style-type: none"> <li>• 1AD-20, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK</li> <li>• 1AD-21, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK.</li> </ul> BOP notes that both annunciators are lit and informs SRO.
		SRO transitions to Step 6.a RNO and directs actions.
Step 6 a. RNO	SRO	Perform the following: <p>a. Ensure the following valves - OPEN:</p> <ul style="list-style-type: none"> <li>• 1KC-425A (NC Pumps Ret Hdr Cont Isol)</li> <li>• 1KC-338B (NC Pumps Sup Hdr Cont Isol)</li> <li>• 1KC-424B (NC Pumps Ret Hdr Cont Isol).</li> </ul> BOP notes 1KC-338B is closes and re-opens valve.
Step 6 b. RNO	ALL	IF AT ANY TIME any of the following conditions are met: <ul style="list-style-type: none"> <li>• Time since loss of KC – GREATER THAN 10 MINUTES</li> </ul> OR <ul style="list-style-type: none"> <li>• Any NC pump trip criteria from Enclosure 1 (Foldout Page) is met.</li> </ul> THEN... <p>Conditions should not apply.</p>

Op-Test No.: NRC Scenario No.: 2 Event No.: 6

Event Description: Component Cooling valve failure to the reactor coolant pumps.

Time	Position	Applicant's Actions or Behavior
Step 7	BOP	Verify KC available as follows: a. Verify the following Train A KC non-essential header isolation valves - OPEN: <ul style="list-style-type: none"> <li>• 1KC-230A (Rx Bldg Non-Ess Hdr Isol)</li> <li>• 1KC-3A (Rx Bldg Non-Ess Ret Hdr Isol)</li> <li>• 1KC-50A (Aux Bldg Non-Ess Hdr Isol)</li> <li>• 1KC-1A (Aux Bldg Non-Ess Ret Hdr Isol)</li> </ul> b. Verify the following Train B KC non-essential header isolation valves - OPEN: <ul style="list-style-type: none"> <li>• 1KC-228B (Rx Bldg Non-Ess Hdr Isol)</li> <li>• 1KC-18B (Rx Bldg Non-Ess Ret Hdr Isol)</li> <li>• 1KC-53B (Aux Bldg Non-Ess Hdr Isol)</li> <li>• 1KC-2B (Aux Bldg Non-Ess Ret Hdr Isol)</li> </ul> c. Start additional KC pump(s) as necessary to supply any KC loads presently in service.
		<b>EXAMINER NOTE: At this point, the SGTR leak will increase in size.</b>

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
	ALL	Crew notes that the leak rate has increased on the 1C S/G and informs SRO.
	SRO	Returns to Step 2 of AP/1/A/5500/010 (Reactor Coolant Leak), Case I (Steam Generator Tube Leak).
Step 2	RO/ BOP	Verify Pzr level – STABLE OR INCREASING. Notes Pzr level is decreasing and informs SRO.
	SRO	Transitions to Step 2 RNO and directs actions.
		<b>EXAMINER NOTE: The crew has Enclosure 1 criteria to trip the reactor and safety inject based on Pzr level decreasing uncontrollably or reaching 4%. If the crew decides to use that guidance, the remainder of AP/1/A/5500/010 steps will not be performed.</b>
Step 2 RNO	BOP	Perform the following: a. Maintain charging flow less than 180 GPM. b. Manually throttle 1NV-294 (NV Pmps A&B Disch Flow Ctrl) to stabilize Pzr level. c. <u>IF</u> Pzr level is stable <u>OR</u> increasing, <u>THEN GO TO</u> Step 3. Notes Pzr level is still decreasing and informs SRO.

Op-Test No.: NRC Scenario No. 2 Event No. 7-9

Event Description: #7 1C Steam Generator Tube Rupture (500 gpm).

#8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection

#9 1A Steam Generator PORV fails open during rapid cooldown

Time	Position	Applicant's Actions or Behavior
	BOP	<p><b>EXAMINER NOTE: This step was previously performed.</b></p> <p>d. <u>IF</u> Pzr level continues to decrease, <u>THEN</u>...</p> <p>1) Reduce letdown flow to 45 GPM as follows:</p> <p>a) Manually control 1NV-148 (Letdn Press Control) to maintain letdown pressure at 350 PSIG.</p> <p>b) <u>IF</u> 1NV-13A (Letdn Orif 1A Otlt Cont Isol) open, <u>THEN</u>...</p> <p>Step does not apply.</p> <p>c) <u>IF</u> 1NV-10A (Letdn Orif 1B Otlt Cont Isol) open, <u>THEN</u> throttle 1NV-849 (Letdn Flow Var Orif Ctr!) until letdown flow is 45 GPM.</p> <p>d) <u>WHEN</u> letdown pressure is stable at 350 PSIG, <u>THEN</u> place 1NV-148 (Letdn Press Control) in "AUTO".</p> <p>2) <u>IF</u> Pzr level continues to decrease, <u>THEN</u>: ensure the following valves closed:</p> <ul style="list-style-type: none"> <li>• 1NV-10A (Letdn Orif 1B Otlt Cont Isol)</li> <li>• 1NV-11A (Letdn Orif 1C Otlt Cont Isol)</li> <li>• 1NV-13A (Letdn Orif 1A Otlt Cont Isol)</li> </ul> <p>3) <u>IF</u> Pzr level stable <u>OR</u> increasing, <u>THEN GO TO</u> Step 3.</p> <p>Notes Pzr level continuing to decrease and informs SRO.</p> <p>4) <u>IF</u> Pzr level continues to decrease, <u>THEN</u> start an additional NV pump as follows:</p> <p>a. Open 1NV-252A (NV Pumps Suct From FWST)</p> <p>b. Open 1NV-253B (NV Pumps Suct From FWST)</p> <p>c. Close 1NV-188A (VCT Otlt Isol)</p> <p>d. Close 1NV-189B (VCT Otlt Isol)</p> <p>e. Start the desired NV Pump.</p>

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 2 (cont)	BOP	5) IF Pzr level is stable OR increasing, THEN ... BOP notes Pzr level is decreasing and informs SRO.  6) IF Pzr level continues to decrease OR Pzr level cannot be maintained greater than 4%, THEN: a. Manually trip reactor. b. WHEN reactor tripped, THEN initiate S/I. c. GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
	SRO	Enters EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection) and directs operators
Step 1	ALL	Monitor Enclosure 1 (Foldout Page)
		<b>EXAMINER NOTE: Steps 2 through 5 are immediate Action steps and must be performed from memory.</b>
Step 2	RO	Verify Reactor Trip: <ul style="list-style-type: none"> <li>• All rod bottom lights – LIT</li> <li>• All reactor trip and bypass breakers – OPEN</li> <li>• I/R amps – DECREASING</li> </ul>
Step 3	RO	Verify Turbine Trip: <ul style="list-style-type: none"> <li>• All turbine stop valves – CLOSED</li> </ul> OR <ul style="list-style-type: none"> <li>• Both of the following: <ul style="list-style-type: none"> <li>• All MSIVs - CLOSED</li> <li>• All MSIV bypass valves - CLOSED.</li> </ul> </li> </ul>
Step 4	BOP	Verify 1ETA and 1ETB – ENERGIZED.

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 5	BOP	Verify S/I is actuated: a. "SAFETY INJECTION ACTUATED" status light (1SI-13) – LIT b. E/S load sequencer actuated status lights (1SI-14) – LIT
Step 6	RO	Announce "Unit 1 Safety Injection".
Step 7	SRO	Implement RP/0/A/5000/01 (Classification Of Emergency).
Step 8	RO	Verify all Feedwater Isolation status lights (1SI-5) – LIT
Step 9	BOP	Verify Phase A Containment Isolation status as follows: a. Phase A "RESET" lights – DARK b. Monitor Light Panel Group 5 St lights – LIT <b>EXAMINER NOTE: Students should note that 1NF-228 is not closed and take actions to attempt to close the valve and then secure the NF pumps per local operator action.</b>
Step 10	ALL	Verify proper Phase B actuation as follows: a. Containment pressure – HAS REMAINED LESS THAN 3 PSIG b. <u>IF AN ANY TIME</u> containment pressure exceeds 3 PSIG while in this procedure, <u>THEN</u> perform Step 10.a.
Step 11	RO	Verify proper CA pump status as follows: a. Motor driven CA pumps – ON b. 3 S/G N/R levels – GREATER THAN 11%

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 12	BOP	Verify all of the following S/I pumps – ON: <ul style="list-style-type: none"> <li>• NV pumps</li> <li>• ND pumps</li> <li>• NI pumps</li> </ul> BOP notes 1A NI pump tagged out. Transition to RNO not required.
Step 13	BOP	Verify all KC pumps – ON.
Step 14	BOP	Verify all Unit 1 and Unit 2 RN pumps – ON
Step 15	BOP	Verify proper ventilation systems operation as follow: <ul style="list-style-type: none"> <li>• <b>REFER TO Enclosure 2 (Ventilation System Verification)</b></li> <li>• Notify Unit 2 operator to perform Enclosure 3 (Opposite Unit Ventilation Verification)</li> </ul> <b>EXAMINER NOTE: Copy is behind this sheet</b>
<b>Event # 8</b> <b>E-0</b> <b>Encl 2</b> <b>Step 2</b>	BOP	Enclosure 2 actions to verify proper Aux building ventilation operation. Ensure proper VA system operation as follows: Ensure the following fans – OFF: <ul style="list-style-type: none"> <li>• ABUXF 1A</li> <li>• ABUXF 1B</li> </ul> BOP notes the fan on and depresses OFF for ABUXF 1A and 1B. BOP continues with remaining Enclosure 2 actions. When he returns to the horseshoe, informs SRO of ventilation status.

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 16	RO	Verify all S/G pressures – GREATER THAN 775 PSIG.
Step 17	BOP/RO	Verify proper S/I flow as follows: a. "NV S/I FLOW" – INDICATING FLOW b. NC Pressure – LESS THAN 1620 PSIG Determines NC pressure is greater than 1620 psig and informs SRO.
	SRO	Transitions to Step 17.b RNO and directs actions.
Step 17.b RNO	BOP	b. Perform the following: 1) Ensure ND pump miniflow valve on operating ND pump(s) – OPEN. 2) <u>IF</u> the ND Pump miniflow valve(s) cannot be opened, <u>THEN</u> ... Step does not apply. 3) <u>GO TO</u> Step 18.
	SRO	Transition to Step 18 A/ER and directs actions.
Step 18	RO	Control S/G levels as follows: a. Verify total CA flow – GREATER THAN 450 GPM. b. <u>WHEN</u> at least one S/G N/R level is greater than 11% (29% ACC), <u>THEN</u> throttle feed flow to maintain all S/G N/R levels between 11% (29% ACC) and 50%.



Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 19	RO	Verify all CA isolation valves – OPEN.
Step 20	BOP	Verify S/I equipment status based on monitor light panel – IN PROPER ALIGNMENT.
	RO	<b>NOTE:</b> Enclosure 4 (NC Temperature Control) shall remain in effect until subsequent procedures provide alternative NC temperature control guidance.
Step 21	RO	Control NC temperature. <u>REFER TO</u> Enclosure 4 (NC Temperature Control).
Step 22	BOP	Verify Pzr PORV and Pzr spray valve status as follows:  a. All Pzr PORVs - CLOSED.  <b>EXAMINER NOTE: The crew may determine that previous actions meet the intent of this step and not transition to this RNO.</b>  b. Normal Pzr spray valves - CLOSED. c. At least one Pzr PORV isolation valve – OPEN.
Step 23	RO	Verify NC subcooling based on core exit T/Cs – GREATER THAN 0°F.
Step 24	RO	Verify main steamlines are intact as follows: • All S/G pressures – STABLE OR INCREASING • All S/Gs – PRESSURIZED.

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 25	RO/BOP	Verify S/G tubes are intact as follows: <ul style="list-style-type: none"> <li>• Verify the following EMF trip 1 lights – DARK:               <ul style="list-style-type: none"> <li>• 1EMF-33 (Condenser Air Ejector Exhaust)</li> <li>• 1EMF-34 (S/G Sample)</li> <li>• 1EMF-26 (Steamline 1A)</li> <li>• 1EMF-27 (Steamline 1B)</li> <li>• 1EMF-28 (Steamline 1C)</li> <li>• 1EMF-29 (Steamline 1D)</li> </ul> </li> <li>• All S/G levels – STABLE OR INCREASING IN A CONTROLLED MANNER</li> </ul> Determines that 1EMF-33 and 1EMF-29 are in alarm, and/or 1C S/G level is increasing in an uncontrolled manner and informs SRO.
	SRO	Transitions to Step 25 RNO and directs actions.
	SRO	IF any EMF trip 1 light is lit OR any S/G level is increasing in an uncontrolled manner, THEN concurrently: <ul style="list-style-type: none"> <li>• Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees)</li> <li>• GO TO EP/1/A/5000/E-3 (Steam Generator Tube Rupture).</li> </ul>
	SRO	<b>Transitions to EP/1/A/5000/E-3 and directs actions.</b>
Step 1	RO/BOP	Monitor Enclosure 1 (Foldout Page).

Op-Test No.: NRC Scenario No. 2 Event No. 7-9

Event Description: #7 1C Steam Generator Tube Rupture (500 gpm).

#8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection

#9 1A Steam Generator PORV fails open during rapid cooldown

Time	Position	Applicant's Actions or Behavior
Step 2	RO/BOP	Identify ruptured S/Gs as follows: <ul style="list-style-type: none"> <li>• S/G level – INCREASING IN AN UNCONTROLLED MANNER</li> </ul> OR <ul style="list-style-type: none"> <li>• Chemistry or RP determines ruptured S/G by frisking the cation columns in the CT lab.</li> </ul> OR <ul style="list-style-type: none"> <li>• The following EMF trip 1 lights – LIT:               <ul style="list-style-type: none"> <li>• 1EMF-26 (Steamline 1A)</li> <li>• 1EMF-27 (Steamline 1B)</li> <li>• 1EMF-28 (Steamline 1C)</li> <li>• 1EMF-29 (Steamline 1D)</li> </ul> </li> </ul> OR <ul style="list-style-type: none"> <li>• Chemistry determines ruptured S/G using 1EMF-34 (S/G Sample).</li> </ul> OR <ul style="list-style-type: none"> <li>• <u>IF S/G Sampling is required to identify ruptured S/G(s), THEN:</u> <ol style="list-style-type: none"> <li>a. Ensure the following signals reset:               <ol 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> </ol> </li> <li>b. Align all S/Gs for Chemistry sampling.</li> <li>c. Notify Chemistry to sample all S/Gs for activity.</li> </ol> </li> </ul> <p><b>EXAMINER NOTE: Normally crews rely on EMF trip 1 lights and ask for RP/Chemistry confirmation.</b></p>

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 3	RO	Verify at least one intact S/G – AVAILABLE FOR NC SYSTEM COOLDOWN.

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 4	RO	Isolate steam flow from ruptured S/Gs as follows: a. Verify all ruptured S/Gs PORV – CLOSED. b. Verify S/G(s) 1B and 1C – INTACT RO notes that 1C S/G is ruptured and informs SRO.
	SRO	SRO transitions to Step 4.b RNO and directs actions.
Step 4 b. RNO	RO	Perform the following: 1) <u>IF</u> both motor driven CA pumps available, <u>THEN</u> close the "CAPT TRIP T/V CTRL". 2) <u>IF</u> CA Pump #1 is the only source of feedwater, <u>THEN</u> ... Step does not apply. 3) <u>IF</u> S/G 1B is ruptured, <u>THEN</u> ... Step does not apply. 4) <u>IF</u> S/G 1C is ruptured, <u>THEN</u> : a) Dispatch two operators to unlock and close 1SA-4 (Main Steam 1C To CAPT Maintenance Isol)(DH-624, FF-53, Rm 572) (Breakaway lock installed)
	ALL	<u>WHEN</u> the ruptured S/G steam supply to CA Pump #1 is isolated, <u>THEN</u> open the "CAPT TRIP T/V CTRL".
	SRO	Transition to Step 4.c A/ER and directs actions.

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 4.c	RO	<p><b>EXAMINER NOTE: This step will be performed for 1C S/G only.</b></p> <p>Isolate blowdown and steam drain on all ruptured S/G(s) as follows:</p> <ul style="list-style-type: none"> <li>• S/G 1C:               <ol style="list-style-type: none"> <li>1) Close 1SM-75A (S/G 1C Otlt Hdr Bldwn C/V)</li> <li>2) Verify the following blowdown isolation valves – CLOSED:                   <ol style="list-style-type: none"> <li>a) 1BB-60A (S/G 1C Bldwn Cont Isol Insd)</li> <li>b) 1BB-149B (S/G 1C Bldwn Cont Isol Byp)</li> <li>c) 1BB-61B (S/G 1C Bldwn Cont Isol Otsd)</li> </ol> </li> </ol> </li> </ul>
Step 5	RO	<p>Close the following valves on all ruptured S/G(s):</p> <ul style="list-style-type: none"> <li>• MSIV</li> <li>• MSIV Bypass valve</li> </ul> <p>Notes that MSIV on 1C S/G will not close and informs SRO.</p>
	SRO	Transitions to Step 5 RNO and directs actions.

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 5 RNO	RO	Perform the following: a. Close the following valves on remaining S/Gs: <ul style="list-style-type: none"> <li>• MSIV</li> <li>• MSIV bypass valve.</li> </ul> b. Place steam dump control in manual and lower controller output to 0%. c. Place "STEAM DUMP SELECT" switch in pressure mode. d. Transfer turbine steam seal supply to AS as follows: 1) Open 1TL-8 (Aux Stm To Stm Seal Reg). 2) Close 1TL-2 (Main Stm To Stm Seal Reg).
	BOP	e. Ensure the following turbine S/V before seat drain valves - CLOSED: <ul style="list-style-type: none"> <li>• 1SM-41 (Stop Vlv #1 Before Seat Drn)</li> <li>• 1SM-44 (Stop Vlv #2 Before Seat Drn)</li> <li>• 1SM-43 (Stop Vlv #3 Before Seat Drn)</li> <li>• 1SM-42 (Stop Vlv #4 Before Seat Drn)</li> </ul> f. Close 1AS-1 (SM To AS Inlet). g. Ensure the following valves - CLOSED: <ul style="list-style-type: none"> <li>• 1HM-1 (MSRH 1A&amp;1B SSRH Stm Source)</li> <li>• 1HM-2 (MSRH 1C&amp;1D SSRH Stm Source).</li> </ul> h. Dispatch operator to isolate steam flow from all ruptured S/G(s). <u>REFER TO</u> Enclosure 2 (Locally Isolating Steam Flow From Ruptured S/G(s)). i. Use intact S/G(s) PORV for steam release. j. <u>IF</u> at least one intact S/G cannot be isolated from all ruptured S/G(s), <u>THEN</u> ... Step does not apply.
	SRO	Transitions to Step 6 A/ER and directs actions.

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 6	RO/BOP	Control ruptured S/G(s) level as follows: a. Verify ruptured S/G(s) N/R level – GREATER THAN 11% (29% ACC). <b>EXAMINER NOTE: This step will be performed for 1C S/G only.</b> b. Isolate feed flow to all ruptured S/G(s) as follows: • S/G 1C: 1) Close 1CA-46A (CA Pmp B Disch To S/G 1C Isol) 2) Close 1CA-50A (CA Pmp 1 Disch To S/G 1C Isol) c. <u>IF AT ANY TIME</u> ruptured S/G(s) N/R level is less than 11% (29% ACC), <u>THEN</u> perform step 6. <b>EXAMINER NOTE: This action should not be required.</b>
Step 7	BOP	Verify at least one NC pump - ON.
Step 8	RO/BOP	<u>WHEN</u> "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) is lit, <u>THEN</u> : 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: • Pzr spray OR • Pzr PORV.
	ALL	<u>NOTE</u> : • NC Pump trip criteria based on NC subcooling does not apply after starting a controlled cooldown. • 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.



Op-Test No.: NRC Scenario No. 2 Event No. 7-9												
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown												
Time	Position	Applicant's Actions or Behavior										
		<b>EXAMINER NOTE: Cooldown and depressurization to minimize break flow is a CRITICAL TASK. These are noted in the guide.</b>										
Step 9 a, b	RO	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>EXAMINER NOTE: S/G pressure should be in these categories based on scenario effects of cooldown.</b> <table border="1" data-bbox="863 842 1562 1101"> <thead> <tr> <th>1C S/G Pressure</th> <th>Core Exit T/C's (°F)</th> </tr> </thead> <tbody> <tr> <td>&gt; 1200</td> <td>532 (512 ACC)</td> </tr> <tr> <td>1100-1199</td> <td>520 (501 ACC)</td> </tr> <tr> <td>1000-1099</td> <td>507 (489 ACC)</td> </tr> <tr> <td>900-999</td> <td>494 (476 ACC)</td> </tr> </tbody> </table> c. Ensure ruptured S/G isolated as follows: 1) Verify the following valves on all ruptured S/Gs – CLOSED <ol style="list-style-type: none"> <li>a. MSIV</li> <li>b. MSIV bypass valves</li> </ol> RO notes 1C MSIV is open and informs SRO.	1C S/G Pressure	Core Exit T/C's (°F)	> 1200	532 (512 ACC)	1100-1199	520 (501 ACC)	1000-1099	507 (489 ACC)	900-999	494 (476 ACC)
1C S/G Pressure	Core Exit T/C's (°F)											
> 1200	532 (512 ACC)											
1100-1199	520 (501 ACC)											
1000-1099	507 (489 ACC)											
900-999	494 (476 ACC)											
	SRO	Transitions to Step 9.c.1) RNO and directs actions.										

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 9.c.1) RNO	RO	1) Perform the following: a) Verify the following valves on at least one intact S/G – CLOSED: <ul style="list-style-type: none"> <li>• MSIV</li> <li>• MSIV bypass valve</li> </ul> RO notes that all intact S/G MSIV and MSIV Bypass valves are closed and informs SRO.
	SRO	SRO transitions to Step 9.c.2) A/ER and directs actions.
Step 9.c.2)	RO/BOP	IF S/G 1B OR 1C ruptured, THEN verify one of the following CAPT steam supply valves - CLOSED: <ul style="list-style-type: none"> <li>• "CAPT TRIP T/V CTRL"</li> </ul> OR <ul style="list-style-type: none"> <li>• Manual isolation valve on the affected S/G.</li> </ul>
Step 9 d,	RO	d. Verify the condenser is available as follows: <ul style="list-style-type: none"> <li>• "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) – LIT</li> <li>• MSIV on intact S/G(s) – OPEN</li> </ul> RO notes that condenser is not available based on MSIVs on intact S/Gs closed and informs SRO.
	SRO	Transition to Step 9.d RNO and directs actions.
	SRO	GO TO Step 9.g RNO. Transitions to Step 9.g RNO and directs actions.
		<b>EXAMINER NOTE: The 1A S/G PORV, when opened, will remain full open. This is event 9 and will become an issue when the target temperature is reached and the RO attempts to stabilize temperatures. (Refer to Step 9.i RNO and Step 17)</b>

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm).		
#8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection		
#9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 9 g. RNO <b>CRITICAL TASK</b>	RO	Perform the following: 1) Dump steam from all intact S/G(s) at maximum rate with S/G PORV(s) 2) <u>IF</u> any intact S/G PORV cannot be opened from the control room, <u>THEN</u> ... Step does not apply. 3) <u>IF</u> operator(s) were dispatched to S/G PORV(s), <u>THEN</u> ... Step does not apply. 4) <u>IF</u> no intact S/G is available for NC System cooldown, <u>THEN</u> ... Step does not apply. 5) <u>GO TO</u> Step 9.h.
	SRO	Transitions to Step 9.h A/ER and directs actions.
Step 9 h.	RO	Verify main steam isolation blocked status lights (1SI-13) – LIT <b>EXAMINER NOTE: This indication depends if Step 8 was performed. If it was not, the SRO will transition to the RNO as listed below, otherwise he will continue to Step 9.i.</b>

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 9 h. RNO	BOP	<p><u>IF AT ANY TIME</u> pressure in S/Gs used for cooldown is approaching 800 PSIG, <u>THEN</u>:</p> <p>1) Depressurize NC System to less than 1955 PSIG using one of the following:</p> <ul style="list-style-type: none"> <li>• Pzr spray</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Pzr PORV.</li> </ul> <p>2) <u>WHEN</u> "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) is lit, <u>THEN</u>:</p> <p>a. Depress ECCS steam pressure "BLOCK" pushbuttons.</p> <p>b. Verify main steam isolation blocked status lights (1SI-13) – LIT.</p> <p>3) Maintain NC pressure less than 1955 PSIG.</p>
	SRO	Transitions to Step 9.i A/ER and directs actions.
Step 9 i.	RO	<p>Verify core exit T/Cs – LESS THAN REQUIRED TEMPERATURE</p> <p><b>EXAMINER NOTE: This will probably not be true at this time and the SRO will transition to the RNO.</b></p> <p>Notes that core exit T/Cs are higher than required temperature and informs SRO.</p>
	SRO	Transitions to Step 9.i RNO and directs actions.
Step 9 i. RNO	RO	<p>Perform the following:</p> <p>1) <u>WHEN</u> core exits T/Cs are less than required temperatures <u>THEN</u> perform Steps 9i and 9j.</p> <p>2) <u>GO TO</u> Step 10.</p>

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 9 j. <b>CRITICAL TASK</b>	RO	<b>EXAMINER NOTE: At some point, the RO will attempt to stabilize temperatures and it will be noted that the S/G PORV on 1A S/G will not close. The PORV Block Valve will need to be closed to allow NC temperature to be stabilized.</b>  Stabilize core exit T/Cs – LESS THAN REQUIRED TEMPERATURE.  RO determines SG 1A PORV is stuck open and isolates the PORV to stop the cooldown
	SRO	Transitions to Step 10 A/ER and directs actions.
Step 10	BOP/RO	Verify Pzr PORV and isolation valve status as follows: a. Power to all Pzr PORV isolation valves – AVAILABLE b. All Pzr PORVs – CLOSED  BOP notes that 1NC-36B is not closed and informs SRO. <b>EXAMINER NOTE: The crew may determine that previous actions meet the intent of this step and not transition to this RNO.</b>  c. At least one Pzr PORV isolation valve – OPEN d. <u>IF AT ANY TIME</u> a Pzr PORV opens due to high pressure while in this procedure, <u>THEN</u> , after Pzr pressure decreases to less than 2315 PSIG, perform Step 10.b.
Step 11	BOP	Ensure S/I – RESET: a. ECCS. b. D/G load sequencers. c. <u>IF AT ANY TIME</u> a B/O occurs, <u>THEN</u> restart S/I equipment previously on.
Step 12	BOP	Ensure the following containment isolation signals – RESET: • Phase A • Phase B.

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 13	BOP	Establish VI to containment as follows: a. Ensures 1VI-77B (VI Cont Isol) – OPEN b. Verify VI pressure – GREATER THAN 85 PSIG
Step 14	BOP	Verify criteria to stop operating ND pumps as follows: a. At least one ND pump - ON. b. NC pressure - GREATER THAN 285 PSIG. c. Ensure all ND pump(s) with suction aligned to FWST – STOPPED. d. <u>IF AT ANY TIME</u> NC pressure decreases to less than 285 PSIG in an uncontrolled manner, <u>THEN</u> restart ND
Step 15	RO/BOP	Control intact S/G levels as follows: 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 16% (29% ACC) and 50%.
Step 16	SRO	Verify ruptured S/G(s) – IDENTIFIED.
Step 17	SRO	Verify if NC System cooldown should be stopped: a. Verify core exit T/Cs - LESS THAN REQUIRED TEMPERATURE. b. Stabilize core exit T/Cs - LESS THAN REQUIRED TEMPERATURE. <b>EXAMINER NOTE: If the target temperature is not reached, they will hold as stated in the RNO.</b>
Step 18	RO	Verify ruptured S/G(s) pressure is under operator control as follows: a. All ruptured S/G(s) pressure – STABLE OR INCREASING. b. <u>IF AT ANY TIME</u> ruptured S/G(s) pressure is decreasing while in this procedure, <u>THEN</u> perform Step 18.

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 19	RO	Verify NC subcooling based on core exit T/Cs – GREATER THAN 20°F.
Step 20	BOP	<p>Depressurize NC System using PZR Spray as follows:</p> <ol style="list-style-type: none"> <li>Verify normal PZR spray flow – AVAILABLE.</li> <li>Verify PZR level – LESS THAN 76% (73% ACC).</li> <li>Depressurize NC System with maximum available spray.</li> <li>Verify subcooling based on core exit T/Cs – GREATER THAN 0° F.</li> <li>Verify PZR level – LESS THAN 76% (73% ACC).</li> <li>Verify NC pressure – LESS THAN RUPTURED S/G(s) PRESSURE.</li> </ol> <p>Notes NC pressure greater than ruptured S/G pressure and informs SRO.</p> <p><b>EXAMINER NOTE: Due to the size of the leak, NC pressure should be higher than ruptured S/G pressure and the crew will likely transition to the RNO.</b></p>

Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 21	BOP	<p><b>EXAMINER NOTE: If this option for depressurization is used, the SRO will loop back through this step until one of the conditions is met. The transitions are as follows:</b></p> <ul style="list-style-type: none"> <li><b>b. Go to step 23</b></li> <li><b>d. Go to Step 21.h</b></li> <li><b>e. Go to Step 21.h</b></li> <li><b>f. Return to Step 21.d</b></li> <li><b>g. Return to Step 21.d</b></li> </ul> <p>Depressurize NC System using PZR PORV as follows:</p> <ul style="list-style-type: none"> <li>a. Verify at least one Pzr PORV – AVAILABLE</li> <li>b. Verify Pzr level – LESS THAN 76% (73% ACC)</li> <li>c. Open one Pzr PORV.</li> <li>d. Verify subcooling based on core exit T/Cs – GREATER THAN 0°F</li> <li>e. Verify Pzr level – LESS THAN 76% (73% ACC)</li> <li>f. Verify NC pressure – LESS THAN RUPTURED S/G(s) PRESSURE.</li> <li>g. Verify Pzr level – GREATER THAN 11% (20% ACC)</li> <li>h. Close Pzr PORV.</li> <li>i. Close Pzr spray valve(s).</li> </ul>
Step 22	RO	Verify NC Pressure - INCREASING.
		<u>CAUTION: S/I must be terminated when termination criteria are satisfied to prevent overfilling the ruptured S/G(s).</u>



Op-Test No.: NRC Scenario No. 2 Event No. 7-9		
Event Description: #7 1C Steam Generator Tube Rupture (500 gpm). #8 Auxiliary Building ventilation fails to swap to emergency mode of operation on safety injection #9 1A Steam Generator PORV fails open during rapid cooldown		
Time	Position	Applicant's Actions or Behavior
Step 23	RO/BOP	Verify S/I termination criteria as follows: a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F. b. Verify secondary heat sink as follows: <ul style="list-style-type: none"> <li>• N/R level in at least one intact S/G - GREATER THAN 11% (29% ACC)</li> </ul> OR <ul style="list-style-type: none"> <li>• Total feed flow available to S/G(s) -GREATER THAN 450 GPM.</li> </ul> c. NC pressure - STABLE OR INCREASING. d. Pzr level - GREATER THAN 11% (20% ACC).
Step 24	BOP	Stop S/I pumps as follows: a. Stop NI pumps. b. Ensure only one NV pump – ON.
Step 25	BOP	Verify VI pressure - GREATER THAN 50 PSIG.
Step 26	RO/BOP	isolate NV S/I flowpath as follows: a. Verify the following valves - OPEN: <ul style="list-style-type: none"> <li>• 1NV-252A (NV Pumps Suct From FWST)</li> <li>• 1NV-253B (NV Pumps Suct From FWST).</li> </ul> b. Verify the following valves - OPEN <ul style="list-style-type: none"> <li>• 1NV-203A (NV Pumps A&amp;B Recirc Isol)</li> <li>• 1NV-202B (NV Pmps A&amp;B Recirc Isol).</li> </ul> <b>EXAMINER NOTE: These valves may be closed, depending upon NC system pressure. If so, SRO will direct actions per Step 29.b RNO to open them.</b> c. Close the following valves: <ul style="list-style-type: none"> <li>• 1NI-9A (NV Pmp C/L Inj Isol)</li> <li>• 1NI-10B (NV Pmp C/L Inj Isol).</li> </ul>

Terminate scenario when 1NI-9A and 1NI-10B are closed.

Classification: Site Area Emergency (4.1.S.3)

Simulation Facility: CatawbaScenario No.: NRC-1Op-Test No: 1

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_

\_\_\_\_\_

**Objectives:** To evaluate the applicants' ability to increase power using NOPs while maintaining Tave matched to Tref, and to respond to a failure of 1NV-148 to control in automatic with manual control available and failure of 1C S/G level control program. The applicants will be tested on their use of AOPs to respond to a loss of the normal power supply to 1ETA. The 1A diesel generator load sequencer will fail to actuate, requiring the crew to return a component cooling water pump and a charging pump to service manually in order to prevent a reactor coolant pump seal failure. The applicants will then respond to a turbine runback due to a Zone A lockout. During the runback, the control rods will fail to insert in automatic and control rod M-12 will fail to insert. The applicants will be evaluated using EOPs to respond to a LOCA outside containment. Feedwater isolation will fail to actuate automatically and 1A NI pump will fail to start in automatic. A success path exists via ECA-1.2 and E-1.

**Initial Conditions:** 75% power, MOL, Equilibrium Xe.  
NCS Boron Concentration 1056 ppm.

**Turnover:**

- Charging pump 1B is tagged for motor cooler leak. It has been out of service for 19 hours. It may be available by end of shift tonight.
- DFCS trouble alarm due to S/G 1B feedwater flow channel II (1CFP5020) transmitter reading 3%. IAE is investigating. An OAC point value had been inserted for the failed transmitter.
- NC Loop "A" flow channel III (1NCP5020) has failed to 23%. IAE is investigating. An OAC point value had been inserted for the failed transmitter.
- Hurricane Holly has been downgraded to a tropical storm. York County is under a severe thunderstorm watch.
- Systems Operations Center is requesting an immediate power increase at 10%/hr to 100% power. Conditioned power level is 100%. OP/1/A/6100/003, Controlling Procedure for Unit Operation, Enclosure 4.1 step 2.43 is complete with the next milestone at 85% power.

Event No.	Malf. No.	Event Type*	Event Description (IC 105)
1		R-BOP	Dilute NC system boron for power increase
2		N-RO	Increase power from 75%
3	MAL-NV021A = 0 Trigger 1	C-BOP	Valve 1NV-148 (LETDOWN PRESSURE CONTROL) fails closed in automatic with manual control available.
4	MAL SGL004C =90 Ramp=80 Trigger 3	I-RO	1C S/G level program failure
5	OVR EP029D =ON MAL EQB005A Delay = 10 sec Trigger 5	C-BOP	Loss of normal power to 1ETA with failure of 1A diesel generator load sequencer
6	MAL EP003C MAL IRX010M12 MAL IRX009 =0 Trigger 7	C-RO	Zone A lockout/turbine runback with failure of rods to move in automatic leads to stuck rod M-12. Rod M-12 does not drop on reactor trip.
7	MAL-ND004A = 1000 MAL-ND009C = 25% Delay = 30 sec Trigger 9	M	LOCA outside containment (ND Train 1A)
8	MAL NI001A =0	C-BOP	NI Pump 1A fails to start in auto only. (Pre-Inserted)
9	MAL-ISE007A = BLOCK MAL ISE007B = BLOCK VLV-CF012A	C-RO	Automatic feedwater isolation fails. (Pre-Inserted) 1C S/G CF Containment isolation valve fails in auto. (Pre-Inserted)

\* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor  
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2004 NRC OPERATING EXAMINATION  
SCENARIO 1

TURNOVER INFORMATION

**Initial Conditions:** 75% power, MOL, Equilibrium Xe.  
NCS Boron Concentration 1056 ppm.

**Turnover:**

- Charging pump 1B is tagged for motor cooler leak. It has been out of service for 19 hours. It may be available by end of shift tonight.
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- Hurricane Holly has been downgraded to a tropical storm. York County is under a severe thunderstorm watch.
- Systems Operations Center is requesting an immediate power increase at 10%/hr to 100% power. Conditioned power level is 100%. OP/1/A/6100/003, Controlling Procedure for Unit Operation, Enclosure 4.1 step 2.43 is complete with the next milestone at 85% power.

**SCENARIO #1**  
**Simulator Operator Actions and Phone Call Instructions**

**EVENT**

**START THE DATA RECORDING FILES (CDF)**

1. No communications are anticipated during power increase.
2. **If Secondary Chemistry is called** concerning blowdown requirements, state that you will call back if changes to the blowdown flowrate are needed.
3. When examiner directs: Insert **Trigger 1 (NV-148 FAILS CLOSED IN AUTOMATIC)**.  
No further action required.  
  
**NO** scripted communications are anticipated. Any phone calls would be to Shift Work Manager about getting SPOC support and getting work requests started.
4. When examiner directs: Insert **Trigger 3 (1C S/G LEVEL PROGRAM FAILS to 90%)**  
  
**NO** scripted communications are anticipated. Any phone calls would be to Shift Work Manager about getting SPOC support and getting work requests started.
5. When examiner directs: Insert **Trigger 5 (1ETA Normal Feeder and 1A Sequencer Fails)**  
  
**If an NLO is dispatched to monitor the 1A D/G in AP/07**, acknowledge the instruction.  
  
**If an NLO is dispatched to 1ETA to investigate, after 5 minutes**, state that you found nothing wrong with 1ETA Normal Feeder breaker.
6. When examiner directs: Insert **Trigger 7 (Zone A Lockout/Rods Fail in Auto/M-12 is stuck)**  
  
**When the TCC is called** to investigate the power failure, only acknowledge the request to investigate and repair.  
**When SOC and Reactor Group are called**, only acknowledge the operator report on unit status and that you will be monitoring.  
**When RP and Chemistry are called**, only acknowledge that the requests for sampling will be performed.
7. When examiner directs: Insert **Trigger 9 (ND TRAIN A DISCH LINE RUPTURE and NC TO ND CHECK VALVE LEAKAGE)**  
  
**IF Radiation Protection is called** concerning the leak, state that you will monitor for radiation levels.  
**When NLO is dispatched to secure NF glycol pumps, Insert LOA-CNT003 VALUE="PMP OFF"**. Report back after 5 minutes and state that NF glycol pumps are secured.  
**IF an NLO is dispatched** to locate the leak, after 2 minutes, state that Radiation Protection will not let anyone enter the Auxiliary building due to radiation exposure concerns.

Op-Test No.: NRC Scenario No.: 1 Event No.: 1		
Event Description: Dilution for power increase		
Time	Position	Applicant's Actions or Behavior
		<b>EXAMINER NOTE: Per the turnover, the requested rate is an increase at 10%/hr.</b>
	SRO	Directs BOP to add water to begin the load change and provides guidance that the dilution should be done in 3 batches. <b>EXAMINER NOTE: A normal dilution batch at this core life should be about 200-400 gallons.</b>
	BOP	<b>Refer to OP/1/A/6150/009 (Boron Concentration Control) Enclosure 4.3 (Dilution).</b>
Step 2.2	BOP	Ensure the following valve control switches in "AUTO": <ul style="list-style-type: none"> <li>• 1NV-242A (RMWST To B/A Blender Ctrl)</li> <li>• 1NV-181A (B/A Blender OtIt To VCT)</li> </ul>
Step 2.3	BOP	Adjust the total makeup batch counter to the desired volume of reactor makeup water to be added.
Step 2.4	BOP	Place the "NC MAKEUP MODE SELECT" switch to the "DILUTE" position.
Step 2.5	BOP	Adjust the controller for 1NV-242A (RMWST To B/A Blender Ctrl) to the desired flow.
Step 2.6	BOP	Ensure 1NV-242A (RMWST To B/A Blender Ctrl) controller in "AUTO".
Step 2.7	BOP	Ensure at least one reactor makeup water pump is in "AUTO" or "ON".

Op-Test No.: NRC Scenario No.: 1 Event No.: 1		
Event Description: Dilution for power increase		
Time	Position	Applicant's Actions or Behavior
	BOP	NOTE: If necessary, dilution can be manually secured at any time by placing the "NC MAKEUP CONTROL" switch to the "STOP" position.
Step 2.8	BOP	Place the "NC MAKEUP CONTROL" switch in the "START" position.
Step 2.9	BOP	Verify the following valves open: <ul style="list-style-type: none"> <li>• 1NV-242A (RMWST To B/A Blender Ctrl)</li> <li>• 1NV-181A (B/A Blender Off To VCT)</li> </ul>
Step 2.10	BOP	If in "AUTO", verify the reactor makeup water pump starts.
Step 2.11	BOP	When the desired volume of reactor makeup water is reached on the total makeup batch counter, ensure the following valves close: <ul style="list-style-type: none"> <li>• 1NV-242A (RMWST To B/A Blender Ctrl)</li> <li>• 1NV-181A (B/A Blender Off To VCT)</li> </ul>
Step 2.12	BOP	If automatic makeup is desired, refer to Enclosure 4.1 (Automatic Makeup).

Op-Test No.: NRC Scenario No.: 1 Event No.: 2		
Event Description: Turbine load increase		
Time	Position	Applicant's Actions or Behavior
	SRO	Directs RO to increase load at a rate of 2 MW/min or 10% per hour. <b>EXAMINER NOTE: IF rods are in AUTOMATIC, the RO will ensure reactor control maintains T-Avg within <math>\pm 1^\circ\text{F}</math> with T-Ref. If rods are in manual, the RO maintains T-Avg within <math>+2^\circ\text{F}</math> with T-Ref. (From Limits and Precautions of OP/1/A/6100/003, Controlling Procedure for Unit Operations)</b>
Step 2.3	SRO/RO	Per OP/1/A/6100/003, Enclosure 4.1: Coordinate with SOC to increase turbine load per OP/1/B/6300/001.
	RO	Refer to OP/1/B/6300/001, Turbine Generator, Enclosure 4.2, Step 2.4.
	SRO	Direct RO to increase load at a rate of approximately 2 MW/min or 10% per hour.
Step 2.2.1	RO	Depress the "Load Rate" pushbutton and verify it illuminates.
Step 2.2.2	RO	Input the desired load rate on the numeric keypad and verify the load rate appears on the Variable Display.
Step 2.2.3	RO	Depress the "Enter" pushbutton and verify "Load Rate" light goes off.
Step 2.2.4	RO	Depress the "Target" pushbutton and verify it illuminates.
Step 2.2.5	RO	Input the desired load target on the numeric keypad and verify the load target appears on the Target Display.
Step 2.2.6	RO	Depress the "Enter" pushbutton and verify "Load Rate" light goes off.
Step 2.2.7	RO	Verify new load target appears on Target Display.
Step 2.2.8	RO	To start load increase, depress the "Go" pushbutton and verify it illuminates.



Op-Test No.: NRC Scenario No.: 1 Event No.: 2		
Event Description: Turbine load increase		
Time	Position	Applicant's Actions or Behavior
Step 2.2.9	ALL	S/G blowdown changes should be coordinated with Secondary Chemistry.

Op-Test No.: NRC Scenario No.: 1 Event No.: 3		
Event Description: Valve 1NV-148 (LETDOWN PRESSURE CONTROL) fails closed in automatic with manual control available.		
Time	Position	Applicant's Actions or Behavior
	BOP	<b>Obtains OP/1/B/6100/010H (Annunciator Response for Panel 1AD-7) for alarm 1AD-7 F/1 (LETDN HX OUTLET HI PRESS) and performs required actions.</b> <b>EXAMINER NOTE: The actions to be taken per the annunciator response are outlined here. The complete annunciator response is behind this sheet.</b>
	BOP	Verifies alarm using 1NVP5570 (Letdown Press) and determines that letdown pressure is high.
	BOP	Determines that 1NV-148 is closed and informs SRO.
	BOP	Takes manual control of 1NV-148 and restores letdown pressure to ~350 PSIG by opening 1NV-148.
	BOP	Verify proper orifice selection and letdown valve alignment. <b>EXAMINER NOTE: This action will not be necessary since taking manual control of 1NV-148 will correct the problem. 1NV-148 will remain in manual for the duration of the scenario.</b>

Op-Test No.: NRC Scenario No.: 1 Event No.: 4		
Event Description: 1C steam generator level program fails to 90%		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Obtains OP/1/B/6100/010E (Annunciator Response for Panel 1AD-4) for alarms:</p> <ul style="list-style-type: none"> <li>• 1AD-4 C/3 (S/G C FLOW MISMATCH LO CF FLOW)</li> <li>• 1AD-4 B/3 (S/G C LEVEL DEVIATION)</li> </ul> <p>and performs required actions.</p> <p><b>EXAMINER NOTE: The actions to be taken per the annunciator response are outlined here. The complete annunciator response is behind this sheet.</b></p>
	RO	Determines that 1C S/G level is increasing, refers to annunciator response, and informs SRO.
	RO	Places manual/auto station for 1C S/G feedwater regulating valve in MANUAL and throttles the valve to bring level back to program level.
	RO	<p>Match level in S/G C with programmed level for A, B, and D S/G's and maintain.</p> <p><b>EXAMINER NOTE: This valve will remain in manual for the remainder of the scenario.</b></p>

Op-Test No.: NRC Scenario No.: 1 Event No.: 5		
Event Description: Loss of normal power to 1ETA with failure of 1A diesel generator load sequencer.		
Time	Position	Applicant's Actions or Behavior
		<p><b>EXAMINER NOTE: The crew may enter AP/1/A/5500/21 (Loss of KC) due to the loss of the running KC pump prior to completion of AP/1/A/5500/07 (Loss of Normal Power). The applicable steps of AP/1/A/5500/21 begin on page 11.</b></p> <p><b>The crew may enter AP/1/A/5500/12 (Loss of Charging or Letdown) due to the loss of the running NV pump prior to completion of AP/07 (Loss of Normal Power). The applicable steps of AP/1/A/5500/12 begin on page 12.</b></p>
	BOP	Recognize symptoms of a loss of the normal power supply to 1ETA and inform SRO.
	SRO	Enter AP/1/A/5500/07 (Loss of Normal Power) Case 1 (Loss of Normal Power to an Essential Train) and direct actions.
Step 1	ALL	Monitor Enclosure 1 (Foldout Page).
Step 2	BOP	Verify affected bus - ENERGIZED.
Step 3	RO/BOP	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.
Step 4	RO	Stop any dilutions in progress.
Step 5	RO	Verify CA Pump #1 - ON.
Step 6	RO	Maintain reactor power less than or equal to 100%.
Step 7	BOP	Verify S/I status as follows: a. S/I - HAS ACTUATED. Determines that safety injection is not actuated and informs SRO.

Op-Test No.: NRC Scenario No.: 1 Event No.: 5		
Event Description: Loss of normal power to 1ETA with failure of 1A diesel generator load sequencer.		
Time	Position	Applicant's Actions or Behavior
Step 7.a. RNO	SRO	Transitions to Step 7.a. RNO and directs actions. <u>GO TO</u> Step 8. SRO transitions to Step 8 A/ER and directs actions.
		<b>CAUTION</b> Resetting sequencer will prevent further automatic loading of B/O loads.
Step 8	BOP	Verify ND System status as follows: a. Verify ND on affected train(s) - PREVIOUSLY OPERATING IN RESIDUAL HEAT REMOVAL MODE. Determines that the ND system is not aligned in residual heat removal mode and informs SRO.
Step 8 a. RNO	SRO	Transitions to Step 8.a. RNO and directs actions <u>GO TO</u> Step 9. SRO transitions to Step 9 A/ER and directs actions.
Step 9	BOP	Verify B/O busses are energized as follows: a. 1AD-11, K/3 (4KV B/O BUS FTA VOLTAGE LO) – DARK. b. 1AD-11, K/4 (4KV B/O BUS FTB VOLTAGE LO) – DARK.
		<b>EXAMINER NOTE: The crew will determine that the A Train sequencer has not loaded any blackout loads. The following step will reference Enclosure 2 of AP/1/A/5500/07 to manually align those loads.</b>
Step 10	BOP	Verify B/O loads in service as follows: a. Maintain D/G load less than 5750 KW. b. Ensure proper B/O sequencer(s) loading as follows: <ul style="list-style-type: none"><li>• <u>REFER TO</u> Enclosure 2 (Blackout Loads)</li><li>• Dispatch operator to ensure all required in plant loads are energized or on. <u>REFER TO</u> Enclosure 3 (Local Blackout Loads).</li></ul> c. Restore spent fuel pool cooling. <u>REFER TO</u> OP/1/A/6200/005 (Spent Fuel Pool Cooling).
Step 11	BOP	Verify 6.9KV busses - ENERGIZED.

Op-Test No.: NRC Scenario No.: 1 Event No.: 5		
Event Description: Loss of normal power to 1ETA with failure of 1A diesel generator load sequencer.		
Time	Position	Applicant's Actions or Behavior
		<u>NOTE:</u> There is a five minute time delay for the automatic swapover from YV to RN.
Step 12	BOP	Verify "YV OPERABLE" light - LIT.
Step 13	RO	Verify "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT.
Step 14	BOP	Stop unnecessary loads placed on affected bus by the sequencer as follows: a. Reset affected D/G load sequencer(s). b. Establish normal control room ventilation. <u>REFER TO</u> OP/O/A/6450/011 (Control Room Area Ventilation/Chilled Water System). c. Stop unnecessary loads. Resets "A" diesel generator load sequencer and informs SRO. No unnecessary loads were started during the loss of power to 1ETA.
Step 15	SRO/ BOP	Determine and correct cause of blackout. BOP determines that the normal supply breaker to 1ETA from 1ATC is open and informs SRO.
Step 16	BOP	<u>IF</u> spent fuel pool instrumentation is failed low, <u>THEN</u> ... Determines that the spent fuel pool indication is not failed and informs SRO. SRO determines that step does not apply.
Step 17	SRO	Ensure compliance with appropriate Tech Specs: <ul style="list-style-type: none"> <li>• 3.8.1 (A.C. Sources - Operating)</li> <li>• 3.8.2 (A.C. Sources - Shutdown)</li> <li>• 3.8.7 (Inverters - Operating)</li> <li>• 3.8.8 (Inverters - Shutdown)</li> <li>• 3.8.9 (Distribution Systems - Operating)</li> <li>• 3.8.10 (Distribution Systems - Shutdown).</li> </ul>

Op-Test No.: NRC Scenario No.: 1 Event No.: 5		
Event Description: Loss of normal power to 1ETA with failure of 1A diesel generator load sequencer.		
Time	Position	Applicant's Actions or Behavior
Step 18	SRO	Determine required notifications: <ul style="list-style-type: none"> <li>• <u>REFER TO</u> RP/0/A/5000/001 (Classification Of Emergency)</li> <li>• <u>REFER TO</u> RP/0/B/5000/013 (NRC Notification Requirements).</li> </ul> Determines that a 4 hour notification is required per Enclosure 4.3 of RP/13 due to the 1A diesel generator starting.
		<b>EXAMINER NOTE: The crew will not be allowed to restore normal power to 1ETA. The remaining steps in Event 5 provide guidance for restarting a KC pump and NV pump if the crews implement the Abnormal Procedures instead of manually starting the pumps in response to a failed automatic action.</b>
		<b>EXAMINER NOTE: The crew may elect to start a KC pump immediately or the SRO may choose to enter AP/21 (Loss of KC) at this point. Either option is acceptable. The first 6 steps of AP/21 are included for reference.</b>
	BOP	Determines that the operating KC pump has tripped and informs the SRO.
	SRO	<b>Enters AP/1/A/5500/21 (Loss of KC) and directs actions.</b>
		<u>CAUTION</u> 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.
Step 1	ALL	Monitor Enclosure 1 (Foldout Page).
Step 2	BOP	Verify at least one KC pump – ON  BOP reports no KC pump is on
		<b>EXAMINER NOTE: If the crew starts the 1A NV Pump prior to starting a KC pump, then this becomes the critical step. It is critical that either an NV pump or a KC pump is started within 10 minutes to prevent NCP seal failure. *</b>

Op-Test No.: NRC Scenario No.: 1 Event No.: 5		
Event Description: Loss of normal power to 1ETA with failure of 1A diesel generator load sequencer.		
Time	Position	Applicant's Actions or Behavior
Step 2 a RNO	SRO	SRO transitions to Step 2 RNO
<b>CRITICAL TASK</b>	BOP	a. Start at least one KC pump b. <u>IF</u> no KC Pump can be started, <u>THEN</u> ... BOP starts any of 4 KC pumps and reports the success.
	SRO	SRO transitions to Step 3 A/ER column and directs actions.
Step 3	ALL	<u>IF AT ANY TIME</u> all KC pumps are lost, <u>THEN RETURN TO STEP 2.</u>
Step 4	BOP	Verify both KC surge tank levels – 50% to 90% and STABLE.
Step 5	BOP	Start additional KC pump(s) as necessary to supply any KC loads presently in service.
	ALL	<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.
Step 6	BOP	Verify KC flow to NC pumps as follows: <ul style="list-style-type: none"> <li>• 1AD-20, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK</li> <li>• 1AD-21 A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK.</li> </ul>
		<b>EXAMINER NOTE:</b> The crew may elect to start a NV pump immediately or the SRO may choose to enter AP/1/A/5500/12 (Loss of Charging or Letdown) Case 1 (Loss of Charging) at this point. Either option is acceptable. The first 6 steps of AP/1/A/5500/12 Case 1 are included for reference.
	BOP	Determines that the operating NV pump has tripped and informs the SRO.
	SRO	<b>Enter AP/1/A/5500/12 (Loss of Charging or Letdown) Case 1 (Loss of Charging) and directs actions.</b>
Step 1	RO	Stop any power changes.

Op-Test No.: NRC Scenario No.: 1 Event No.: 5

Event Description: Loss of normal power to 1ETA with failure of 1A diesel generator load sequencer.

Time	Position	Applicant's Actions or Behavior
Step 2	BOP	Ensure the following letdown isolation valves – CLOSED: <ul style="list-style-type: none"> <li>• 1NV-10A (Letdn Orif 1B Otlf Cont Isol)</li> <li>• 1NV-11A (Letdn Orif 1C Otlf Cont Isol)</li> <li>• 1NV-13A (Letdn Orif 1A Otlf Cont Isol)</li> </ul>
Step 3	ALL	Monitor conditions for continued NC pump operation as follows: <ul style="list-style-type: none"> <li>• NC pump #1 seal outlet temperature – LESS THAN 235°F</li> <li>• NC pump lower bearing temperature – LESS THAN 225°F.</li> </ul>
		<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.
Step 4	BOP	Verify NV pump status as follows: <ul style="list-style-type: none"> <li>• At least one NV pump – ON.</li> </ul> Determines that no NV pumps are running and informs SRO.
	SRO	Transitions to Step 4 RNO and directs actions.
		<b>EXAMINER NOTE:</b> If the crew starts the 1A NV Pump prior to starting a KC pump, then this becomes the critical step. It is critical that either an NV pump or a KC pump is started within 10 minutes to prevent NCP seal failure. *



Op-Test No.: NRC Scenario No.: 1 Event No.: 5

Event Description: Loss of normal power to 1ETA with failure of 1A diesel generator load sequencer.

Time	Position	Applicant's Actions or Behavior
Step 4 RNO  <b>CRITICAL TASK</b>	BOP	<p>Perform the following:</p> <p>a. Ensure the malfunctioning NV pump – SECURED.</p> <p>b. Ensure only one suction source as follows:</p> <ul style="list-style-type: none"> <li>• VCT <ul style="list-style-type: none"> <li>• 1NV-188A (VCT Off Isol) – OPEN</li> <li>• 1NV-189B (VCT Off Isol) – OPEN</li> <li>• VCT level – GREATER THAN 23%</li> <li>• 1NV-252A (NV Pumps Suct From FWST) – CLOSED</li> <li>• 1NV-253B (NV Pumps Suct From FWST) – CLOSED</li> </ul> </li> <li><u>OR</u></li> <li>• FWST...</li> </ul> <p>Determines that suction source is from the VCT and informs SRO.</p> <p>c. <u>IF</u> the operating NV pump tripped due to loss of suction, <u>THEN</u> ...</p> <p>Determines that step does not apply and continues to Step 4.d. RNO</p> <p>d. Start the available NV pump as follows:</p> <ol style="list-style-type: none"> <li>1) Manually open 1NV-309 (Seal Water Injection Flow) to full open.</li> <li>2) Manually 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 the NV pump aux oil pump.</li> <li>6) <u>IF</u> suction is from the FWST, <u>THEN</u> ...</li> </ol> <p>Determines that step does not apply and continues to Step 4.e. RNO</p>
Step 4.e. RNO	BOP	<p><u>IF</u> no NV pump(s) available, <u>THEN</u>...</p> <p>Determines step does not apply and transitions to Step 5 A/ER</p>

Op-Test No.: NRC Scenario No.: 1 Event No.: 5		
Event Description: Loss of normal power to 1ETA with failure of 1A diesel generator load sequencer.		
Time	Position	Applicant's Actions or Behavior
Step 5	BOP	Verify charging header is aligned to NC loop as follows: a. 1NV-312A (Chrg Line Cont Isol) – OPEN. b. 1NV-314B (Chrg Line Cont Isol) – OPEN. c. Verify one of the following valves – OPEN: • 1NV-32B (NV Supply To Loop A Isol) OR ▪ 1NV-39A (NV Supply To Loop D Isol). d. Verify 1NV-294 (NV Pmps A&B Disch Flow Ctrl) – OPEN.  BOP notes 1NV-294 is closed and notifies SRO. SRO transitions to Step 5.d RNO and directs actions.
Step 5 d. RNO	BOP	d. Perform the following: 1) Manually open 1NV-309 (Seal Water Injection Flow). 2) Throttle 1NV-294 (NV Pmps A& Disch Flow Ctrl) to establish greater than 32 GPM "N/R CHRGR LN FLOW".  SRO transitions to Step 6 A/ER and directs actions.
Step 6	BOP	Verify the following: • "TOTAL SEAL WTR FLOW" – GREATER THAN 32 GPM • 1NV-309 (Seal Water Injection Flow) – IN "AUTO".  <b>EXAMINER NOTE: The next event should start here.</b>

Op-Test No.: NRC Scenario No.: 1 Event No.: 6		
Event Description: Zone A lockout/turbine runback with failure of rods to move in automatic leads to stuck rod M-12		
Time	Position	Applicant's Actions or Behavior
		<b>EXAMINER NOTE: Rods will fail to move in automatic resulting in the need for manual rod insertion. The crew may decide to implement AP/15 (Rod Control Malfunction) or AP/14 (Control Rod Misalignment), but the scenario should proceed to Event 7 after the runback is complete and the plant is stabilized.</b>
	ALL	Observes that a Zone A lockout has occurred and informs SRO.
	ALL	Recognize conditions for AP/1/A/5500/03 (Load Rejection), inform SRO, and perform immediate actions from memory.
	SRO	Enters AP/1/A/5500/03 (Load Rejection) Case I (Switchyard Available) and directs actions.
		<b>EXAMINER NOTE: Steps 1 and 2 are Immediate Action steps and are required to be performed from memory.</b>
Step 1	RO	Verify turbine load – DECREASING IN AUTOMATIC.
		<b>EXAMINER NOTE: The RO will observe that control M-12 in control bank "D" is not inserting with the rest of the bank "D" rods and will inform the SRO. The crew should allow rods to continue to be inserted until the turbine runback is complete and the plant has stabilized.</b>
Step 2	RO	Verify proper reactor response: <ul style="list-style-type: none"> <li>• Control rods – IN "AUTO" AND STEPPING IN</li> <li>• P/R neutron flux – DECREASING</li> </ul> Determines that control rods are not stepping in and places the CRD Bank Selector Switch to "Manual", begins driving rods and informs SRO.
	SRO	Transitions to Step 2 RNO and directs actions.

Op-Test No.: NRC Scenario No.: 1 Event No.: 6		
Event Description: Zone A lockout/turbine runback with failure of rods to move in automatic leads to stuck rod M-12		
Step 2 RNO	BOP	IF T-Avg is greater than 1.5°F higher than T-Ref, <u>THEN</u> manually insert control rods as required to maintain T-Avg within 1°F of T-Ref.
	SRO	Transitions to Step 3 A/ER and directs actions.
Step 3	RO	Verify proper steam dump operation as follows: a. Verify T-Ref instrumentation – AVAILABLE. b. "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) – LIT c. Verify the following: <ul style="list-style-type: none"> <li>• "C-7A LOSS OF LOAD INTLK COND DUMP" status light (1Si-18) – LIT</li> <li>• Steam dump valves – MODULATING</li> </ul> d. T-Avg – DECREASING TO T-REF
Step 4	BOP	Verify Pzr PORV and Pzr spray valve status as follows: a. All Pzr PORVs – CLOSED b. Normal Pzr spray valves – CLOSED
Step 5	BOP	Verify proper CM System operation as follows: a. <u>WHEN</u> reactor power is less than 75%, <u>THEN</u> 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 Determines that standby hotwell pump is not on and informs SRO.
	SRO	Transitions to Step 5.c RNO and directs actions.
Step 5.c RNO	BOP	Manually start standby hotwell pump(s) as necessary. Determines sufficient CM/CF flow available and hotwell pump start not required.
	SRO	Transitions to Step 5.d A/ER and directs actions.

Op-Test No.: NRC Scenario No.: 1 Event No.: 6		
Event Description: Zone A lockout/turbine runback with failure of rods to move in automatic leads to stuck rod M-12		
Step 5.d	BOP	d. Verify standby condensate booster pump(s) – ON Determines that standby condensate booster pump is not on and informs SRO.
	SRO	Transitions to Step 5.d RNO and directs actions.
Step 5.d RNO	BOP	Manually start standby condensate booster pump(s) as necessary. Determines sufficient CM/CF flow available and condensate booster pump start not required.
	SRO	Transitions to Step 6 A/ER and directs actions.
Step 6	BOP	Verify the following generator alarms – DARK: <ul style="list-style-type: none"> <li>• 1AD-11, C/1 (GEN BKR A OVER CURRENT)</li> <li>• 1AD-11, F/1 (GEN BKR B OVER CURRENT)</li> </ul>
Step 7	RO	Verify S/G levels are adequate as follows: <ul style="list-style-type: none"> <li>• All S/G low level alert alarms (1AD-4) – DARK</li> <li>• All S/G low CF flow alarms (1AD-4) – DARK</li> </ul>
		<b>EXAMINER NOTE: If alarm in at this point due to the controls for S/G 1C being in manual, the SRO will go to Step 7 RNO, otherwise he will continue with Step 8 A/ER (below).</b>
Step 7 RNO	SRO	Perform the following: <ul style="list-style-type: none"> <li>a. Ensure feedwater regulating valves – MODULATING TO CONTROL S/G LEVELS AT PROGRAM SETPOINT.</li> <li>b. <u>IF</u> any S/G(s) NR level is decreasing in an uncontrolled manner, <u>THEN</u>:...</li> </ul> Determines this step is N/A and continues.
	SRO	Transitions to Step 8 A/ER column and directs actions.

Op-Test No.: NRC Scenario No.: 1 Event No.: 6		
Event Description: Zone A lockout/turbine runback with failure of rods to move in automatic leads to stuck rod M-12		
Step 8	BOP	Verify AS header pressure – GREATER THAN OR EQUAL TO 140 PSIG.
Step 9	BOP	Monitor Enclosure 3 (Rod Insertion Limit Boration). <b>EXAMINER NOTE: AP/1/A/5500/03, Enclosure 3 is behind this sheet.</b>
Step 10	RO	Verify reactor power – LESS THAN 30% Determines that power is greater than 30% and informs SRO.
	SRO	Transitions to Step 10 RNO and directs actions.
Step 10 RNO	SRO	<p>a. <u>IF</u> the runback target load is less than 30%, <u>THEN</u>: ... Determines this step is N/A and continues.</p> <p>b. <u>WHEN</u> the appropriate runback target load is reached, <u>THEN</u>:</p> <ol style="list-style-type: none"> <li>1) Stabilize unit at current power level</li> <li>2) Maintain control rods above insertion limits</li> <li>3) Adjust the following as required to maintain T-Avg within 1°F of T-Ref: <ul style="list-style-type: none"> <li>• Turbine load</li> <li>• Control rods</li> <li>• Boron concentration</li> </ul> </li> </ol> <p><b>EXAMINER NOTE: Due to stuck rod, the crew should determine that rods should not be used once plant is stable.</b></p> <p>c. <u>GO TO</u> Step 12.</p>
	SRO	Transitions to Step 12 A/ER and directs actions.

Op-Test No.: NRC Scenario No.: 1 Event No.: 6		
Event Description: Zone A lockout/turbine runback with failure of rods to move in automatic leads to stuck rod M-12		
Step 12	RO/BOP	<p>Verify the following PCBs - CLOSED:</p> <ul style="list-style-type: none"> <li>• Generator breaker 1A</li> <li>• Generator breaker 1B</li> <li>• PCB 14</li> <li>• PCB 15</li> <li>• PCB 17</li> <li>• PCB 18.</li> </ul> <p>Determines that Generator breaker 1A, PCB 17 and PCB 18 are open and informs SRO.</p>
	SRO	Transitions to Step 12 RNO and directs actions.
		<u>NOTE</u> When separated from the grid, the turbine reverts to speed control.
Step 12.a. RNO	RO	a. IF both generator PCBs are open, THEN ... Step does not apply.
Step 12.b. RNO	RO	b. IF the turbine is separated from the grid, THEN... Step does not apply.
Step 12.c. RNO	BOP	<p>c. IF load rejection caused by loss of main busline 1A or 1B, THEN:</p> <p>1) Notify Transmission Control Center (TCC), using one of the following methods, to investigate and repair cause of the loss of busline:</p> <ul style="list-style-type: none"> <li>• 704-382-9403</li> <li>• 704-382-9404</li> <li>• 704-399-9744</li> <li>• 704-382-4413 (System Operating Center).</li> </ul> <p>2) WHEN notified by TCC that the affected busline is ready to be reenergized, THEN...</p> <p><b>EXAMINER NOTE: The 1A busline will remain deenergized for the remainder of the scenario.</b></p>
Step 12.d. RNO	RO	d. IF a full load rejection has occurred, THEN... Step does not apply.

Op-Test No.: NRC Scenario No.: 1 Event No.: 6		
Event Description: Zone A lockout/turbine runback with failure of rods to move in automatic leads to stuck rod M-12		
	SRO	Transitions to step 13 A/ER and directs actions.
Step 13	RO	Adjust power factor as necessary. <u>REFER TO</u> Unit 1 Revised Data Book Figure 43.
Step 14	ALL	<p><u>WHEN</u> the appropriate runback target load is reached, <u>THEN</u>:</p> <ul style="list-style-type: none"> <li>• Stabilize unit at appropriate power level.</li> <li>• Maintain control rods above insertion limits.</li> <li>• Adjust the following as required to maintain T-Avg within 1°F of T-Ref</li> <li>• Turbine load</li> <li>• Control rods</li> <li>• Boron concentration.</li> </ul> <p><b>EXAMINER NOTE: Due to stuck rod, the crew should determine that rods should not be used once plant is stable.</b></p>
Step 15	RO/SRO	Notify System Operating Center (SOC) using the red dispatcher telephone of current unit status.
Step 16	ALL	Determine and correct cause of load rejection.
Step 17.a	BOP	<p>Shut down unnecessary plant equipment as follows:</p> <p>a. Restore CM and CF as follows:</p> <p>1) Verify C-htr drain pumps – ON.</p> <p>Determines C-htr drain pumps are OFF and notifies SRO.</p>
	SRO	Transitions to Step 17.a.1) RNO and directs actions.
Step 17.a.1) RNO	BOP	<u>WHEN</u> time and manpower permit, <u>THEN</u> complete the shutdown of the C-htr drain pumps. <u>REFER TO</u> OP/1/B/6250/004 (Feedwater Heater Vents, Drains, and Bleed System).
	SRO	Transitions to Step 17.a.2) A/ER and directs actions.



Op-Test No.: NRC Scenario No.: 1 Event No.: 6		
Event Description: Zone A lockout/turbine runback with failure of rods to move in automatic leads to stuck rod M-12		
Step 17.a.2)		2) Verify both CF Pumps – IN SERVICE 3) Shutdown one CF pump as necessary. Refer to OP/1/A/6250/001 (Condensate and Feedwater System). 4) Shutdown excess Condensate Booster Pumps. Refer to OP/1/A/6250/001 (Condensate and Feedwater System). 5) Shutdown excess Hotwell Pumps. Refer to OP/1/A/6250/001 (Condensate and Feedwater System).
Step 17.b	BOP	b. RC pump(s) and cooling tower fans. REFER TO OP/1/B/6400/001A (Condenser Circulating Water System).
		<b>EXAMINER NOTE: If reactor power is not considered stable, the SRO will transition to the Step 18 RNO which will have him go to Step 19 and the remainder of Step 18 will be done when power IS considered stable.</b>
Step 18	RO	Reset steam dump valves as follows: a. Verify reactor power – STABLE. b. Verify steam dump valves – IN "T-AVG" MODE. c. Verify steam dump valves – CLOSED. d. Reset steam dump valves. e. Verify the following status lights (1SI-18) – DARK. <ul style="list-style-type: none"> <li>• "C-7A LOSS OF LOAD INTLK COND DUMP"</li> <li>• "C-7B LOSS OF LOAD INTLK ATMOS DUMP"</li> </ul> f. IF "T-AVG" mode of operation is available, THEN ensure steam dump valves in "T-AVG" mode. g. Verify "STM DUMP CTRL" – IN AUTOMATIC.
Step 19	RO	Verify reactor power – GREATER THAN 15%.

Op-Test No.: NRC Scenario No.: 1 Event No.: 6		
Event Description: Zone A lockout/turbine runback with failure of rods to move in automatic leads to stuck rod M-12		
Step 20	RO/BOP	Verify CA Pumps – OFF. Determines CAPT #1 is on and informs SRO.
	SRO	Transitions to Step 20 RNO and directs actions.
Step 20 RNO		a. WHEN CA is no longer needed to feed S/G(s), THEN shutdown the CA System following the automatic start and return CA System to standby readiness. REFER TO OP/1/A/6250/002 (Auxiliary Feedwater System). b. Re-establish S/G blowdown. REFER TO OP/1/A/6250/008 (Steam Generator Blowdown).
	SRO	Transitions to Step 21 A/ER and directs actions.
Step 21	RO	Verify reactor power change – GREATER THAN OR EQUAL TO 15% IN A 1 HOUR PERIOD.
Step 22	ALL	Notify the following sections to take appropriate samples: <ul style="list-style-type: none"> <li>• Radiation Protection to sample and analyze gaseous effluents. REFER TO Selected Licensee Commitments Manual, Section 16.11-6.</li> <li>• 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).</li> </ul>
Step 23	SRO	Ensure compliance with appropriate Tech Specs: <ul style="list-style-type: none"> <li>• 3.1.1 (Shutdown Margin (SDM))</li> <li>• 3.1.6 (Control Bank Insertion Limits)</li> <li>• 3.8.1 (AC Sources – Operating)</li> </ul>
Step 24	ALL	Notify Reactor Group Engineer of occurrence.

Op-Test No.: NRC Scenario No.: 1 Event No.: 6		
Event Description: Zone A lockout/turbine runback with failure of rods to move in automatic leads to stuck rod M-12		
Step 25	ALL	Determine long term plant status. <u>RETURN TO OP/1/A/6100/003</u> (Controlling Procedure for Unit Operation).
		<b>EXAMINER NOTE: Crew may address the stuck rod with AP/1/A/5500/14 (Control Rod Misalignment) or AP/1/A/5500/15 (Control Rod Malfunction), however, the intent is to proceed to Event 7.</b>

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Time	Position	Applicant's Actions or Behavior
	ALL	Recognize symptoms of a LOCA outside containment <ul style="list-style-type: none"> <li>• Pressurizer level decreasing</li> <li>• Pressurizer pressure decreasing</li> <li>• EMF 41 in alarm</li> </ul> <b>EXAMINER NOTE: The AP/1/A/5500/10 (Reactor Coolant Leak) actions are supplied here, but the rate of decrease may cause the crew to safety inject from their Enclosure 1 criteria.</b>
	SRO	<b>Implements AP/1/A/5500/10 (Reactor Coolant Leak) Case II, (NC System Leak) and directs actions.</b>
Step 1	ALL	Monitor Enclosure 1 (Foldout Page)
Step 2	RO/ BOP	Verify Pzr level – STABLE OR INCREASING. Determines Pzr level is decreasing and informs SRO.
	SRO	Transitions to Step 2 RNO and directs actions.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Time	Position	Applicant's Actions or Behavior
Step 2 RNO	BOP	Perform the following: <ol style="list-style-type: none"> <li>Maintain charging flow less than 180 GPM.</li> <li>Manually throttle 1NV-294 (NV Pmps A&amp;B Disch Flow Ctrl) to stabilize Pzr level.</li> <li><u>IF</u> Pzr level is stable <u>OR</u> increasing, <u>THEN GO TO</u> Step 3. Determines Pzr level is decreasing and informs SRO.</li> <li><u>IF</u> Pzr level continues to decrease, <u>THEN</u>:</li> </ol> <p><b>EXAMINER NOTE: A reactor trip and safety injection will be required prior to completion of this step.</b></p>
	ALL	Recognize that pressurizer level and pressure are decreasing uncontrollably and determine the need to trip the reactor and initiate safety injection.
	SRO	Directs RO to trip the reactor and the BOP to manually initiate S/I.
	SRO	<b>Enters EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection) and directs operators.</b>
		<b>EXAMINER NOTE: Steps 2 through 5 are Immediate Action steps and are required to be performed from memory.</b>
Step 1	ALL	Monitor Enclosure 1 (Foldout Page)
Step 2	RO	Verify Reactor Trip: <ul style="list-style-type: none"> <li>All rod bottom lights – LIT</li> <li>All reactor trip and bypass breakers – OPEN</li> <li>I/R amps – DECREASING</li> </ul> Determines that the rod bottom light for rod M-12 is not lit and informs SRO.
	SRO	Transitions to Step 2 RNO and directs actions.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Time	Position	Applicant's Actions or Behavior
	RO	Manually trip reactor  Manually cycles the reactor trip breaker handles. Informs SRO that rod M-12 is still not inserted, but that all reactor trip and bypass breakers are open and I/R amps are decreasing. RO and SRO concur that the reactor is tripped.
	SRO	Transitions to Step 3 A/ER and directs actions.
Step 3	RO	Verify Turbine Trip: • All turbine stop valves – CLOSED
Step 4	BOP	Verify 1ETA and 1ETB – ENERGIZED.
Step 5	BOP	Verify S/I is actuated: a. "SAFETY INJECTION ACTUATED" status light (1SI-13) – LIT b. E/S load sequencer actuated status lights (1SI-14) – LIT
Step 6	RO	Announce "Unit 1 Safety Injection".
Step 7	SRO	Implement RP/0/A/5000/01 (Classification Of Emergency).

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Time	Position	Applicant's Actions or Behavior
Step 8 EVENT #9	RO	<b>EXAMINER NOTE: The RO may manually initiate Feedwater Isolation prior to this step being read per OMP 1-7 guidance.</b> Verify all Feedwater Isolation status lights (1SI-5) – LIT Determines that an automatic feedwater Isolation has not occurred and informs SRO.
	SRO	Transitions to Step 8 RNO and directs actions.
Step 8. RNO	RO	Perform the following: a. Manually initiate Feedwater Isolation. Informs SRO that manual Feedwater Isolation was not successful  b. <u>IF</u> proper status light is not obtained, <u>THEN</u> manually close valves. BOP manually closes 1CF-51 on C S/G and notifies SRO.
	SRO	Transitions to Step 9 A/ER and directs actions.
Step 9	BOP	Verify Phase A Containment Isolation status as follows: a. Phase A "RESET" lights – DARK b. Monitor Light Panel Group 5 St lights – LIT <b>EXAMINER NOTE: Students should note that 1NF-228 is not closed and take actions to attempt to close the valve and then secure the NF pumps per local operator action.</b>
Step 10	ALL	Verify proper Phase B actuation as follows: a. Containment pressure – HAS REMAINED LESS THAN 3 PSIG <u>IF AN ANY TIME</u> containment pressure exceeds 3 PSIG while in this procedure, <u>THEN</u> perform Step 10.a.
Step 11.a	RO	Verify proper CA pump status as follows: a. Motor driven CA pumps – ON

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Time	Position	Applicant's Actions or Behavior
Step 11.b	RO	b. 3 S/G N/R levels – GREATER THAN 11%
Step 12 <b>EVENT #8</b>	BOP	Verify all of the following S/I pumps – ON: <ul style="list-style-type: none"> <li>• NV pumps</li> <li>• ND pumps</li> <li>• NI pumps</li> </ul> Determines that 1A NI pump failed to start and 1B NV pump was previously tagged out and informs the SRO.
	SRO	Transitions to Step 12 RNO and directs actions.
Step 12. RNO	BOP	Perform the following for the affected train(s): <ol style="list-style-type: none"> <li>a. Reset ECCS.</li> <li>b. Reset D/G load sequencer.</li> <li>c. Manually start affected pump.</li> <li>d. IF AT ANY TIME A B/O occurs, THEN restart S/I equipment previously on.</li> </ol> BOP manually starts the 1A NI pump and informs SRO.
	SRO	Transitions to Step 13 A/ER and directs actions.
Step 13	BOP	Verify all KC pumps – ON.
Step 14	BOP	Verify all Unit 1 and Unit 2 RN pumps – ON.
Step 15	BOP	Verify proper ventilation systems operation as follows: <ul style="list-style-type: none"> <li>• <u>REFER TO</u> Enclosure 2 (Ventilation System Verification)</li> <li>• Notify Unit 2 operator to perform Enclosure 3 (Opposite Unit Ventilation Verification)</li> </ul> <b>EXAMINER NOTE: Copy of enclosure 2 is attached for reference.</b>



Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Time	Position	Applicant's Actions or Behavior
Step 16	RO	Verify all S/G pressures – GREATER THAN 775 PSIG.
Step 17	BOP	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. Determines NC pressure is ~1300 psig and informs SRO.
	SRO	Transitions to Step 17.d. RNO and directs actions.
Step 17.d. RNO	BOP	Perform the following: 1) Ensure ND pump miniflow valve on operating ND pump(s) – OPEN. 2) <u>IF</u> the ND pump miniflow valve(s) cannot be opened, <u>THEN</u> ... Determines that step does not apply.
	SRO	3) <u>GO TO</u> Step 18.
	SRO	Transitions to Step 18 A/ER and directs actions.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Time	Position	Applicant's Actions or Behavior
Step 18	RO	Control S/G levels as follows: a. Verify total CA flow – GREATER THAN 450 GPM. b. <u>WHEN</u> at least one S/G N/R level is greater than 11% (29% ACC), <u>THEN</u> throttle feed flow to maintain all S/G N/R levels between 11% (29% ACC) and 50%.
Step 19	RO	Verify all CA isolation valves – OPEN.
Step 20	BOP	Verify S/I equipment status based on monitor light panel – IN PROPER ALIGNMENT.
		<u>NOTE</u> : Enclosure 4 (NC Temperature Control) shall remain in effect until subsequent procedures provide alternative NC temperature control guidance.
Step 21	RO	Control NC temperature. <u>REFER TO</u> Enclosure 4 (NC Temperature Control).
Step 22	BOP	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.
Step 23	RO	Verify NC subcooling based on core exit T/Cs – GREATER THAN 0°F. Determines that NC subcooling is less than 0°F and informs SRO.
	SRO	Transitions to Step 23 RNO and directs actions.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Time	Position	Applicant's Actions or Behavior
Step 23 RNO	BOP	<p>IF any NV OR NI pump is on, THEN:</p> <ul style="list-style-type: none"> <li>a. Ensure all NC pumps – OFF.</li> <li>b. Maintain seal injection flow.</li> </ul> <p>Stops all NC pumps and informs SRO.</p> <p><b>EXAMINER NOTE: NC pumps may have been tripped earlier per Enclosure 1 guidance when the loss of subcooling was first detected.</b></p>
	SRO	Transitions to Step 24 A/ER and directs actions.
Step 24	RO	<p>Verify main steamlines are intact as follows:</p> <ul style="list-style-type: none"> <li>• All S/G pressures – STABLE OR INCREASING</li> <li>• All S/Gs – PRESSURIZED.</li> </ul>
Step 25	RO/BOP	<p>Verify S/G tubes are intact as follows:</p> <ul style="list-style-type: none"> <li>• Verify the following EMF trip 1 lights – DARK: <ul style="list-style-type: none"> <li>• 1EMF-33 (Condenser Air Ejector Exhaust)</li> <li>• 1EMF-34 (S/G Sample)</li> <li>• 1EMF-26 (Steamline 1A)</li> <li>• 1EMF-27 (Steamline 1B)</li> <li>• 1EMF-28 (Steamline 1C)</li> <li>• 1EMF-29 (Steamline 1D)</li> </ul> </li> <li>• All S/G levels – STABLE OR INCREASING IN A CONTROLLED MANNER</li> </ul>

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Time	Position	Applicant's Actions or Behavior
Step 26	BOP	Verify NC System is intact as follows: <ul style="list-style-type: none"> <li>• Containment pressure – LESS THAN 1 PSIG.</li> <li>• <u>IF</u> normal off-site power is available, <u>THEN</u> verify containment pressure less than 0.3 PSIG.</li> <li>• Containment high range EMFs – LESS THAN 3 R/HR:               <ul style="list-style-type: none"> <li>• 1EMF-53A (Containment train A)</li> <li>• 1EMF-53B (Containment train B).</li> </ul> </li> <li>• Containment EMF Trip 1 lights – DARK:               <ul style="list-style-type: none"> <li>• 1EMF-38 (Containment Particulate)</li> <li>• 1EMF-39 (Containment Gas)</li> <li>• 1EMF-40 (Containment Iodine).</li> </ul> </li> <li>• Containment sump level – STABLE.</li> </ul>
Step 27	RO	Verify S/I termination criteria as follows: <ol style="list-style-type: none"> <li>a. NC subcooling based on core exit T/Cs – GREATER THAN 0°F. Determines that subcooling is less than 0°F and informs SRO.</li> </ol>
	SRO	Transitions to Step 27 RNO and directs actions.
Step 27. RNO	SRO	<u>GO TO</u> Step 28.
	SRO	Transitions to Step 28 A/ER and directs actions.
Step 28	ALL	Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Time	Position	Applicant's Actions or Behavior
Step 29	BOP	Control S/G levels as follows: a. Verify N/R levels in all S/Gs – GREATER THAN 11%. b. Throttle feed flow to maintain all S/G N/R levels between 11% and 50%.
Step 30	BOP	Verify secondary radiation is normal as follows: 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: • Notify Chemistry to sample all S/Gs for activity. OR • Notify RP to frisk all cation columns for activity. d. Verify the following EMF trip 1 lights - DARK: • 1EMF-33 (Condenser Air Ejector Exhaust) • 1EMF-34 (S/G Sample) • 1EMF-26 (Steamline 1A) • 1EMF-27 (Steamline 1B) • 1EMF-28 (Steamline 1C) • 1EMF-29 (Steamline 1D). e. <u>WHEN</u> activity results are reported, <u>THEN</u> verify all S/Gs indicate no activity.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Time	Position	Applicant's Actions or Behavior
Step 31	BOP	Verify auxiliary building radiation is normal as follows: <ul style="list-style-type: none"> <li>• EMF-41 (Aux Bldg Ventilation) trip 1 light – DARK</li> <li>• All area monitor EMF trip 1 lights – DARK.</li> </ul> BOP notes that EMF-41, EMF-1, EMF-3 and EMF-4 are in alarm and informs SRO.
	SRO	Transitions to Step 31 RNO and directs actions.
Step 31. RNO	ALL	Evaluate cause of abnormal conditions as follows: <ol style="list-style-type: none"> <li>a. Monitor OAC EMF alarms, OAC VA Graphic and area monitor EMFs to determine location of activity.</li> <li>b. Dispatch operator to locate potential leak.</li> <li>c. <b><u>IF cause of alarm is LOCA outside containment, THEN GO TO EP/1/A/5000/ECA-1.2 (LOCA Outside Containment).</u></b></li> </ol> Dispatches operator to attempt to locate the leak in the auxiliary building. Based on other indications, crew should determine that a leak outside containment exists.
	SRO	Transitions to EP/1/A/5000/ECA-1.2 (LOCA Outside Containment) and directs actions.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Step 1	BOP	<p>Verify proper valve alignment as follows:</p> <p>a. Verify all of the following ND suction valves – CLOSED:</p> <ul style="list-style-type: none"> <li>• 1ND-2A (ND Pump 1A Suct Frm Loop B)</li> <li>• 1ND-37A (ND Pump 1B Suct Frm Loop C)</li> <li>• 1ND-1B (ND Pump 1A Suct Frm Loop B)</li> <li>• 1ND-36B (ND Pump 1B Suct Frm Loop C).</li> </ul> <p>b. Verify following NI valves – CLOSED:</p> <ol style="list-style-type: none"> <li>1) 1Ni-121A (Ni Pump 1A to H-Legs B&amp;C).</li> <li>2) 1Ni-152B (Ni Pump 1B to H-Legs A&amp;D).</li> <li>3) 1Ni-183B (ND Hdr A&amp;B Hot Leg Inj Isol).</li> </ol> <p>c. Verify 1NV-857 (Pressurizer Aux Spray Ctrl) – CLOSED.</p>
Step 2	BOP	<p>Attempt to identify and isolate break as follows:</p> <p>a. Isolate ND header 1A to cold legs as follows:</p> <ol style="list-style-type: none"> <li>1) Place the "PWR DISCON FOR 1NI-173A" in "ENABLE".</li> <li>2) Close 1NI-173A (ND HDR 1A To Cold Legs C&amp;D).</li> <li>3) Verify NC pressure – INCREASING.</li> <li>4) <u>GO TO</u> Step 3.</li> </ol>
Step 3	ALL	<p>Verify leak path is isolated as follows:</p> <p>a. NC pressure – INCREASING.</p> <p>b. Initiate actions as required to complete leak isolation.</p> <p>c. <u>GO TO EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant).</u></p>

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
	SRO	Transitions to EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant) and directs actions.
Step 1	ALL	Monitor Enclosure 1 (Foldout Page).
Step 2	RO	Verify main steamlines are intact as follows: <ul style="list-style-type: none"> <li>• All S/G pressures – STABLE OR INCREASING</li> <li>• All S/Gs – PRESSURIZED.</li> </ul>
Step 3	BOP	Control intact S/G levels as follows: <ol style="list-style-type: none"> <li>a. Verify N/R levels in all intact S/Gs – GREATER THAN 11% (29% ACC).</li> <li>b. Throttle feed flow to maintain all S/G N/R levels between 11% (29% ACC) and 50%.</li> </ol>



Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Step 4	BOP	<p>Verify secondary radiation is normal as follows:</p> <p>a. Ensure the following signals - RESET:</p> <ol 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> </ol> <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>• Notify Chemistry to sample all S/Gs for activity.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• 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>• 1EMF-33 (Condenser Air Ejector Exhaust)</li> <li>• 1EMF-34 (S/G Sample)</li> <li>• 1EMF-26 (Steamline 1A)</li> <li>• 1EMF-27 (Steamline 1B)</li> <li>• 1EMF-28 (Steamline 1C)</li> <li>• 1EMF-29 (Steamline 1D)</li> </ul> <p>d. <u>WHEN</u> activity results are reported, <u>THEN</u> verify all S/Gs indicate no activity.</p>

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Step 5	BOP	<p>Verify Pzr PORV and isolation valve status as follows:</p> <ol style="list-style-type: none"> <li>Power to all Pzr PORV isolation valves - AVAILABLE.</li> <li>All Pzr PORVs – CLOSED.</li> <li>At least one Pzr PORV isolation valve – OPEN.</li> <li><u>IF AT ANY TIME</u> a Pzr PORV opens due to high pressure, <u>THEN</u>, after Pzr pressure decreases to less than 2315 PSIG, ensure the valve closes or is isolated.</li> </ol>
		<b>EXAMINER NOTE: Pzr level may not yet be &gt; 11% when this step is reached and the crew may continue in the procedure. However, as soon as Pzr level is &gt; 11%, Enclosure 1 actions will direct them to transition to EP/1/A/5000/ES-1.1.</b>
Step 6	RO/BOP	<p>Verify S/I Termination criteria as follows:</p> <ol style="list-style-type: none"> <li>NC subcooling based on core exit T/Cs – GREATER THAN 0°F.</li> <li>Verify secondary heat sink as follows: <ul style="list-style-type: none"> <li>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>Total feed flow to all intact S/Gs – GREATER THAN 450 GPM.</li> </ul> </li> <li>NC pressure – STABLE OR INCREASING.</li> <li>Pzr level – GREATER THAN 11% (20% ACC).</li> <li><b>GO TO EP/1/A/5000/ES-1.1 (Safety Injection Termination).</b></li> </ol>
	SRO	<b>Transitions to EP/1/A/5000/ES-1.1 (Safety Injection Termination) and directs actions.</b>

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Step 1	ALL	Monitor Enclosure 1 (Foldout Page).
Step 2	BOP	Ensure S/I – RESET: a. ECCS. b. D/G load sequencers. c. <u>IF AT ANY TIME</u> a B/O occurs, <u>THEN</u> restart S/I equipment previously on.
Step 3	BOP	Ensure the following containment isolation signals – RESET: • Phase A • Phase B.
Step 4	BOP	Establish VI to containment as follows: • Ensure 1Vi-77B (VI Cont Isol) – OPEN • Verify Vi pressure – GREATER THAN 85 PSIG.
Step 5	BOP	Ensure only one NV pump – ON.
Step 6	RO/BOP	Verify NC pressure – STABLE OR INCREASING.
Step 7	BOP	Verify VI pressure – GREATER THAN 50 PSIG.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9		
Event Description: LOCA outside containment. NI pump 1A fails to start in auto only and automatic feedwater isolation fails.		
Step 8	BOP	<p>Isolate NV S/i flowpath as follows:</p> <p>a. Verify the following valves – OPEN:</p> <ul style="list-style-type: none"> <li>• 1NV-252A (NV Pumps Suct From FWST)</li> <li>• 1NV-253B (NV Pumps Suct From FWST)</li> </ul> <p>b. Verify the following valves – OPEN:</p> <ul style="list-style-type: none"> <li>• 1NV-203A (NV Pumps A&amp;B Recirc Isol)</li> <li>• 1NV-202B (NV Pumps A&amp;B Recirc Isol).</li> </ul> <p><b>EXAMINER NOTE: Based on current NC pressure, 1NV-203A and 1NV-202B may be closed. If so, the SRO will transition to Step 8.b RNO to open them and then transition back to Step 8.c A/ER and continue.</b></p> <p>c. Close the following valves:</p> <ul style="list-style-type: none"> <li>• 1NI-9A (NV Pmp C/L Inj Isol)</li> <li>• 1NI-10B (NV Pmp C/L Inj Isol).</li> </ul>

Terminate scenario when 1NI-9A and 1NI-10B are closed.

Classification: Site Area Emergency (4.1.S.3)