

**NRC INITIAL LICENSE EXAM
SCENARIO # 1**

Catawba Nuclear Station NRC Exam May 2014

Facility:	Catawba NRC Exam 2014	Scenario No.:	1	Op Test No.:	2014301
Examiners:	_____	Operators:	SRO		
	_____		RO		
	_____		BOP		
<p>Initial Conditions: IC#176; Unit 1 is just below POAH, BOL. Unit 2 is at 100%. 1B NI (Safety Injection) Pump and the 1D RC (Condenser Circulating Water) Pump are tagged out for preventative maintenance.</p>					
<p>Turnover: Unit 1 is just below POAH, BOL. Unit 2 is at 100%. 1B NI (Safety Injection) Pump and the 1D RC (Condenser Circulating Water) Pump are tagged out for preventative maintenance. The crew is to shift operating KC (Component Cooling) pumps by starting the 1B2 KC pump and securing the 1B1 KC pump and then increase power 1%.</p>					
Event No.	Malf. No.	Event Type*	Event Description		
1	---	N-BOP N-SRO	Shift operating Component Cooling pumps.		
2	---	R-RO N-SRO	Withdraw control rods to increase reactor power to 1%		
3	XMT-SG101 XMT-SG102	I-RO I-SRO	1D S/G W/R signal fails low. Feed reg. bypass valve opens. AP/06		
4	RN001A	C-BOP C-SRO	RN (Nuclear Service Water) Pit A Screen Hi D/P. AP/20		
5	FWP015C CA004B	C-RO C-SRO TS-SRO	1B CF (Main Feed) Pump trips, 1B CA (AFW Pump fails to start) AP/06		
6	NV066	C-BOP C-SRO TS-SRO	1A NV pump trips. Requires manual start of 1B NV pump. AP/12		
7	NC008F NC009F	M-ALL	PZR PORV fails open. Manual closure attempt is unsuccessful. Manual block valve will not close.		
8	NI001A	C-BOP C-SRO	1A NI (Safety Injection) Pump fails to start in AUTO.		
9	CA022A	C-RO	1CA-152 fails to close on Feedwater Isolation		
<p>* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor</p>					

Catawba Nuclear Station NRC Exam May 2014

Scenario 1 – Summary

Initial Condition

Unit 1 is just below POAH, BOL. Unit 2 is at 100%. 1B NI (Safety Injection) Pump and the 1D RC (Condenser Circulating Water) Pump are tagged out for preventative maintenance.

Turnover:

Unit 1 just below POAH, BOL. Unit 2 at 100%. 1B NI (Safety Injection) Pump and the 1D RC (Condenser Circulating Water) Pump tagged out. The crew is to shift operating KC (Component Cooling) pumps by starting the 1B2 KC pump and securing the 1B1 KC pump and then increase power 1%.

Event 1

Shift operating Component Cooling pumps per OP/1/A/6400/005 (Component Cooling System), Enclosure 4.17 (Shifting KC Pumps).

Event 2

Raise reactor power to 1%. Crew will use rods since unit is below POAH.

Event 3

1D S/G W/R level signal fails LOW; associated Feed Reg. Bypass Valve opens. RO takes manual control to stabilize and restore 1D S/G level. AP/06 (Loss of SG Feedwater) Case III entry. This failure is internal to the DCS and does not indicate on the W/R level board indication.

Event 4

AP/20 (Loss of Nuclear Service Water) entry. TS evaluation will indicate no LCO entry required.

Event 5

1B Main Feedwater Pump trips, along with the failure of the 1B AFW pump to auto start. AP/06 Case I entry. A TS evaluation required due to failure of the 1B AFW pump to start.

Event 6

1A NV Pump (Charging) trips. BOP manually starts the 1B NV pump to restore charging and letdown. AP/12 (Loss of Charging or Letdown) will be entered. TS evaluation required.

Event 7

1NC-36B (PZR PORV) fails open. RO attempts manual closure of the PORV. This will not be successful. AP/11 (Pressurizer Pressure Anomalies) entry. This is the major event because the PZR PORV cannot be closed, nor will the manual block isolation close. Recognizing a LOCA, the crew will determine that the reactor must be tripped.

Event 8

1A NI (Safety Injection) Pump fails to auto start on the SI signal. BOP manually starts to establish intermediate head injection flow.

Event 9

1CA-152 (S/G 1D CF BYP TO CA NOZZLE) fails to close on the feedwater isolation. RO manually closes the valve.

Critical Task 1 – Establish flow from at least one intermediate head ECCS pump prior to transition from E-0.

Critical Task 2 – Trip NC pumps on loss of subcooling with S/I flow verified per E-0 within 5 minutes of criteria met.

Catawba Nuclear Station NRC Exam May 2014

EXERCISE GUIDE WORKSHEET

1. INITIAL CONDITIONS:

1.1 Reset to IC 176

START TIME: _____

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		1	XMT-SG101 [XCF_5641 S/G D W/R LVL CH 1 TO DCS/ELSEWHERE (CFAA5641)]	40		3 MIN		3
		1	XMT-SG102 [XCF_5642 S/G D W/R LVL CH 2 TO DCS/ELSEWHERE (CFAA5642)]	40		3 MIN		3
		3	MAL-RN001A (RN PIT SCREEN A HI D/P)	97				4
		5	OVR-FWP015C (CFPT 1B TRIP_RESET TRIP PB)	ON				5
		n/a	MAL-CA004B FAILURE OF CA PUMP B TO START)	BOTH				5
		7	LOA-NV066 (RACKOUT NV PMP 1A)	RACK OUT				6
		9	VLV-NC009F (NC36B PZR PORV FAIL TO POSITION)	1				7
		n/a	VLV-NC008F (NC35B PORV ISOL VLV FAIL TO POSITION)	1				7
		n/a	MAL-NI001A (NI PUMP A FAILURE)	AUTO				8
		n/a	VLV-CA022A (CA152 S/G MAIN CF BYP TO CA NOZ FAIL AUTO ACTIONS)					9
		n/a	LOA-NI004 (RACKOUT NI PMP 1B)	RACK OUT				
		n/a	LOA-RC068 (RACKOUT RC PMP 1D)	RACK OUT				
			Place red collars on the 1B NI Pump and the 1D RC Pump.					

Catawba Nuclear Station NRC Exam May 2014

2. SIMULATOR BRIEFING

2.1 Control Room Assignments:

Position	Name
CRS	
RO	
BOP	

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

3. EXERCISE PRESENTATION

3.1 Familiarization Period

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

3.2 **Scenario EVENT 1**, Shift KC Pumps

✓	BOOTH INSTRUCTOR ACTION
	IF Operator dispatched to perform a pre-operational pump checkout, REPEAT the information.

✓	BOOTH INSTRUCTOR ACTION
	WHEN one minute has elapsed from the start of the 1B2 KC Pump, CALL the control room and inform them that the 1B2 KC Pump looks good for a continuous run.

3.3 **Scenario EVENT 2**, Increase reactor power to 1%

3.4 **Scenario EVENT 3**, 1D S/G W/R Level Failure

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 1 to give a failure of 1D S/G W/R level.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to investigate the problem with 1D S/G W/R level instrumentation REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to verify S/G level indication on the Aux Shutdown Panels, REPORT 1D S/G Level is reading 40%.

Catawba Nuclear Station NRC Exam May 2014

3.5 Scenario EVENT 4, RN Pit A Screen Hi D/P

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 3 to cause the RN Pit A Hi D/P.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to investigate the problem with RN Pit A, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF an Operator and/or Maintenance are dispatched to investigate RN Pit A and/or breaker, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator dispatched to check out the RN pump that was started, REPEAT the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Environmental Chemistry is contacted, REPEAT back the information.

3.6 Scenario EVENT 5, 1B CFPT trips, 1B CA Pump fails to start

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 5 to cause the 1B CFPT to trip.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to investigate the problem with 1B CFPT, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF an Operator and/or Maintenance are dispatched to investigate the 1B CA pump and/or breaker, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to investigate the problem with 1B CA Pump, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF an Operator is dispatched to perform the alarm response for the 1B CFPT, REPEAT back the information.

Catawba Nuclear Station NRC Exam May 2014

3.7 Scenario EVENT 6, 1A NV Charging Pump trips

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 7 to cause the 1A NV Charging Pump to trip.
✓	BOOTH INSTRUCTOR ACTION
	IF Operator and/or Maintenance are dispatched to investigate the 1A NV Pump and/or breaker, Repeat back the information.
✓	BOOTH INSTRUCTOR ACTION
	IF an Operator dispatched to breaker and/or pump, after 10 minutes REPORT : No relays are present on the breaker and no abnormal conditions are noted at the pump.
✓	BOOTH INSTRUCTOR ACTION
	IF NEO dispatched to check the 1B NV Pump, after 5 minutes REPORT : The 1B NV Pump looks good for continuous run.
✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to investigate the problem with 1A NV Pump, REPEAT back the information.

3.8 Scenario EVENTS 7,8,AND 9 1NC-36B fails open, 1NC-35B will not close, 1B NI Pump will not start on Safety Injection, 1CA-152 (S/G 1D CF BYB TO CA NOZZLE) fails to close on feedwater isolation.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 9 to cause the 1NC-36B to fail open.
✓	BOOTH INSTRUCTOR ACTION
	IF SWM is contacted to investigate 1NC-36B and/or 1NC-35B, REPEAT back the order.
✓	BOOTH INSTRUCTOR ACTION
	IF Operator and/or Maintenance are dispatched to investigate the 1A NI Pump and/or breaker, REPEAT the order.
✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to secure all ice condenser air handling units and place Hydrogen Analyzers in service, REPEAT the order.
✓	BOOTH INSTRUCTOR ACTION
	IF Secondary Chemistry is notified to sample all S/Gs for activity, REPEAT the order.

Catawba Nuclear Station NRC Exam May 2014

✓	BOOTH INSTRUCTOR ACTION
	IF RP is notified to frisk all cation columns for activity, REPEAT the order.

Op Test No.: 301 Scenario # 1 Event # 1 Page 9 of 42

Event Description: Shift operating KC (Component Cooling) Pumps.

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

EVENT 1

NOTE TO EVALUATOR: Crew begins by shifting the operating Component Cooling pumps per OP/1/A/6400/005 (Component Cooling System), Enclosure 4.17 (Shifting KC Pumps).

NOTE TO EVALUATOR: The crew may have a Focus Brief and then make a plant page announcing the start of the 1B2 KC Pump.

	BOP	Start 1B2 KC Pump
	BOP	Secure 1B1 KC Pump
NOTE TO EVALUATOR: The following actions are from OP/1/A/6400/005 (Component Cooling System), Enclosure 4.17 (Shifting KC Pumps).		
	BOP	3.2 IF shifting KC Train 1B pumps, perform the following: 3.2.1 Start the idle KC Train 1B pump: <ul style="list-style-type: none"> "KC PUMP B1" "KC PUMP B2"
NOTE: 1KC-C40B (Train B Miniflow Isol) may open during performance of the next step.		
	BOP	3.2.2 Adjust the following flow controllers on 1MC11 to zero gpm flow: <ul style="list-style-type: none"> 1KC-149 (KF Hx 1A Cool Wtr Otlt) 1KC-156 (KF Hx 1B Cool Wtr Otlt)
	BOP	3.2.3 Stop the desired KC Train 1B pump: <ul style="list-style-type: none"> "KC PUMP B1" OR <ul style="list-style-type: none"> "KC PUMP B2"
	BOP	3.2.4 IF KC Train 1B flow approaches 5700 gpm while performing the next step, ensure 1KC-C40B (Train B Miniflow Isol) is closed.

Op Test No.:	301	Scenario #	1	Event #	1	Page	10	of	42
Event Description: Shift operating KC (Component Cooling) Pumps.									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>3.2.5 Perform the following for the KF cooling loops that are in service:</p> <ul style="list-style-type: none"> Adjust 1KC-149 (KF Hx 1A Cool Wtr Otlr) flow controller on 1MC11 to 3000 gpm or as necessary to maintain Spent Fuel Pool temperature < 125°F. Adjust 1KC-156 (KF Hx 1B Cool Wtr Otlr) flow controller on 1MC11 to 3000 gpm or as necessary to maintain Spent Fuel Pool temperature < 125°F.
END OF EVENT 1		

Op Test No.:	301	Scenario #	1	Event #	2	Page	11	of	42
Event Description: Increase reactor power to 1%									
Time	Position	Applicant's Actions or Behavior							

EVENT 2		
	RO	Withdraw control rods to increase reactor power.
NOTE TO EVALUATOR: The following actions are from OP/1/A/6100/001 (Controlling Procedure for Unit Startup), Enclosure 4.1 (Unit Startup).		
<p>NOTE: 1. Control rod withdrawal shall NOT exceed the temporary rod withdrawal limits specified in Unit One R.O.D. Section 2.3.</p> <p>2. Refer to Unit One R.O.D. Section 2.4 for the rate at which reactor power can be changed.</p> <p>3. The throttling of a S/G bypass reg valve affects the other S/G bypass reg valves. Therefore, SM/CF ΔP needs to be monitored as the unit approaches POAH.</p> <p>4. If NC boron concentration is greater than 1000 ppmB, T-AVG control may be very sensitive above the POAH due to a positive MTC. Unit One R.O.D. Section 5.10 provides MTC at the current conditions.</p> <p>5. When approaching the beginning of the Power Range NI indication (.1% on the PR), a startup rate of < 0.2 dpm is required. The < .2 dpm rate shall NOT be exceeded, except when performing PT/0/A/4150/001 J (Zero Power Physics Testing), until the turbine is placed on line. (SOMP 01-02). (R.M.)</p> <p>6. Per SOER 07-01 (Reactivity Management) it is recommended that Plant Operators monitor multiple indications such as Thermal Power Best Estimate, Nuclear Instrumentation, Steam Pressure. ΔT's, CF Flowrate, and Turbine Load when making at power reactivity changes. (R.M.)</p>		
	RO	3.178 Increase reactor power to 1%. (R.M.)
END OF EVENT 2		

Op Test No.:	<u>301</u>	Scenario #	<u>1</u>	Event #	<u>3</u>	Page	<u>12</u>	of	<u>42</u>
Event Description: 1D S/G W/R Level Failure									
Time	Position	Applicant's Actions or Behavior							

EVENT 3		
<p>Indications: 1CF-57 (S/G 1D CF BYB CTRL) begins to open 1CAP5120 (CA FLOW TO S/G 1D) indication increases to top of scale. S/G 1D Level begins to increase. 1AD-4, E/5 'CFCV ISOL VLVs CLSD' 1AD-2, F-10 'DCS TROUBLE'</p>		
	RO	Recognizes 1CF-57 (S/G 1D CF BYB CTRL) opening.
	RO	Take manual control of 1CF-55 (S/G 1D CF CTRL) and 1CF-57 (S/G 1D CF BYB CTRL) and control 1D S/G level at normal level.
	SRO	Crew enters AP/1/A/5500/006, CASE III.
<p>NOTE TO EVALUATOR: The crew will make a plant page announcing the entry into AP/1/A/5500/006, Loss of S/G Feedwater.</p>		
<p>NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/006, Loss of S/G Feedwater, Case III (CF Control Not in Auto)</p>		
	CREW	<p>1. <u>IF AT ANY TIME</u> S/G levels approaching:</p> <ul style="list-style-type: none"> 83% N/R level (S/G HI-HI Level Turb Trip) <p><u>OR</u></p> <ul style="list-style-type: none"> 11% N/R level (S/G LO-LO Level Rx Trip). <p><u>THEN:</u></p> <p>a. Manually trip reactor. b. <u>GO TO</u> EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).</p>
	RO or BOP	<p>2. Verify the following:</p> <ul style="list-style-type: none"> At least one CF pump - IN SERVICE 1AD-3, C/6 "CF ISOL TRN A" - DARK 1AD-3, D/6 "CF ISOL TRN B" - DARK.
	RO or BOP	<p>3. <u>IF AT ANY TIME</u> any CF main feed reg valve in manual, <u>THEN</u> ensure associated feed reg bypass valve in manual.</p>
	RO or BOP	<p>4. Verify CF pump speed controller for in service CF pump(s):</p> <ul style="list-style-type: none"> IN AUTO RESPONDING ADEQUATELY
	RO or BOP	<p>5. Verify all S/G CF control valves:</p> <ul style="list-style-type: none"> IN AUTO RESPONDING ADEQUATELY

Op Test No.:	301	Scenario #	1	Event #	3	Page	13	of	42
Event Description:		1D S/G W/R Level Failure							
Time	Position	Applicant's Actions or Behavior							

	RO or BOP	<p>5. RNO Perform the following for the affected S/G(s):</p> <p>a. Ensure affected controller(s) – IN MANUAL.</p> <p>b. IF AT ANY TIME S/G level not on program, THEN adjust CF flow to obtain a slight trend in the appropriate direction.</p> <p>c. IF AT ANY TIME control valve adjustment is required, THEN attempt to maintain CF/SM D/P constant during CF control valve adjustments.</p>
	RO or BOP	<p>6. Verify the following:</p> <ul style="list-style-type: none"> S/G level(s) - STABLE S/G level(s) - APPROXIMATELY AT PROGRAM Malfunction - CORRECTED
	CREW	<p>6. RNO Perform the following:</p> <p>a. Continue to control CF/SM D/P and S/G CF Flow rates to stabilize level in affected S/G(s) approximately at program level.</p> <p>b. WHEN all the following conditions met:</p> <ul style="list-style-type: none"> S/G level(s) - STABLE S/G level(s) - APPROXIMATELY AT PROGRAM Malfunction - CORRECTED. <p>THEN GO TO Step 7.</p> <p>c. Do not continue in this procedure until all conditions met.</p>
<p>NOTE TO EVALUATOR: The SRO may address Tech Spec 3.3.3 [Post Accident Monitoring (PAM) Instrumentation], but it does not apply. Tech Spec 3.3.4 (Remote Shutdown System) does not apply because Aux Feedwater Flow instrumentation is available</p>		
<p>NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.</p>		
<p>END OF EVENT 3</p>		
<p>Booth Operator will insert Trigger 3 for EVENT 4 at the discretion of the lead examiner.</p>		

Op Test No.:	301	Scenario #	1	Event #	4	Page	14	of	42
Event Description: RN Pit Screen A Hi D/P									
Time	Position	Applicant's Actions or Behavior							

EVENT 4		
Indications:	1AD-12, B/2 'RN PIT A SCREEN HI D/P' OAC PT. C1A1007 'RN PIT A SCREEN DIFF LEVEL'	
	BOP	Recognize 'A' Pit level decreasing
	CREW	Enter AP/0/A/5500/020 (Loss of Nuclear Service Water)
	BOP	Swap suctions and discharges to the SNSWP
NOTE TO EVALUATOR: The crew may choose to use the annunciator response to address this event. REFER to Attachment 4.		
NOTE TO EVALUATOR: The crew will make a plant page announcing the entry into AP/1/A/5500/020, Loss of Nuclear Service Water.		
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/020, Loss of Nuclear Service Water, Case II (Loss of RN Pit Level)		
	BOP	1. Verify the following alarms - DARK: <ul style="list-style-type: none"> 1AD-12, B/2 "RN PIT A SCREEN HI D/P" 1AD-12, B/5 "RN PIT B SCREEN HI"
	BOP	1. RNO IF the operating RN pump is on the affected pit with high D/P, THEN align RN to SNSWP. REFER TO Enclosure 2 (RN Valve Alignment for RN Swap to SNSWP).
NOTE TO EVALUATOR: The SRO may choose to read Enclosure 2 or hand Enclosure 2 to the BOP to perform.		
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/020, Loss of Nuclear Service Water, Enclosure 2 (RN Valve Alignment for RN Swap to the SNSWP).		
	BOP	1. Ensure the following valves - OPEN: <ul style="list-style-type: none"> 1RN-3A (RN P/H Pit A Isol From SNSWP) 1RN-4B (RN P/H Pit B Isol From SNSWP) 1RN-58B (RN Hdr B Ret To SNSWP) 1RN-63A (RN Hdr A Ret To SNSWP) 1RN-846A (D/G 1A Hx Ret To SNSWP) 1RN-848B (D/G 1B Hx Ret To SNSWP) 2RN-846A (D/G 2A Hx Ret To SNSWP) 2RN-848B (D/G 2B Hx Ret To SNSWP).

Op Test No.:	301	Scenario #	1	Event #	4	Page	15	of	42
Event Description: RN Pit Screen A Hi D/P									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>2. Ensure the following valves - CLOSED:</p> <ul style="list-style-type: none"> • 1RN-1A (RN P/H Pit A Isol From Lake) • 1RN-2B (RN P/H Pit A Isol From Lake) • 1RN-5A (RN P/H Pit B Isol From Lake) • 1RN-6B (RN P/H Pit B Isol From Lake) • 1RN-53B (Station RN Disch Hdr X-Over) • 1RN-54A (Station RN Disch Hdr X-Over) • 1RN-57A (Station RN Disch To RL Sys) • 1RN-843B (Station RN Disch To RL Sys) • 1RN-49A (Non-Ess Supply Hdr Isol) • 1RN-50B (Non-Ess Supply Hdr Isol) • 2RN-49A (Non-Ess Supply Hdr Isol) • 2RN-50B (Non-Ess Supply Hdr Isol) • 1RN-847A (D/G 1A Hx Ret To Lake) • 1RN-849B (D/G 1B Hx Ret To Lake) • 2RN-847A (D/G 2A Hx Ret To Lake) • 2RN-849B (D/G 2B Hx Ret To Lake).
NOTE TO EVALUATOR: Step 3 will not apply.		
	BOP	<p>4. IF RN Pit A initiated the auto or manual swap to the SNSWP, THEN ensure the following valves are closed:</p> <ul style="list-style-type: none"> • 1RN-48B (RN Supply X-Over Isol) • 2RN-48B (RN Supply X-Over Isol).
NOTE TO EVALUATOR: Step 5 will not apply.		
NOTE TO EVALUATOR: End of Enclosure 2		
	BOP	2. Start idle RN pump(s) on the unaffected train.
	BOP	<p>3. Verify affected pit level adequate as follows:</p> <ul style="list-style-type: none"> • 1AD-12, B/1 "RN PUMP INTAKE PIT A LEVEL-LO" - DARK • 1AD-12, B/4 "RN PUMP INTAKE PIT B LEVEL-LO" - DARK • 2AD-12, B/1 "RN PUMP INTAKE PIT A LEVEL-LO" - DARK • 2AD-12, B/4 "RN PUMP INTAKE PIT B LEVEL-LO" - DARK • Affected pit level indication - STABLE OR INCREASING.
	BOP	4. Verify each operating RN pump discharge flow - LESS THAN 23,000 GPM.

Op Test No.: 301 Scenario # 1 Event # 4 Page 16 of 42

Event Description: RN Pit Screen A Hi D/P

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE After automatic swapover to SNSWP on emergency-low RN pit level, RN swap to SNSWP annunciators will only be lit for 2 minutes following swapover.

	BOP	<p>5. <u>IF</u> any of the following alarms are lit <u>OR</u> were previously lit:</p> <ul style="list-style-type: none"> • 1AD-12, E/2 "RN PIT A SWAP TO SNSWP" <p><u>OR</u></p> <ul style="list-style-type: none"> • 2AD-12, E/2 "RN PIT A SWAP TO SNSWP" <p><u>OR</u></p> <ul style="list-style-type: none"> • 1AD-12, E/5 "RN PIT B SWAP TO SNSWP" <p><u>OR</u></p> <ul style="list-style-type: none"> • 2AD-12, E/5 "RN PIT B SWAP TO SNSWP". <p><u>THEN</u> perform the following:</p> <ol style="list-style-type: none"> Ensure all RN pumps - ON. Ensure correct RN valve alignment. <u>REFER TO</u> Enclosure 2 (RN Valve Alignment for RN Swap to SNSWP). <u>IF AT ANY TIME</u> RN pump(s) running on RN pit with LO-LO level, <u>THEN</u> secure affected pump(s). <u>IF</u> WL discharge in progress, <u>THEN</u> coordinate with Radwaste Chemistry to secure all controlled WL discharges. <u>IF</u> any RN chemical addition is in progress, <u>THEN</u> have Chemistry secure it.
	BOP	<p>6. Verify SNSWP level adequate and stable as follows:</p> <ul style="list-style-type: none"> • 1AD-12, A/3 "SNSWP LEVEL LO" - DARK • SNSWP level indication - STABLE.
<p>NOTE TO EVALUATOR: The KC heat exchanger outlet mode switches will be in the "KC Temp" position if the corresponding train of KC is in service. Otherwise, it will be in the "Miniflow" position.</p>		
	BOP	<p>7. Ensure proper alignment of RN to KC Hxs as follows:</p> <ol style="list-style-type: none"> Verify RN - ALIGNED TO KC HX(S) IN SERVICE. Ensure KC Hx Otlt Mode switches - PROPERLY ALIGNED.

Op Test No.:	301	Scenario #	1	Event #	4	Page	17	of	42
Event Description: RN Pit Screen A Hi D/P									
Time	Position	Applicant's Actions or Behavior							

	BOP	8. Verify each operating RN pump discharge flow - GREATER THAN 8,600 GPM.
	CREW	9. Determine and correct cause of loss of RN pit level.
	BOP	10. Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual: <ul style="list-style-type: none"> SLC 16.7-6 (RN Discharge Instrumentation) 3.3.2 (Engineered Safety Features Actuation System (ESFAS) Instrumentation). 3.6.5 (Containment Air Temperature) 3.7.8 (Nuclear Service Water System (NSWS)) 3.7.9 (Standby Nuclear Service Water Pond (SNSWP)).
NOTE TO EVALUATOR: No Tech Spec Actions need to be entered.		
Booth Operator will insert Trigger 5 for EVENT 5 at the discretion of the lead examiner.		
	SRO	11. Determine required notifications: <ul style="list-style-type: none"> <u>REFER TO</u> RP/0/A/5000/001 (Classification Of Emergency) <u>REFER TO</u> RP/0/B/5000/013 (NRC Notification Requirements).
	CREW	12. <u>WHEN</u> corrective action for loss of pit level taken, <u>THEN</u> restore RN to normal alignment. <u>REFER TO</u> Enclosure 3 (Returning RN alignment To Normal After Transfer To SNSWP).
	BOP	13. Ensure RN pumps - IN OPERATION AS NEEDED.
	BOP	14. Verify each operating RN pump discharge flow - GREATER THAN 8,600 GPM.
	BOP	15. Notify Environmental Chemistry of any RN pump shifts that have occurred.
	SRO	16. Determine long term plant status. RETURN TO procedure in effect.
NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.		
END OF EVENT 4		

Op Test No.:	<u>301</u>	Scenario #	<u>1</u>	Event #	<u>5</u>	Page	<u>18</u>	of	<u>42</u>
Event Description: 1B CF (Main Feedwater) Pump Trips, 1B CA (Auxiliary Feedwater) Pump fails to start									
Time	Position	Applicant's Actions or Behavior							

INDICATIONS: 1AD-1, A/6 'TURB TRIP ON LOSS OF BOTH CFPTS'		
1AD-1, B/1 'AMSAC TURB TRIP'		
1AD-1, C/6 'EXT TRAIN A-B/ NON TRAIN TURB TRIP'		
1AD-1, C/7 'LO ETS PRESS'		
1AD-1, E/7 'TURB ETS HDR PRESS LO'		
1AD-5, C/1 'CFPT B TRIPPED'		
1AD/5, C/4 'CFPT B COMMON TROUBLE'		
	RO	Recognize 1B CFPT Trip and subsequent loss of feedwater.
	RO	Recognize failure of 1B CA Pump to start and attempts to start it.
	CREW	ENTERS AP/1/A/5500/006, CASE I
NOTE TO EVALUATOR: The crew will make a plant page announcing the entry into AP/1/A/5500/006, Loss of S/G Feedwater.		
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/006, Loss of S/G Feedwater, Case I (Loss of CF Supply To S/Gs)		
	RO	1. Verify reactor power - LESS THAN 5%.
	RO	2. Verify all S/G hi-hi level alert alarms (1AD-4) - DARK.
	RO	3. Verify 1AD-2, F/9 "DCS ALTERNATE ACTION" - DARK.
	RO	4. Verify total CA flow - GREATER THAN Perform the following: 450 GPM.
	RO	5. Control S/G levels as follows: a. Verify all S/G N/R levels – GREATER THAN 11%. b. WHEN at least one S/G N/R level is greater than 11%, THEN throttle feedflow to maintain all S/G N/R levels between 11% - 50%.
	SRO	6. REFER TO Case II (Loss of Normal CA Supply).
NOTE TO EVALUATOR: The crew may initiate a makeup to the UST per step 2 of Case II. No other actions from Case II are necessary.		

Op Test No.:	301	Scenario #	1	Event #	5	Page	19	of	42
Event Description: 1B CF (Main Feedwater) Pump Trips, 1B CA (Auxiliary Feedwater) Pump fails to start									
Time	Position	Applicant's Actions or Behavior							

	SRO	7. Ensure compliance with appropriate Tech Specs and SLCs: <ul style="list-style-type: none"> 3.3.2 (ESFAS Instrumentation) 3.7.5 (Auxiliary Feedwater System) SLC 16-7.1 (AMSAC). SLC 16-7.14 (Trip of All Main Feedwater Pumps Turbine Trip Instrumentation).
NOTE TO EVALUATOR: T.S 3.7.5 Auxiliary Feedwater (AFW) System Condition B (Restore AFW train to OPERABLE status within 72 hours) should be entered.		
NOTE TO EVALUATOR: The SRO will conduct a "Crew Update" to inform the crew of any Tech Spec conditions that have been entered.		
Booth Operator will insert Trigger 7 for EVENT 6 at the discretion of the lead examiner.		
	SRO	8. Determine required notifications: <ul style="list-style-type: none"> REFER TO RP/0/A/5000/001 (Classification Of Emergency) REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
	CREW	9. Determine and correct cause of loss of CF supply.
	RO	10. Verify at least one CF Pump - ON.
NOTE TO EVALUATOR: It is not intended for the next step to be performed in this scenario.		
	BOP	10. RNO Perform a hot restart of one CF Pump. REFER TO OP/1/A/6250/001 (Condensate and Feedwater System).
NOTE TO EVALUATOR: Due to the likelihood that the scenario will progress to the next event prior to completing all of the steps of the AP, the SRO will not do a "Crew Brief" or "Focus Brief" to summarize the event.		
END OF EVENT 5		

Op Test No.:	301	Scenario #	1	Event #	6	Page	20	of	42
Event Description: 1A NV (Chemical and Volume Control) Charging Pump Trips, Loss of Charging and Letdown									
Time	Position	Applicant's Actions or Behavior							

EVENT 6		
Indications:	1AD-11, A/1 '4KV ESS PWR TRAIN A TROUBLE' 1AD-7, C/4 'NCP SEAL WATER LO FLOW' 1AD-7, E/1 'CHARGING LINE HI/LO FLOW'	
	BOP	Recognizes 1A NV pump tripped
	CREW	Enters AP/1/A/5500/012, Loss of Charging or Letdown
NOTE TO EVALUATOR: The following steps are taken from AP/1/A/5500/012, Loss of Charging or Letdown, Case I (Loss of Charging).		
	RO	1. Stop any power changes.
	BOP	2. Ensure the following letdown isolation valves - CLOSED: <ul style="list-style-type: none"> 1NV-10A (Letdn Orif 1B Otlr Cont Isol) 1NV-11A (Letdn Orif 1C Otlr Cont Isol) 1NV-13A (Letdn Orif 1A Otlr Cont Isol).
	BOP	3. Ensure any malfunctioning NV pump - SECURED.
	BOP or RO	4. Monitor conditions for continued NC pump operation as follows: NC pump #1 seal outlet temperature - LESS THAN 235°F NC pump lower bearing temperature - LESS THAN 225°F.
NOTE TO EVALUATOR: Step 5 will not apply.		
NOTE: 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, <u>without</u> indication of cavitation.		
	BOP	6. Verify NV pump status as follows: <ul style="list-style-type: none"> At least one NV pump - ON.
	BOP	6. RNO Perform the following: <ol style="list-style-type: none"> Ensure any malfunctioning NV pump - SECURED. Ensure the following valves - OPEN: <ul style="list-style-type: none"> 1NV-203A (NV Pumps A&B Recirc Isol) 1NV-202B (NV Pmps A&B Recirc Isol).

Op Test No.:	<u>301</u>	Scenario #	<u>1</u>	Event #	<u>6</u>	Page	<u>21</u>	of	<u>42</u>
Event Description: 1A NV (Chemical and Volume Control) Charging Pump Trips, Loss of Charging and Letdown									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>c. Ensure only one suction source as follows:</p> <ul style="list-style-type: none"> • VCT • 1NV-188A (VCT Otlt Isol) - OPEN • 1NV-189B (VCT Otlt Isol) - OPEN • VCT level - GREATER THAN 23% • 1NV-252A (NV Pumps Suct From FWST) - CLOSED • 1NV-253B (NV Pumps Suct From FWST) - CLOSED.
NOTE TO EVALUATOR: The crew will determine that step 6 RNO d. does not apply		
	BOP	<p>e. Start the available NV pump as follows:</p> <ol style="list-style-type: none"> 1) OPEN 1NV-309 (Seal Water Injection Flow) to full open. 2) CLOSE 1NV-294 (NV Pmps A&B Disch Flow Ctrl). 3) Start NV pump aux oil pump. 4) Start available NV pump. 5) Stop NV pump aux oil pump.
NOTE TO EVALUATOR: The crew will determine that step 6 RNO e.6) does not apply		
NOTE TO EVALUATOR: The crew will determine that step 6 RNO f. does not apply		
	BOP	<p>7. Verify charging header aligned to NC loop as follows:</p> <ol style="list-style-type: none"> 1NV-312A (Chrg Line Cont Isol) - OPEN. 1NV-314B (Chrg Line Cont Isol) - OPEN. Verify one of the following valves - OPEN: <ul style="list-style-type: none"> • 1NV-32B (NV Supply To Loop A Isol) OR <ul style="list-style-type: none"> • 1NV-39A (NV Supply To Loop D Isol). Verify the following NC pump conditions: <ul style="list-style-type: none"> • #1 seal outlet temperatures less than or equal to 180°F • Lower bearing temperatures less than or equal to 180°F. Verify 1NV-294 (NV Pmps A&B Disch Flow Ctrl) - OPEN.
	BOP	<p>7.e. RNO e. Perform the following:</p> <ol style="list-style-type: none"> 1) OPEN 1NV-309 (Seal Water Injection Flow). 2) THROTTLE 1NV-294 (NV Pmps A&B Disch Flow Ctrl) to establish greater than 32 GPM "N/R CHRG LN FLOW"

Op Test No.:	<u>301</u>	Scenario #	<u>1</u>	Event #	<u>6</u>	Page	<u>22</u>	of	<u>42</u>
Event Description: 1A NV (Chemical and Volume Control) Charging Pump Trips, Loss of Charging and Letdown									
Time	Position	Applicant's Actions or Behavior							

	BOP	8. Verify the following: <ul style="list-style-type: none"> "TOTAL SEAL WTR FLOW" - GREATER THAN 32 GPM 1NV-309 (Seal Water Injection Flow) – IN AUTO.
	BOP	8. RNO Perform the following: <ol style="list-style-type: none"> IF any NC pump #1 seal outlet temperature OR lower bearing temperature greater than 180°F, THEN maintain cooldown rate less than or equal to 1°F per minute. Slowly THROTTLE 1NV-309 (Seal Injection Flow) to establish 32 GPM "TOTAL SEAL WTR FLOW" Place 1NV-309 in auto.
	BOP	9. Verify Pzr level - GREATER THAN 17%.
	BOP	10. Control charging to stabilize Pzr level greater than 17%.
	BOP	11. Ensure "PZR HTR GROUP 1C" - ON.
	BOP	12. Control VCT level as follows: <ol style="list-style-type: none"> Verify NC system makeup - SET FOR DESIRED BORON CONCENTRATION. Verify "NC MAKEUP MODE SELECT" - IN AUTO.
	BOP	13. Verify normal letdown - IN SERVICE.
NOTE TO EVALUATOR: Step a. will not be performed and step b. will be applicable. The SRO may wait to evaluate Tech Specs until after the restoration of letdown.		
NOTE TO EVALUATOR: To shorten the scenario, the Booth Operator can insert Trigger 9 to start the Major at the discretion of the lead examiner and the Tech Specs can be covered by follow up questioning.		
	SRO	13. RNO Perform the following: <ol style="list-style-type: none"> Restore normal letdown. REFER TO Case II (Loss of Letdown).

Op Test No.:	<u>301</u>	Scenario #	<u>1</u>	Event #	<u>6</u>	Page	<u>23</u>	of	<u>42</u>
Event Description: 1A NV (Chemical and Volume Control) Charging Pump Trips, Loss of Charging and Letdown									
Time	Position	Applicant's Actions or Behavior							

	SRO	14. Ensure compliance with appropriate Tech Specs: <ul style="list-style-type: none"> 3.4.13 (RCS Operational Leakage) 3.4.14 (RCS Pressure Isolation Valve (PIV) Leakage) 3.5.2 (ECCS - Operating) 3.5.3 (ECCS - Shutdown) 3.5.5 (Seal Injection Flow) 3.6.3 (Containment Isolation Valves) SLC 16.9-9 (Boration Systems Charging Pump - Shutdown) SLC 16.9-10 (Boration Systems Charging Pump - Operating).
NOTE TO EVALUATOR: SRO will determine that Tech Spec 3.5.2 (ECCS-Operating) Condition A (Restore train to OPERABLE status 72 hours) and SLC 16.9-10 (Borating Systems Charging Pump – Operating) Condition A (Restore non-functional pump to FUNCTIONAL status 72 hours) should be entered.		
	SRO	15. Determine required notifications: <ul style="list-style-type: none"> <u>REFER TO</u> RP/0/A/5000/001 (Classification Of Emergency) <u>REFER TO</u> RP/0/B/5000/013 (NRC Notification Requirements).
		16. Verify at least one NV pump - ON.
NOTE TO EVALUATOR: Step 17 will not apply		
	SRO	18. Determine long term plant status. <u>RETURN TO</u> procedure in effect.

Op Test No.:	<u>301</u>	Scenario #	<u>1</u>	Event #	<u>6</u>	Page	<u>24</u>	of	<u>42</u>
Event Description: 1A NV (Chemical and Volume Control) Charging Pump Trips, Loss of Charging and Letdown									
Time	Position	Applicant's Actions or Behavior							

NOTE TO EVALUATOR: The following steps are taken from AP/1/A/5500/012, Loss of Charging or Letdown, Case II (Loss of Letdown).		
	RO	1. Stop any power changes.
	BOP	2. Ensure the following letdown isolation valves - CLOSED: <ul style="list-style-type: none"> • 1NV-10A (Letdn Orif 1B Otlt Cont Isol) • 1NV-11A (Letdn Orif 1C Otlt Cont Isol) • 1NV-13A (Letdn Orif 1A Otlt Cont Isol).
	BOP	3. Verify Pzr level - GREATER THAN 17%.
	BOP	4. Control charging to stabilize Pzr level at program level while maintaining seal injection flow.
	BOP	5. Ensure "PZR HTR GROUP 1C" - ON.
	BOP	6. Control VCT level as follows: <ul style="list-style-type: none"> a. Verify NC system makeup - SET FOR DESIRED BORON CONCENTRATION. b. Verify "NC MAKEUP MODE SELECT" - IN AUTO.
	BOP	7. Determine and correct cause of loss of letdown.
	BOP	8. IF AT ANY TIME excess letdown required, THEN establish excess letdown. REFER TO OP/1/A/6200/001 (Chemical and Volume Control System).
	BOP	9. Verify proper VC/YC system operation. REFER TO Enclosure 3 (Control Room Ventilation System Verification).

Op Test No.:	301	Scenario #	1	Event #	6	Page	25	of	42
Event Description: 1A NV (Chemical and Volume Control) Charging Pump Trips, Loss of Charging and Letdown									
Time	Position	Applicant's Actions or Behavior							

NOTE TO EVALUATOR: The SRO may wait to evaluate Tech Specs until after the restoration of letdown.		
	SRO	10. Ensure compliance with appropriate Tech Specs: <ul style="list-style-type: none"> 3.3.1 (Reactor Trip System (RTS) Instrumentation) 3.3.3 (Post Accident Monitoring (PAM) Instrumentation) 3.3.4 (Remote Shutdown System) 3.4.1 (RCS Pressure, Temperature, and Flow Departure From Nucleate Boiling (DNB) Limits) 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) 3.4.13 RCS (Operational Leakage). 3.6.3 (Containment Isolation Valves).
NOTE TO EVALUATOR: The SRO will determine that no Tech Specs apply for the loss of letdown.		
	BOP	11. Verify at least one of the following valves - CLOSED: <ul style="list-style-type: none"> 1NV-1A (NC Letdn To Regen Hx Isol) OR <ul style="list-style-type: none"> 1NV-2A (NC Letdn To Regen Hx Isol).
	SRO	11. RNO <u>GO TO</u> Step 16.
	BOP	16. Establish letdown as follows: <ol style="list-style-type: none"> Verify ability to establish normal letdown - RESTORED. Ensure 1NV-849 (Letdn Flow Var Orif Ctrl) valve demand position - 0%. Verify the following valves - OPEN: <ul style="list-style-type: none"> 1NV-1A (NC Letdn To Regen Hx Isol) 1NV-2A (NC Letdn To Regen Hx Isol).
NOTE If LTOP is in service, then 1NC-34A will be made inoperable when the only letdown path aligned is NV system normal letdown. 1NC-34A LTOP operability is based on the letdown alignment. (PIP C-10-1320)		

Op Test No.:	<u>301</u>	Scenario #	<u>1</u>	Event #	<u>6</u>	Page	<u>26</u>	of	<u>42</u>
Event Description: 1A NV (Chemical and Volume Control) Charging Pump Trips, Loss of Charging and Letdown									
Time	Position	Applicant's Actions or Behavior							

	BOP	d. OPEN the following valves: <ul style="list-style-type: none"> • 1NV-15B (Letdn Cont Isol) • 1NV-10A (Letdn Orif 1B Otlf Cont Isol). e. Adjust 1NV-294 (NV Pmps A&B Disch Flow Ctrl) as necessary to maintain letdown subcooled in following steps. f. THROTTLE 1NV-148 (Letdn Press Control) to 45% demand. g. THROTTLE open 1NV-849 (Letdn Flow Var Orif Ctrl) in 1% to 5% increments until one of the following conditions met: <ul style="list-style-type: none"> • Letdown flow and letdown pressure increases OR <ul style="list-style-type: none"> • Valve demand position is 60% open.
	SRO	h. Do not continue until one of the above conditions met.
	BOP	i. Verify letdown flow and letdown pressure - HAS INCREASED.
	BOP	j. Adjust 1NV-148 (Letdn Press Control) to maintain letdown pressure between 150 - 200 PSIG.
NOTE TO EVALUATOR: Time compression may be used in the following step at the discretion of the lead examiner.		
	BOP	k. WHEN 5 minutes have elapsed, THEN perform the following: <ol style="list-style-type: none"> 1) Adjust 1NV-849 (Letdn Flow Var Orif Ctrl) in 1% to 5% increments to desired letdown flow. 2) WHEN letdown at desired flow, THEN perform the following: <ol style="list-style-type: none"> a) Adjust 1NV-148 (Letdn Press Control) to maintain letdown pressure at 350 PSIG. b) Ensure 1NV-148 (Letdn Press Control) - IN AUTO.
Booth Operator will insert Trigger 9 for EVENT 7 at discretion of lead examiner.		
	BOP	3) IF AT ANY TIME additional letdown flow desired, THEN establish letdown with the 45 or 75 GPM orifice. REFER TO OP/1/A/6200/001 (Chemical and Volume Control System).

Op Test No.:	301	Scenario #	1	Event #	6	Page	27	of	42
Event Description: 1A NV (Chemical and Volume Control) Charging Pump Trips, Loss of Charging and Letdown									
Time	Position	Applicant's Actions or Behavior							

	BOP	I. WHEN Pzr level restored to programmed level, THEN perform the following: 1) Ensure 1NV-294 (NV Pmps A&B Disch Flow Ctrl) - IN AUTO. 2) Ensure "PZR Level Master" – IN AUTO.
	SRO	17. Determine required notifications: • REFER TO RP/0/A/5000/001 (Classification Of Emergency) • REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
	BOP	18. Verify excess letdown - ISOLATED.
	SRO	19. Determine long term plant status. RETURN TO procedure in effect.
END OF EVENT 6		

Op Test No.:	<u>301</u>	Scenario #	<u>1</u>	Event #	<u>7</u>	Page	<u>28</u>	of	<u>42</u>
Event Description: 1NC-36B (PZR PORV) fails open, 1NC-35B (PZR PORV ISOL) will not close									
Time	Position	Applicant's Actions or Behavior							

EVENT 7		
Indications: 1AD-2, D/10 'DCS TROUBLE' 1AD-6, E/10 'PZR PORV DISCH HI TEMP' 1AD-6, F/8 'PZR LO PRESS CONTROL'		
	BOP	Recognize 1NC-36B open
	BOP	Attempt to close 1NC-36B
	BOP	Attempt to close 1NC-35B
	RO	Manually Trip the Reactor
	BOP	Manually initiate Safety Injection.
NOTE TO EVALUATOR: Due to the immediate action nature of the event, it is not anticipated that the crew will have time to make a plant page announcing the entry into AP/1/A/5500/0011, Pressurizer Pressure Anomalies.		
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/011, Pressurizer Pressure Anomalies, Case I (Pressurizer Pressure Decreasing).		
	BOP	1. Verify all Pzr PORVs - CLOSED.
	BOP	1. RNO Perform the following: a. Close Pzr PORV(s). b. IF any Pzr PORV cannot be closed, THEN: 1) Close the affected PORV(s) isolation valve. 2) IF the Pzr PORV isolation valve cannot be closed, THEN perform the following: a) IF in Mode 3 with CLAs isolated OR in Mode 4, THEN GO TO AP/1/A/5500/027 (Shutdown LOCA).
	RO	b) Trip reactor.
	BOP	c) WHEN reactor tripped OR S/I setpoint reached, THEN ensure S/I initiated.
EVENTS 8 AND 9		
	CREW	d) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
TRANSITION TO E-0 (Reactor Trip or Safety Injection)		

Op Test No.:	<u>301</u>	Scenario #	<u>1</u>	Event #	<u>7,8 and 9</u>	Page	<u>29</u>	of	<u>42</u>
Event Description: 1NC-36B (PZR PORV) fails open, 1NC-35B (PZR PORV ISOL) will not close, 1B NI Pump fails to auto start on SI signal, 1CA-152 (S/G 1D CF BYP TO CA NOZZLE) fails to close on feedwater isolation.									
Time	Position	Applicant's Actions or Behavior							

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

	RO and BOP	1. Monitor Enclosure 1 (Foldout Page).
	RO	2. Verify Reactor Trip: Perform the following: <ul style="list-style-type: none"> All rod bottom lights - LIT All reactor trip and bypass breakers - OPEN I/R power - DECREASING.
	RO	3. Verify Turbine Trip: Perform the following: <ul style="list-style-type: none"> All turbine stop valves - CLOSED
	BOP	4. Verify 1ETA and 1ETB - ENERGIZED.
	RO	5. Verify S/I is actuated: <ul style="list-style-type: none"> a. "SAFETY INJECTION ACTUATED" status light (1SI-13) – LIT b. Both E/S load sequencer actuated status lights (1SI-14) - LIT.
NOTE TO EVALUATOR: Upon "Loss of Subcooling" with S/I flow verified, the RO or BOP will trip the NC (Reactor Coolant) pumps within 5 minutes per Enclosure 1 guidance. This satisfies Critical Task # C-2		
	RO	6. Announce "Unit 1 Safety Injection".
	SRO	7. Determine required notifications: <ul style="list-style-type: none"> REFER TO RP/0/A/5000/001(Classification Of Emergency) REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
	RO or BOP	8. Verify all Feedwater Isolation status lights (1SI-5) - LIT
	RO	8. RNO Perform the following: <ul style="list-style-type: none"> a. Initiate Feedwater Isolation. b. IF proper status light indication not obtained, THEN CLOSE valves
END OF EVENT 9		

Op Test No.:	301	Scenario #	1	Event #	7 and 8	Page	30	of	42
Event Description: 1NC-36B (PZR PORV) fails open, 1NC-35B (PZR PORV ISOL) will not close, 1B NI Pump fails to auto start on SI signal									
Time	Position	Applicant's Actions or Behavior							

	BOP	9. Verify Phase A Containment Isolation status as follows: a. Phase A "RESET" lights - DARK.
	BOP	b. Monitor Light Panel Group 5 St lights on energized train(s) - LIT.
	BOP	10. Verify proper Phase B actuation as follows: a. Verify Containment pressure - HAS REMAINED LESS THAN 3 PSIG
	RO or BOP	b. IF AT ANY TIME containment pressure exceeds 3 PSIG while in this procedure, THEN perform Step 10.a.
	RO	11. Verify proper CA pump status as follows: a. Motor driven CA pumps - ON. b. 3 S/G N/R levels - GREATER THAN 11%.
	RO	11.a. RNO a. Perform the following for affected train(s): 1) Reset ECCS. 2) Reset D/G load sequencer(s), 3) Start affected pump(s).
	RO and BOP	4) IF AT ANY TIME B/O occurs, THEN restart S/I equipment previously on.
	BOP	12. Verify all of the following S/I pumps - ON: Perform the following for affected train(s): <ul style="list-style-type: none"> NV pumps ND pumps NI pumps.
CRITICAL TASK	BOP	12. RNO Perform the following for affected train(s): a. Reset ECCS. b. Reset D/G load sequencer(s) c. Start affected pump(s).
	RO and BOP	d. IF AT ANY TIME B/O occurs, THEN restart S/I equipment previously on.
END OF EVENT 8		

Op Test No.:	<u>301</u>	Scenario #	<u>1</u>	Event #	<u>7</u>	Page	<u>31</u>	of	<u>42</u>
Event Description: 1NC-36B (PZR PORV) fails open, 1NC-35B (PZR PORV ISOL) will not close									
Time	Position	Applicant's Actions or Behavior							

	BOP	13. Verify all KC pumps - ON.
	BOP	14. Verify all Unit 1 and Unit 2 RN pumps
	BOP	15. Verify proper ventilation systems operation as follows: <ul style="list-style-type: none"> • REFER TO Enclosure 2 (Ventilation System Verification). • Notify Unit 2 operator to perform Enclosure 3 (Opposite Unit Ventilation Verification).
NOTE TO EVALUATOR: SRO will state that they will hand Enclosure 3 to a Unit 2 operator and set Enclosure 3 off to the side.		
	RO	16. Verify all S/G pressures - GREATER THAN 775 PSIG.
	RO	17. Verify proper S/I flow as follows: <ul style="list-style-type: none"> 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.
	RO	17.d. RNO d. Perform the following: <ul style="list-style-type: none"> 1) Ensure ND pump miniflow valve on operating ND pump(s) - OPEN.
NOTE TO EVALUATOR: Step 17 RNO d. 2) will not apply		
	SRO	3) GO TO Step 18.
	RO or BOP	18. WHEN time and manpower permit (within two hours of event), THEN monitor Spent Fuel Pool level and temperature. REFER TO EP/1/A/5000/G-1(Generic Enclosures), Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring).
	RO	19. Control S/G levels as follows: <ul style="list-style-type: none"> a. Verify total CA flow - GREATER THAN 450 GPM.
NOTE TO EVALUATOR: Total CA flow may not be > 450 gpm due to being under operator control, in which case, the RNO for 19 a. will not apply.		
	RO	b. WHEN each S/G N/R level greater than 11% (29% ACC), THEN control feed flow to maintain that S/G N/R level between 11% (29% ACC) and 50%.
	RO	20. Verify all CA isolation valves - OPEN.

Op Test No.:	301	Scenario #	1	Event #	7	Page	32	of	42
Event Description: 1NC-36B (PZR PORV) fails open, 1NC-35B (PZR PORV ISOL) will not close									
Time	Position	Applicant's Actions or Behavior							

	BOP	21. Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.
	BOP	21. RNO Align equipment.
NOTE Enclosure 4 (NC Temperature Control) shall remain in effect until subsequent procedures provide alternative NC temperature control guidance.		
	RO	22. Control NC temperature. REFER TO Enclosure 4 (NC Temperature Control).
	BOP	23. Verify Pzr PORV and Pzr Spray Valve status as follows: a. All Pzr PORVs - CLOSED.
	BOP	23. RNO a. IF Pzr pressure is less than 2315 PSIG, THEN perform the following: 1) CLOSE Pzr PORV(s). 2) IF any Pzr PORV cannot be closed, THEN CLOSE its isolation valve.
NOTE TO EVALUATOR: RNO step 23.a.3) will not apply		

Op Test No.: 301 Scenario # 1 Event # 7 Page 33 of 42

Event Description: 1NC-36B (PZR PORV) fails open, 1NC-35B (PZR PORV ISOL) will not close

Time	Position	Applicant's Actions or Behavior
	RO or BOP	<p>4) IF any PZR PORV cannot be closed OR isolated, THEN perform the following:</p> <p>a) Energize H2 igniters.</p> <p>b) Dispatch operator to perform the following:</p> <p>(1) Secure all ice condenser air handling units. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11 (Securing All Ice Condenser Units).</p> <p>(2) Place containment H2 analyzers in service. REFER TO OP/1/A/6450/010 (Containment Hydrogen Control Systems).</p> <p>c) IF both the following conditions exist,</p> <ul style="list-style-type: none"> Containment pressure – HAS REMAINED LESS THAN 3 PSIG Containment pressure - BETWEEN 1 PSIG AND 3 PSIG <p>THEN start one VX fan and secure normal containment ventilation. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 18 (VX and Containment Ventilation Control).</p>
	CREW	<p>d) Concurrently:</p> <ul style="list-style-type: none"> Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees GO TO EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant.
TRANSITION TO EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant)		
NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.		

Op Test No.:	<u>301</u>	Scenario #	<u>1</u>	Event #	<u>7</u>	Page	<u>34</u>	of	<u>42</u>
Event Description: 1NC-36B (PZR PORV) fails open, 1NC-35B (PZR PORV ISOL) will not close									
Time	Position	Applicant's Actions or Behavior							

NOTE TO EVALUATOR: The following steps are from EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant)		
	RO and BOP	1. Monitor Enclosure 1 (Foldout Page).
	RO or BOP	2. Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.
NOTE TO EVALUATOR: Depending on the pace of the crew, subcooling may be greater than 0°F in which case the crew would continue to step 3.		
	RO or BOP	2. RNO IF any NV OR NI pump is on, THEN perform the following: a. Ensure all NC pumps - OFF. b. Maintain seal injection flow.
	BOP	3. Verify main steamlines intact: • All S/G pressures - STABLE OR INCREASING • All S/Gs - PRESSURIZED
	RO	4. Control intact S/G N/R 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 11% (29% ACC) and 50%.
	BOP	5. Reset the following: a. ECCS. b. D/G load sequencers. c. Phase A d. Phase B.
	RO or BOP	e. IF AT ANY TIME B/O occurs, THEN restart S/I equipment previously on.
	BOP	6. Establish VI to Containment as follows: • Ensure 1VI-77B (VI Cont Isol) - OPEN. • Verify VI pressure - GREATER THAN 85 PSIG.
	RO	7. Verify secondary radiation - NORMAL: a. Ensure the following signals - RESET: 1) CA System valve control
	BOP	2) KC NC NI NM St signals.

Op Test No.: 301 Scenario # 1 Event # 7 Page 35 of 42

Event Description: 1NC-36B (PZR PORV) fails open, 1NC-35B (PZR PORV ISOL) will not close

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE TO EVALUATOR: The BOP opens the following valves when aligning the S/Gs for chemistry sample in step b. below:

- 1NM-191B (S/G 1A SMPL HDR CONT ISOL)
- 1NM-201A (S/G 1B SMPL HDR CONT ISOL)
- 1NM-211B (S/G 1C SMPL HDR CONT ISOL)
- 1NM-221A (S/G 1D SMPL HDR CONT ISOL)
- 1NM-190A (S/G 1A BLDWN SMPL CONT ISOL)
- 1NM-200B (S/G 1B BLDWN SMPL CONT ISOL)
- 1NM-210A (S/G 1C BLDWN SMPL CONT ISOL)
- 1NM-220B (S/G 1D BLDWN SMPL CONT ISOL)

	BOP	b. Align all S/Gs for Chemistry sampling.
	RO or BOP	c. Perform at least one of the following: <ul style="list-style-type: none"> • Notify Chemistry to sample all S/Gs for activity. OR <ul style="list-style-type: none"> • Notify RP to frisk all cation columns for activity.
	BOP	d. Verify the following EMF trip 1 lights - DARK: <ul style="list-style-type: none"> • 1EMF-33 (Condenser Air Ejector Exhaust) • 1EMF-26 (Steamline 1A) • 1EMF-27 (Steamline 1B) • 1EMF-28 (Steamline 1C) • 1EMF-29 (Steamline 1D).
	RO	e. Verify all S/Gs - INTACT <ul style="list-style-type: none"> • All S/G pressures - STABLE OR INCREASING • All S/Gs - PRESSURIZED
	RO or BOP	f. WHEN activity results are reported, THEN verify all S/Gs indicate no activity.
	BOP	8. Verify Pzr PORVs and Isolation Valves: <ul style="list-style-type: none"> a. Power to all Pzr PORV isolation valves - AVAILABLE. b. All Pzr PORVs – CLOSED.

Op Test No.:	301	Scenario #	1	Event #	7	Page	36	of	42
Event Description: 1NC-36B (PZR PORV) fails open, 1NC-35B (PZR PORV ISOL) will not close									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>8.b. RNO b. IF Pzr pressure is less than 2315 PSIG, THEN perform the following:</p> <p>1) CLOSE Pzr PORV(s).</p> <p>2) IF any Pzr PORV cannot be closed, THEN CLOSE its isolation valve.</p>
NOTE TO EVALUATOR: RNO step 8.B.3) will not apply		
	BOP	c. Any Pzr PORV isolation valve - OPEN.
	RO or BOP	d. IF AT ANY TIME any Pzr PORV opens due to high pressure, THEN after Pzr pressure decreases to less than 2315 PSIG, ensure PORV closes or is isolated.
	RO or BOP	<p>9. Verify S/I termination criteria:</p> <p>a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.</p> <p>b. Secondary heat sink:</p> <ul style="list-style-type: none"> • Any intact S/G N/R level – GREATER THAN 11% (29% ACC) <p>OR</p> <ul style="list-style-type: none"> • Total feed flow to intact S/Gs - GREATER THAN 450 GPM. <p>c. NC pressure - STABLE OR INCREASING.</p> <p>d. Pzr level - GREATER THAN 11% (30% ACC).</p>
	CREW	e. GO TO EP/1/A/5000/ES-1.1 (Safety Injection Termination).
TRANSITION TO EP/1/A/5000/ES-1.1 (Safety Injection Termination)		

Op Test No.: 301 Scenario # 1 Event # 7 Page 37 of 42

Event Description: 1NC-36B (PZR PORV) fails open, 1NC-35B (PZR PORV ISOL) will not close

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE TO EVALUATOR: The following steps are from EP/1/A/5000/ES-1.1 (Safety Injection Termination)

	RO and BOP	1. Monitor Enclosure 1 (Foldout Page).
	BOP	2. Reset the following: a. ECCS. b. D/G load sequencers. c. Phase A. d. Phase B. e. IF AT ANY TIME B/O occurs, THEN restart S/I equipment previously on.
	BOP	3. Establish VI to Containment as follows: • Ensure 1VI-77B (VI Cont Isol) - OPEN. • Verify VI pressure - GREATER THAN 85 PSIG.
	BOP	4. Ensure only one NV pump - ON.
	RO or BOP	5. Verify NC pressure - STABLE OR INCREASING.
NOTE TO EVALUATOR: The crew may determine that NC pressure is decreasing and go to the RNO, ensure PZR spray valves – CLOSED and transition to EP/1/A/5000/ES-1.2 (Post LOCA Cooldown and Depressurization.)		
	BOP	6. Verify VI pressure - GREATER THAN 50 PSIG.
	BOP	7. Isolate NV S/I flowpath as follows: a. Verify the following valves - OPEN: • 1NV-252A (NV Pumps Suct From FWST) • 1NV-253B (NV Pumps Suct From FWST). b. Verify the following valves - OPEN: • 1NV-203A (NV Pumps A&B Recirc Isol) • 1NV-202B (NV Pmps A&B Recirc Isol).
	BOP	7.b. RNO b. Perform the following: 1) OPEN affected valve(s). 2) IF 1NV-203A AND 1NV-202B are open, THEN GO TO Step 7.c.
	BOP	c. CLOSE the following valves: • 1NI-9A (NV Pmp C/L Inj Isol) • 1NI-10B (NV Pmp C/L Inj Isol).

Op Test No.: 301 Scenario # 1 Event # 7 Page 38 of 42

Event Description: 1NC-36B (PZR PORV) fails open, 1NC-35B (PZR PORV ISOL) will not close

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE TO EVALUATOR: The crew may determine that subcooling is < 0°F and use Enclosure 1 guidance to realign the NV S/I flow path per EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 14 (NV Alignment to S/I Mode). See Attachment 12.

	BOP	<p>8. Establish charging as follows:</p> <p>a. Verify all of the following valves - OPEN:</p> <ul style="list-style-type: none"> • 1NV-44A (NC Pmp A Seal Supply Cont Isol) • 1NV-55A (NC Pmp B Seal Supply Cont Isol) • 1NV-66A (NC Pmp C Seal Supply Cont Isol) • 1NV-77A (NC Pmp D Seal Supply Cont Isol). <p>b. THROTTLE 1NV-294 (NV Pmps A&B Disch Flow Ctrl) for 32 GPM charging line flow.</p> <p>c. CLOSE 1NV-309 (Seal Water Injection Flow).</p> <p>d. Ensure one of the following valves – OPEN:</p> <ul style="list-style-type: none"> • 1NV-32B (NV Supply To Loop A Isol) <p>OR</p> <ul style="list-style-type: none"> • 1NV-39A (NV Supply To Loop D Isol) <p>e. Ensure 1NV-37A (NV Supply To Pzr Aux Spray) - CLOSED</p> <p>f. OPEN the following valves:</p> <ul style="list-style-type: none"> • 1NV-312A (Chrg Line Cont Isol) • 1NV-314B (Chrg Line Cont Isol). <p>g. Verify 1NV-309 - ABLE TO BE OPERATED FROM CONTROL ROOM.</p> <p>h. Place 1NV-309 - IN AUTO.</p> <p>i. Perform the following:</p> <ul style="list-style-type: none"> • Maintain charging flow less than 180 GPM. • Maintain 32 GPM seal water flow.
	BOP	<p>9. Control charging as follows:</p> <p>a. Control charging flow to maintain Pzr level stable.</p> <p>b. Verify Pzr level - STABLE OR INCREASING.</p>
	BOP or RO	<p>10. Determine if NI pumps should be stopped:</p> <p>a. Verify the following:</p> <ul style="list-style-type: none"> • NC pressure - STABLE OR INCREASING • NC pressure - GREATER THAN 1620 PSIG.

Op Test No.:	301	Scenario #	1	Event #	7	Page	39	of	42
Event Description: 1NC-36B (PZR PORV) fails open, 1NC-35B (PZR PORV ISOL) will not close									
Time	Position	Applicant's Actions or Behavior							

	BOP	10.a. RNO a. Perform the following: 1) IF Pzr level decreasing, THEN increase charging flow to stabilize Pzr level while maintaining less than 180 GPM.
NOTE TO EVALUATOR: RNO Step 10.a.2) will not apply.		
	SRO	3) GO TO Step 10.d
	BOP	d. Verify Pzr spray valves - CLOSED
	RO	e. Verify main steamlines intact as follows: • ALL S/G pressures – STABLE OR INCREASING • ALL S/Gs - PRESSURIZED
NOTE If Pzr heaters are off, NC pressure may decrease slowly due to Pzr spray bypass flow. This may be considered “stable” pressure		
	BOP	f. Verify NC pressure – STABLE OR INCREASING
	BOP or RO	g. Verify NC pressure – GREATER THAN 1620 PSIG
	SRO	10.g. RNO g. Perform the following: 1) Do not continue until one of the following met: • NC pressure – GREATER THAN 1620 PSIG OR • NC pressure – STABILIZES LESS THAN 1620 PSIG OR • NC pressure - DECREASING
NOTE TO EVALUATOR: RNO Step 10.g.2) will not apply.		
	SRO	3) IF NC pressure remains less than 1620 PSIG, THEN GO TO EP/1/A/5000/ES-1.2 (Post LOCA Cooldown And Depressurization).
TRANSITION TO EP/1/A/5000/ES-1.2 (Post LOCA Cooldown And Depressurization)		
END OF SCENARIO		

Attachment List

Scenario 2

ATTACHMENT 1	- Crew Critical Task Summary
ATTACHMENT 2	- Shift Turnover Information
ATTACHMENT 3	- OP/1/A/6400/005 Enclosure 4.17 (Shifting KC Pumps)
ATTACHMENT 4	- OP/1/A/6100/010M (Annunciator Response For Panel 1AD-12), B/2 (RN PIT A SCREEN HI D/P) rev. 040
ATTACHMENT 5	- AP/1/A/5500/012 Enclosure 3 (Control Room Ventilation System Verification), Rev. 033
ATTACHMENT 6	- EP/1/A/5000/E-0 Enclosure 1 (Foldout Page), Rev. 042
ATTACHMENT 7	- EP/1/A/5000/E-0 Enclosure 2 (Ventilation System Verification), Rev. 042
ATTACHMENT 8	- EP/1/A/5000/G-1 Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring), Rev.7
ATTACHMENT 9	- EP/1/A/5000/E-0 Enclosure 4 (NC Temperature Control), Rev. 042
ATTACHMENT 10	- EP/1/A/5000/E-1 Enclosure 1 (Foldout Page), Rev. 028
ATTACHMENT 11	- EP/1/A/5000/ES-1.1 Enclosure 1 (Foldout Page), Rev. 033
ATTACHMENT 12	- EP/1/A/5000/G-1 Enclosure 14 (NV Alignment To S/I Mode), Rev. 7

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	UNSAT	CT #	CRITICAL TASK
		C-1	Establish flow from at least one intermediate head ECCS pump prior to transition from E-0.
		C-2	Trip NC pumps on loss of subcooling with S/I flow verified per E-0 within 5 minutes of criteria met.

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION			
Unit 1 Status			
Power Level	Power History	NCS Boron	Xenon
3.30e ⁻⁰² %	BOL	1468 PPM	per OAC
Controlling Procedure			
<ul style="list-style-type: none"> OP/1/A/6100/001 (Controlling Procedure for Unit Startup), Enclosure 4.1 (Unit Startup). The steps up to step 3.178 are complete. 			
Other Information Needed to Assume the Shift			
<ul style="list-style-type: none"> Unit 1 is at 3.30e⁻⁰² % power, BOL. Unit 2 is at 100%. 1B NI (Safety Injection) Pump is tagged out for preventative maintenance. The crew is to shift operating KC (Component Cooling) pumps by starting the 1B2 KC pump and securing the 1B1 KC pump and then increase power 1%. 			
NEOs Available			
Six NEOs are available as listed on the status board			
METEOROLOGICAL CONDITIONS			
<ul style="list-style-type: none"> Upper wind direction = 315 degrees, speed = 10 mph Lower wind direction = 315 degrees, speed = 10.5 mph Forecast calls for clear skies over the next 24 hours. 			

**NRC INITIAL LICENSE EXAM
SCENARIO # 2**

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

Facility:	Catawba NRC Exam 2014	Scenario No.:	2	Op Test No.:	2014301
Examiners:	_____	Operators:	SRO		
	_____		RO		
	_____		BOP		
<p>Initial Conditions: IC# 177; Unit 1 is at 100% power, EOL. Unit 2 is at 100%. 1B NI (Safety Injection) Pump and the 1D RC (Condenser Circulating Water) Pump are tagged out for preventative maintenance.</p>					
<p>Turnover: Unit 1 is at 100% power, EOL. Unit 2 is at 100%. 1B NI (Safety Injection) Pump and the 1D RC (Condenser Circulating Water) Pump are tagged out for preventative maintenance. Direction for the crew is to decrease power per the reactivity management plan to ~98% in preparation for removing the 1C1 C Heater Drain Pump for maintenance.</p>					
Event No.	Malf. No.	Event Type*	Event Description		
1	---	N-BOP R-RO N-SRO	Decrease power to 98%.		
2	KC024F	C-BOP C-SRO	1KC-425A fails closed. AP/21		
3	RN025	C-BOP C-SRO TS-SRO	2B RN (Nuclear Service Water) Pump trips. AP/20		
4	EPD003D EHC011A	C-RO C-SRO TS-SRO	Zone B Lockout with auto turbine runback failure. AP/03		
5	MT005A MT007 EHC002	C-RO C-SRO	Main Turbine Loss of Lube Oil Pressure with a failure of the Turbine to trip or runback. Manual Reactor Trip required.		
6	SM007A	M-ALL	Loop A steam line break inside containment.		
7	NI001F NI002A	C-BOP	1NI-9A will not open, 1NI-10B fails to open in Auto		
8	ISE007A ISE007B	C-RO C-SRO	Both trains auto CF isolation fail.		
<p>* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor</p>					

Appendix D

Catawba NRC Exam May 2014 Scenario 2 NUREG 1021 Revision 9

Page 2 of 41

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

Scenario 2 – Summary

Initial Condition IC #177

IC# 177; Unit 1 is at 100% power, EOL. Unit 2 is at 100%. 1B NI (Safety Injection) Pump and the 1D RC (Condenser Circulating Water) Pump are tagged out for preventative maintenance.

Turnover:

Unit 1 is at 100% power, EOL. Unit 2 is at 100%. 1B NI (Safety Injection) Pump and the 1D RC (Condenser Circulating Water) Pump are tagged out for preventative maintenance. Direction for the crew is to decrease power per the reactivity management plan to ~98% in preparation for removing the 1C1 C Heater Drain Pump for maintenance.

Event 1

Decrease power to 98%.

Event 2

1KC-425A fails closed. AP/21 (Loss of Component Cooling) entry.

Event 3

(Nuclear Service Water) 2B RN Pump trips. AP/20 (Loss of Nuclear Service Water) entry. BOP manually starts another RN pump (there is no auto start feature of the RN pumps for these conditions). TS evaluation required.

Event 4

Zone B lockout with auto turbine runback failure. AP/03 (Load Rejection) entry.

Event 5

Main Turbine Loss of Lube Oil pressure with a failure of the turbine to trip or runback. Manual reactor trip required.

Event 6

Loop A steam line break inside containment.

Event 7

1NI-9A (Cold Leg Injection Valve) will not open. 1NI-10B (Cold Leg Injection Valve) fails to open in Auto. Manual opening of 1NI-10B will be successful.

Event 8

Both trains of auto CF (Main Feedwater) isolation fail to actuate. Manual actuation will be successful.

Critical Task 1 – Isolate feed/steam to/from faulted S/G before a transition out of E-2.

Critical Task 2 – Manually trip the main turbine before a severe (orange-path) challenge develops to either subcriticality or the integrity CSF or before transition to ECA-2.1, whichever happens first. If turbine cannot be tripped, manually trip reactor.

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

EXERCISE GUIDE WORKSHEET

1. INITIAL CONDITIONS:

1.1 Reset to IC #177

START TIME:

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		1	VLV-KC024F (KC425A RTN HDR CONTISOL OUTSIDE VLV FAIL TO POSITION)	0				2
		4	VLV-KC024F (KC425A RTN HDR CONTISOL OUTSIDE VLV FAIL TO POSITION)	0			1 SEC	2
		7	LOA-RN025 (U2 RN PMP 2B OVER-CURRENT)	TRIP				3
		12	LOA-VC039 (MNL RST OF LATCH FOR CHILLER B HI COND PRESS TRP DUE TO LOSS RN)	RESET	20 SEC			3
		9	MAL-EP003D (ZONE 1B LOCKOUT)					4
		n/a	MAL-EHC003F (ALL TURBINE AUTO RUNBACK FAILURE)	BLOCK				4
		15	MAL-EHC011A (MAIN TURBINE CTRL VLV CV1 FAILS)	AS_IS	3 MIN			5
		15	MAL-MT005A (TURBINE VIBRATION 2)	20		20 SEC		5
		15	MAL-MT007 (LOSS OF TURBINE LUBE OIL PRESSURE)		15 SEC			5
		n/a	MAL-EHC002 (TURBINE TRIP FAILURE)	BOTH				5
		18	MAL-SM007A (STM LINE BRK ISIDE CONTAINMENT LOOP A)	8.25e5				6
		n/a	VLV-N1001F (NI9A B.I.T. DISCHARGE ISOL VLV FAIL TO POSITION)	0				7
		n/a	VLV-NI002A (NI10B B.I.T. DISCHARGE ISOL VLV FAIL AUTO ACTIONS)					7
		n/a	MAL-ISE007A (AUTO CF ISOL SIGNAL TRN A)	BLOCK				8
		n/a	MAL-ISE007B (AUTO CF ISOL SIGNAL TRN B)	BLOCK				8

Appendix D

Catawba NRC Exam May 2014 Scenario 2 NUREG 1021 Revision 9

Page 4 of 41

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

		n/a	LOA-NI004 (RACKOUT NI PMP 1B)	RACK OUT				
		n/a	LOA-RC068 (RACKOUT RC PMP 1D)	RACK OUT				
			Ensure TRIGGER 4 =x11i223o					
			Ensure TRIGGER 12 = x11o038r I x11o374r I x14o013r					
			Ensure TRIGGER 18 = x01o063g I x01o066g					
			Place red collars on the 1B NI Pump and the 1D RC Pump.					

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

2. SIMULATOR BRIEFING

2.1 Control Room Assignments:

Position	Name
CRS	
RO	
BOP	

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

3. EXERCISE PRESENTATION

3.1 Familiarization Period

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

3.2 **Scenario EVENT 1**, decrease reactor power to 98%.

✓	BOOTH INSTRUCTOR ACTION
	IF the SOC is called to be informed of the power increase, REPEAT the information.

3.3 **Scenario EVENT 2**, 1KC-425A fails closed

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 1 to 1KC-425A to go closed

✓	BOOTH INSTRUCTOR ACTION
	IF Operator and/or Maintenance is dispatched to investigate 1KC-425A, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to investigate the problem with 1KC-425A, REPEAT back the information.

3.4 **Scenario EVENT 3**, 2B RN Pump trips

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 7 to cause the 2B RN Pump to trip.

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to investigate the problem with the 2B RN Pump and/or breaker, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF an Operator and/or Maintenance are dispatched to investigate the 2B RN Pump and/or breaker, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Environmental Chemistry is contacted, REPEAT back the information.

3.5 Scenario EVENT 4, Zone B Lockout

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 9 to cause a Zone B Lockout.

✓	BOOTH INSTRUCTOR ACTION
	IF the TCC is notified of the load reduction, REPEAT back information as required.

✓	BOOTH INSTRUCTOR ACTION
	IF the SOC is notified of current unit status, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to investigate the Zone B lockout, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to investigate the problem with the turbine control system, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Radiation Protection is notified to sample and analyze gaseous effluents, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Primary Chemistry is notified to sample for isotopic analysis of iodine, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF the Reactor Group Engineer is notified of the occurrence, REPEAT back the information.

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

3.6 Scenario EVENTS 5, 6, 7 and 8

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 15 to cause a loss of lube oil pressure to the main turbine.
✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to secure all ice condenser air handling units, REPEAT back the information
✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to place containment hydrogen analyzers in service, REPEAT back the information
✓	BOOTH INSTRUCTOR ACTION
	IF Chemistry is notified to sample all S/Gs for activity, REPEAT the order.
✓	BOOTH INSTRUCTOR ACTION
	IF RP is contacted to frisk the cation columns for activity, REPEAT back the order.

Op Test No.: 301 Scenario # 2 Event # 1 Page 9 of 41

Event Description: Power decrease to 98% power.

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE TO EVALUATOR: Crew begins with a power decrease. BOP performs a boration per OP/1/A/6150/009, Enclosure 4.2. Amount of boration is determined by the power decrease plan. The RO inputs turbine target data. These two evolutions may be performed concurrently. Initial conditions are complete. A reactivity management brief was performed during turnover. Step 3.1 is complete.

	BOP	Perform a boration.
	RO	Input target into the main turbine control panel.

NOTE TO EVALUATOR: Applicant may perform a boration per OP/1/A/6150/009, Boron Concentration Control, Enclosure 4.5 (Manual Operation Of The Makeup Controls). Refer to Attachment 3.

NOTE TO EVALUATOR: The following actions are from OP/1/A/6150/009, Boron Concentration Control, Enclosure 4.2 (Boration).

	BOP	3.2 Ensure the following valve control switches in "AUTO": <ul style="list-style-type: none"> • 1NV-238A (B/A To Blender Ctrl Vlv) • 1NV-186A (B/A Blender Otlt To VCT Otlt)
	BOP	3.3 Ensure 1NV-238A (B/A Xfer Pmp To Blender Ctrl) controller in auto.
	BOP	3.4 Ensure at least one boric acid transfer pump is in "AUTO" or "ON".
	BOP	3.5 Record the desired volume of boric acid to be added. _____ gallons
	BOP	3.6 Adjust the boric acid counter to the desired volume of boric acid to be added. (R.M.)
	BOP	3.7 IF the blender is set up for automatic makeup per Enclosure 4.1 (Automatic Makeup), record the setpoint of the controller for 1NV-238A (B/A Xfer Pmp To Blender Ctrl). _____ gpm
	BOP	3.8 Place the "NC MAKEUP MODE SELECT" switch in "BORATE".

NOTE: Boric Acid flow rates > 32 gpm may result in a boric acid flow deviation annunciator.

Op Test No.:	301	Scenario #	2	Event #	1	Page	10	of	41
Event Description: Power decrease to 98% power.									
Time	Position	Applicant's Actions or Behavior							

	BOP	3.9 IF required, adjust the controller for 1NV-238A (B/A Xfer Pmp To Blender Ctrl) to the desired flow.
NOTE TO EVALUATOR: Step 3.10 will be N/A'd		
	BOP	<p>3.11 <u>IF AT ANY TIME</u> it is desired to divert letdown to the RHT manually operate 1NV-172A (3-Way Divert To VCT-RHT) as follows:</p> <p>3.11.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the "RHT" position.</p> <p>3.11.2 Ensure VCT level is monitored continuously while diverting to the RHT.</p> <p>NOTE: Procedure may continue while performing the following step.</p> <p>3.11.3 <u>WHEN</u> desired VCT level is reached return 1NV-172A (3-Way Divert To VCT-RHT) to auto as follows:</p> <p>3.11.3.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "VCT" position.</p> <p>3.11.3.2 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "AUTO" position.</p>
	BOP	3.12 <u>IF AT ANY TIME</u> during the makeup it becomes necessary to change the makeup flow rate, adjust the setpoint for 1NV-238A (B/A Xfer Pmp To Blender Ctrl) as necessary to achieve the desired flow.

Op Test No.: 301 Scenario # 2 Event # 1 Page 11 of 41

Event Description: Power decrease to 98% power

Time	Position	Applicant's Actions or Behavior
	BOP	<p>3.13 IF AT ANY TIME while boration is in progress it becomes necessary to stop the boration, perform the following:</p> <p>3.13.1 Place the "NC MAKEUP CONTROL" switch to the "STOP" position.</p> <p>3.13.2 Ensure the following valves close: (R.M.)</p> <ul style="list-style-type: none"> • 1NV-238A (B/A To Blender Ctrl Vlv) • 1NV-186A (B/A Blender Otlt To VCT Otlt) <p>3.13.3 Record boric acid volume added as indicated on the Boric Acid counter. _____ gallons</p> <p>3.13.4 WHEN conditions allow resuming the boration, perform the following:</p> <p>3.13.4.1 Determine remaining volume to be added by subtracting the amount previously added (Step 3.13.3) from the desired volume to be added (Step 3.5).</p> <p>_____ - _____ = _____ gallons (Step 3.5) (Step 3.13.3)</p> <p>3.13.4.2 Adjust boric acid counter to the volume of boric acid determined in Step 3.13.4.1. (R.M.)</p> <p>3.13.4.3 Place the "NC MAKEUP CONTROL" switch in the "START" position. (R.M.)</p> <p>3.13.4.4 Verify the following:</p> <ul style="list-style-type: none"> • 1NV-238A (B/A To Blender Ctrl Vlv) modulates to establish desired flow • 1NV-186A (B/A Blender Otlt To VCT Otlt) opens <p>3.13.4.5 IF in "AUTO", verify the boric acid pump starts.</p>
	BOP	<p>3.14 WHILE makeup is in progress, monitor the following for expected results:</p> <ul style="list-style-type: none"> • Control rod motion • NC System Tavg • Reactor Power
	BOP	<p>3.15 Place the "NC MAKEUP CONTROL" switch to the "START" position. (R.M.)</p>

Op Test No.:	301	Scenario #	2	Event #	1	Page	12	of	41
Event Description: Power decrease to 98% power									
Time	Position	Applicant's Actions or Behavior							

	BOP	3.16 Verify the following: <ul style="list-style-type: none"> 1NV-238A (B/A To Blender Ctrl Vlv) modulates to establish desired flow 1NV-186A (B/A Blender Otlt To VCT Otlt) opens
	BOP	3.17 IF in "AUTO", verify the boric acid transfer pump starts.
	BOP	3.18 Verify proper flow by observing the Boric Acid Counter. {PIP 96-0137}
NOTE: The boric acid counter may count up 1 - 5 gallons after termination.		
	BOP	3.19 WHEN the desired volume of boric acid is reached on the boric acid counter, ensure the following valves close: (R.M.) <ul style="list-style-type: none"> 1NV-238A (B/A To Blender Ctrl Vlv) 1NV-186A (B/A Blender Otlt To VCT Otlt)
NOTE TO EVALUATOR: Step 3.20 will be N/A'd		
	BOP	3.21 IF automatic makeup is desired, perform one of the following: 3.21.1 IF it is desired to change the blender outlet boron concentration, refer to Enclosure 4.1 (Automatic Makeup). OR 3.21.2 IF makeup at the previous concentration is acceptable AND the system was previously aligned per Enclosure 4.1 (Automatic Makeup), perform the following: 3.21.2.1 Ensure the controller for 1NV-238A (B/A Xfer Pmp To Blender Ctrl) is set to the value recorded in Step 3.7. (R.M.) 3.21.2.2 Place the "NC MAKEUP MODE SELECT" switch in "AUTO". 3.21.2.3 Place the "NC MAKEUP CONTROL" switch to the "START" position. (R.M.)
NOTE TO EVALUATOR: Step 3.22 will be N/A'd		
END OF BORATION		

Op Test No.:	<u>301</u>	Scenario #	<u>2</u>	Event #	<u>1</u>	Page	<u>13</u>	of	<u>41</u>
Event Description: Power decrease to 98% power									
Time	Position	Applicant's Actions or Behavior							

NOTE TO EVALUATOR: The following steps are from OP/1/B/6300/001, Turbine Generator, Enclosure 4.2 (Load Changing) starting at step 3.2.2.

	RO	<p>3.2.2 Decrease turbine generator load by performing the following:</p> <p>3.2.2.1 Select "LOAD RATE" and verify it illuminates.</p> <p>3.2.2.2 Input the desired load rate.</p> <p>3.2.2.3 Select "ENTER" and verify "LOAD RATE" goes dark</p> <p>3.2.2.4 Select "TARGET" and verify it illuminates.</p> <p>3.2.2.5 Input the desired load target.</p> <p>3.2.2.6 Select "ENTER" and verify "TARGET" goes dark.</p> <p>3.2.2.7 Verify new load target appears on Target Display.</p> <p>3.2.2.8 Select "GO" and verify it illuminates to start load decrease.</p> <p>3.2.2.9 Coordinate with Secondary Chemistry to adjust S/G blowdown flowrates to obtain maximum blowdown for the appropriate load</p>
END OF PREPARATION FOR POWER DECREASE ON THE TURBINE PANEL.		
Booth Operator will insert Trigger 1 for EVENT 2 at the discretion of the lead examiner.		
END OF EVENT 1		

Op Test No.:	301	Scenario #	2	Event #	2	Page	14	of	41
Event Description: 1KC-425A fails closed.									
Time	Position	Applicant's Actions or Behavior							

EVENT 2		
Indications:	1AD-6, C/1-4 'NCP A,B,C,D MTR UPPER BRG KC OUTLET HI/LOW FLOW' 1AD-6, D/1-4 'NCP A,B,C,D MTR LOWER BRG KC OUTLET LO FLOW' 1AD-6, E/1-4 'NCP A,B,C,D THERMAL BARRIER KC OUTLET HI/LO FLOW' 1AD-20, A/1 'KC SUPPLY HDR FLOW TO NCP BRGS LOW' 1AD-21, A/1 'KC SUPPLY HDR FLOW TO NCP BRGS LOW'	
	BOP	Recognize 1KC-425A
	SRO	Enters AP/1/A/5500/021(Loss of Component Cooling)
	BOP	Opens 1KC-425A
NOTE TO EVALUATOR: The crew will make a plant page announcing the entry into AP/1/A/5500/021, Loss of Component Cooling.		
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/021, Loss of Component Cooling.		
<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.		
	RO and BOP	1. Monitor Enclosure 1 (Foldout Page).
	BOP	2. Verify the following: <ul style="list-style-type: none"> At least one KC pump - ON. AND <ul style="list-style-type: none"> Flow to KC loads presently in service.
	BOP	2. RNO Perform the following: <ol style="list-style-type: none"> Start additional KC pump(s) as necessary.
NOTE TO EVALUATOR: Step 2 RNO b. will not apply		
NOTE TO EVALUATOR: Immediate action step 3 will not apply.		
	SRO	3. <u>IF AT ANY TIME</u> all KC pumps are lost, <u>THEN RETURN TO STEP 2.</u>
<u>NOTE</u> Uncooled letdown may result in loss of NV pumps within a matter of minutes.		
	BOP	4. Verify the following: <ul style="list-style-type: none"> 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - DARK AND <ul style="list-style-type: none"> At least one KC pump - ON.

Op Test No.:	<u>301</u>	Scenario #	<u>2</u>	Event #	<u>2</u>	Page	<u>15</u>	of	<u>41</u>
Event Description: 1KC-425A fails closed.									
Time	Position	Applicant's Actions or Behavior							

	SRO	5. <u>IF AT ANY TIME</u> 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" LIT, <u>THEN</u> perform Step 4 RNO.
	BOP	6. Verify both KC surge tank levels - 50% - 90% AND STABLE.
	BOP	7. Start additional KC pump(s) as necessary to supply any KC loads presently in service.
<u>CAUTION</u> 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.		
	BOP	8. Verify KC flow to NC pumps as follows: <ul style="list-style-type: none"> 1AD-20, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK 1AD-21, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK.
	BOP	8. RNO Perform the following: <ul style="list-style-type: none"> a. Ensure the following valves - OPEN: <ul style="list-style-type: none"> 1KC-425A (NC Pumps Ret Hdr Cont Isol) 1KC-338B (NC Pumps Sup Hdr Cont Isol) 1KC-424B (NC Pumps Ret Hdr Cont Isol).
NOTE TO EVALUATOR: It is not anticipated that step RNO 8.b. will apply		
	BOP	9. Verify KC available as follows: <ul style="list-style-type: none"> a. Verify the following Train A KC non-essential header isolation valves - OPEN: <ul style="list-style-type: none"> 1KC-230A (Rx Bldg Non-Ess Hdr Isol) 1KC-3A (Rx Bldg Non-Ess Ret Hdr Isol) 1KC-50A (Aux Bldg Non-Ess Hdr Isol) 1KC-1A (Aux Bldg Non-Ess Ret Hdr Isol).
	BOP	9. b. Verify the following Train B KC non-essential header isolation valves -OPEN: <ul style="list-style-type: none"> 1KC-228B (Rx Bldg Non-Ess Hdr Isol) 1KC-18B (Rx Bldg Non-Ess Ret Hdr Isol) 1KC-53B (Aux Bldg Non-Ess Hdr Isol) 1KC-2B (Aux Bldg Non-Ess Ret Hdr Isol).
	BOP	9. c. Start additional KC pump(s) as necessary to supply any KC loads presently in service.

Op Test No.:	301	Scenario #	2	Event #	2	Page	16	of	41
Event Description: 1KC-425A fails closed.									
Time	Position	Applicant's Actions or Behavior							

	BOP	10. Verify KC surge tank levels normal as follows: a. Verify both KC surge tank levels - 50% - 90% AND STABLE.
	SRO	10. b. <u>GO TO</u> Step 14.
NOTE TO EVALUATOR: The KC heat exchanger outlet mode switches will be in the "KC Temp" position if the corresponding train of KC is in service. Otherwise, it will be in the "Miniflow" position.		
	BOP	14. Ensure KC heat exchanger outlet mode switches - PROPERLY ALIGNED.
	CREW	15. Determine and correct cause of loss of KC.
	SRO	16. Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual: <ul style="list-style-type: none"> SLC 16.9-7 (Boration Systems Flow Path- Shutdown) SLC 16.9-8 (Boration Systems Flow Path- Operating) SLC 16.9-9 (Boration Systems Pumps -Shutdown) SLC 16.9-10 (Boration Systems Charging Pumps - Operating) 3.5.2 (ECCS - Operating) 3.5.3 (ECCS - Shutdown) 3.6.6 (Containment Spray System) 3.7.5 (Auxiliary Feedwater (AFW) System) 3.7.7 (Component Cooling Water (CCW) System).
NOTE TO EVALUATOR: No Tech Spec Actions need to be entered.		
Booth Operator will insert Trigger 7 for EVENT 3 at the discretion of the lead examiner.		
	SRO	17. Determine required notifications: <ul style="list-style-type: none"> <u>REFER TO</u> RP/0/A/5000/001(Classification Of Emergency) <u>REFER TO</u> RP/0/B/5000/013 (NRC Notification Requirements).
NOTE TO EVALUATOR: Step 18 will not apply.		
	BOP	19. Verify KC surge tanks level as follows: <ul style="list-style-type: none"> Greater than 50% Stable or increasing

Op Test No.:	301	Scenario #	2	Event #	2	Page	17	of	41
Event Description: 1KC-425A fails closed.									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>20. WHEN plant conditions permit, THEN perform the following:</p> <ul style="list-style-type: none"> Return KC pumps to normal operation. REFER TO OP/1/A/6400/005 (Component Cooling Water System). Return NV Pump 1A to normal cooling as applicable. REFER TO Enclosure 2 (Alternate Cooling To NV Pump 1A).
	BOP	<p>21. Verify the following:</p> <ul style="list-style-type: none"> 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - DARK 1AD-7, H/3 "VCT HI TEMP" - DARK Normal letdown - IN SERVICE.
	BOP	<p>22. Ensure VCT and letdown path aligned as follows:</p> <p>a. IF desired to align NV pump suction to VCT, then perform the following:</p> <ol style="list-style-type: none"> OPEN the following valves: <ul style="list-style-type: none"> 1NV-188A (VCT Otlt Isol) 1NV-189B (VCT Otlt Isol). CLOSE the following valves: <ul style="list-style-type: none"> 1NV-252A (NV Pumps Suct From FWST) 1NV-253B (NV Pumps Suct From FWST). <p>b. WHEN NV suction aligned to VCT, THEN momentarily place 1NV-172A (3-Way Divert To VCT-RHT) to "VCT" position and return to "AUTO".</p> <p>c. IF desired to restore letdown flow through NV demineralizers, THEN momentarily place 1NV-153A (Letdn Hx Otlt 3-Way Valve) to "DEMIN" position and return to "AUTO".</p>
	SRO	<p>23. Determine long term plant status. RETURN TO procedure in affect.</p>
<p>NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.</p>		
<p>END OF EVENT 2</p>		

Op Test No.:	301	Scenario #	2	Event #	3	Page	18	of	41
Event Description: 2B RN (Nuclear Service Water) Pump Trips									
Time	Position	Applicant's Actions or Behavior							

EVENT 3		
Indications:	1AD-12, A/2 'RN ESSENTIAL HDR A PRESSURE LO' 1AD-12, A/5 'RN ESSENTIAL HDR B PRESSURE LO'	
	BOP	Start an idle RN (Nuclear Service Water) pump
NOTE TO EVALUATOR: The crew will make a plant page announcing the entry into AP/0/A/5500/020, Loss of Nuclear Service Water		
NOTE TO EVALUATOR: The following steps are from AP/0/A/5500/020, Loss of Nuclear Service Water, Case I (Loss of RN Train).		
	BOP	1. Start idle RN pump(s) as required.
	SRO	2. Ensure Unit 1 and Unit 2 OATC monitors Enclosure 1 (Foldout Page).
	BOP or SRO	3. Verify RN System in normal alignment as follows: <ul style="list-style-type: none"> • Both RN Supply headers - ALIGNED AND • Both RN Discharge headers - ALIGNED.
	BOP	4. Verify each operating RN pump discharge flow - GREATER THAN 8,600 GPM.
	BOP	5. Verify each operating RN pump discharge flow - LESS THAN 23,000 GPM.
	BOP	6. Ensure RN pumps - IN OPERATION AS NEEDED.
NOTE TO EVALUATOR: The KC heat exchanger outlet mode switches will be in the "KC Temp" position if the corresponding train of KC is in service. Otherwise, it will be in the "Miniflow" position.		
	BOP	7. Ensure proper alignment of RN to KC Hxs as follows: a. Verify RN - ALIGNED TO IN SERVICE KC HX(S). b. Ensure KC Hx Otlt Mode switches -PROPERLY ALIGNED.
	BOP	8. Verify each operating RN pump discharge flow - GREATER THAN 8,600 GPM.
	BOP	9. Verify RN - AVAILABLE TO ALL UNIT 1 AND UNIT 2 D/G(S).

Op Test No.:	301	Scenario #	2	Event #	3	Page	19	of	41
Event Description: 2B RN (Nuclear Service Water) Pump Trips									
Time	Position	Applicant's Actions or Behavior							

NOTE TO EVALUATOR: The BOP determines that no changes have occurred to the VC/YC (Control Room Ventilation and Chilled Water System) via the OAC or on rear of 1MC-3 in the following step.		
	BOP	10. Determine VC/YC status as follows: <ul style="list-style-type: none"> Verify VC/YC - ALIGNED TO OPERATING RN TRAIN. Verify YC Chiller - RUNNING.
	CREW	11. Determine and correct cause of loss of RN train.
	SRO	12. Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual: <ul style="list-style-type: none"> SLC 16.7-6 (RN Discharge Instrumentation) 3.6.5 (Containment Air Temperature) 3.6.6 (Containment Spray System) 3.6.17 (Containment Valve Injection Water System (CVIWS)) 3.7.5 (Auxiliary Feedwater (AFW) System) 3.7.7 (Component Cooling Water (CCW) System) <li style="background-color: yellow;">3.7.8 (Nuclear Service Water System (NSWS)) 3.7.10 (Control Room Area Ventilation System (CRAVS)) 3.7.11 (Control Room Area Chilled Water System (CRACWS)) 3.8.1 (A.C. Sources - Operating) 3.8.2 (A.C. Sources - Shutdown).
NOTE TO EVALUATOR: T.S. 3.7.8 [(Nuclear Service Water System (NSWS))] Condition A (Restore train to OPERABLE status within 72 hours) should be entered.		
NOTE TO EVALUATOR: The SRO will conduct a "Crew Update" to inform the crew of any Tech Spec conditions that have been entered.		
Booth Operator will insert Trigger 9 for EVENT 4 at the discretion of the lead examiner.		
	SRO	13. Determine required notifications: <ul style="list-style-type: none"> REFER TO RP/0/A/5000/001(Classification Of Emergency) REFER TO RP/0/B/5000/013 (NRC Notification Requirements)

Op Test No.:	301	Scenario #	2	Event #	3	Page	20	of	41
Event Description: 2B RN (Nuclear Service Water) Pump Trips									
Time	Position	Applicant's Actions or Behavior							

	BOP	14. Notify Environmental Chemistry of any RN pump shifts that have occurred.
	SRO	15. Determine long term plant status. <u>RETURN TO</u> procedure in effect.
NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.		
END OF EVENT 3		

Op Test No.:	<u>301</u>	Scenario #	<u>2</u>	Event #	<u>4</u>	Page	<u>21</u>	of	<u>41</u>
Event Description: Zone B Lockout with failure of automatic Turbine runback									
Time	Position	Applicant's Actions or Behavior							

EVENT 4		
Indications:	1AD-11, C/1 'GEN BKR A OVER CURRENT' 1AD-11, F/3 'ZONE B LOCKOUT TRIP' 1AD-11, J/4 '7KV NORM AUX PWR SYSTEM TROUBLE'	
	RO	Recognize failure of the Turbine to runback.
	RO	Manually decrease turbine load.
	CREW	Enter AP/1/A/5500/003, Load Rejection
NOTE TO EVALUATOR: The crew will make a plant page announcing the entry into AP/1/A/5500/003, Load Rejection.		
	RO	1. Verify turbine load - DECREASING IN AUTOMATIC.
	RO	1. RNO Perform the following: a. Select "MANUAL" on turbine control panel. b. Depress "CONTROL VALVES LOWER" pushbutton and reduce turbine load as required.
	RO	2. Verify proper reactor response: <ul style="list-style-type: none"> Control rods - IN "AUTO" AND STEPPING IN P/R neutron flux - DECREASING.
	RO or BOP	3. Verify proper steam dump operation as follows: <ol style="list-style-type: none"> Verify T-Ref instrumentation - AVAILABLE. "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT. Verify the following: "C-7A LOSS OF LOAD INTLK COND DUMP" status light (1SI 18) - LIT. Steam dump valves - MODULATING. T-Avg - DECREASING TO T-REF.
	BOP	4. Verify Pzr PORV and Pzr spray valve status as follows: <ol style="list-style-type: none"> All Pzr PORVs - CLOSED. Normal Pzr spray valves - CLOSED.

Op Test No.:	301	Scenario #	2	Event #	4	Page	22	of	41
Event Description: Zone B Lockout with failure of automatic Turbine runback									
Time	Position	Applicant's Actions or Behavior							

	BOP	5. Verify proper CM System operation as follows: <ol style="list-style-type: none"> a. WHEN reactor power is less than 75%, THEN 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.
NOTE TO EVALUATOR: The crew will determine that the RNO for step 5.c. will not be necessary		
	BOP	d. Verify standby condensate booster pump(s) - ON
NOTE TO EVALUATOR: The crew will determine that the RNO for step 5.c. will not be necessary		
	BOP	6. Verify the following generator alarms - DARK: <ul style="list-style-type: none"> 1AD-11, C/1 "GEN BKR A OVER CURRENT" 1AD-11, F/1 "GEN BKR B OVERCURRENT".
	RO	6. RNO Ensure turbine generator load - REDUCED TO APPROXIMATELY 48% AND THE ALARM CLEARS.
	RO	7. Verify S/G levels are adequate as follows: <ul style="list-style-type: none"> All S/G low level alert alarms (1AD-4) - DARK All S/G low CF flow alarms (1AD-4) - DARK.
	RO	8. Verify reactor power - GREATER THAN 20%.
	RO	9. IF AT ANY TIME reactor power is less than or equal to 20%, THEN perform Step 8 RNO.
	BOP	10. Verify AS header pressure - GREATER THAN OR EQUAL TO 140 PSIG.
	BOP	10. RNO Adjust 1AS-2 (Main Stm To Aux Steam) as required to maintain AS header pressure between 140 PSIG and 150 PSIG.
	RO	11. Adjust 1TL-4 (Stm Seal Reg Byp) as necessary to maintain steam seal pressure between 4 PSIG - 6 PSIG.
	BOP	12. Monitor Enclosure 3 (Rod Insertion Limit Boration).

Op Test No.:	301	Scenario #	2	Event #	4	Page	23	of	41
Event Description: Zone B Lockout with failure of automatic Turbine runback									
Time	Position	Applicant's Actions or Behavior							

	RO	13. Verify reactor power - LESS THAN 30%.
	RO and BOP	<p>13. RNO Perform the following:</p> <p>a. IF the runback target load is less than 30%, THEN:</p> <p>b. WHEN the appropriate runback target load is reached, THEN:</p> <ol style="list-style-type: none"> 1) Stabilize unit at appropriate power level. 2) Maintain control rods above insertion limits. 3) Adjust the following as required to maintain T-Avg within 1°F of T-Ref: <ul style="list-style-type: none"> • Turbine load • Control rods • Boron concentration. <p>c. GO TO Step 15.</p>
	BOP	<p>15. Verify the following PCBs - CLOSED:</p> <ul style="list-style-type: none"> • Generator breaker 1A • Generator breaker 1B • PCB 14 • PCB 15 • PCB 17 • PCB 18.
NOTE When separated from the grid turbine reverts to speed.		
NOTE TO EVALUATOR: The crew will determine that the RNO step 15.c. will apply		
	BOP	<p>15. RNO Perform the following:</p> <p>c. IF load rejection caused by loss of main busline 1A or 1B, THEN:</p> <ol style="list-style-type: none"> 1) Notify Transmission Control Center (TCC), using one of the following methods, to investigate and repair cause of the loss of busline: <ul style="list-style-type: none"> • 704-382-9403 • 704-382-9404 • 704-399-9744 • 704-382-4413 (System Operating Center).

Op Test No.:	301	Scenario #	2	Event #	4	Page	24	of	41
Event Description: Zone B Lockout with failure of automatic Turbine runback									
Time	Position	Applicant's Actions or Behavior							

	BOP	15. RNO c. 2) WHEN notified by TCC that the affected busline is ready to be reenergized, THEN restore power to the affected busline. REFER TO Enclosure 1 (Offsite Power Restoration).
	RO	16. Adjust power factor as necessary. REFER TO Unit 1 Revised Data Book Figure 43.
	RO and BOP	17. WHEN the appropriate runback target load is reached, THEN: <ul style="list-style-type: none"> Stabilize unit at appropriate power level. Maintain control rods above insertion limits. Adjust the following as required to maintain T-Avg within 1°F of T-Ref: <ul style="list-style-type: none"> Turbine load Control rods Boron concentration.
	RO or BOP	18. Notify System Operating Center (SOC) using the red dispatcher telephone of current unit status.
	CREW	19. Determine and correct cause of load rejection.
Booth Operator will insert Trigger 15 for EVENT 5 at discretion of lead examiner.		
	BOP	20. Shut down unnecessary plant equipment as follows: <ol style="list-style-type: none"> Restore CM and CF as follows: <ol style="list-style-type: none"> Verify C-htr drain pumps - ON.
	BOP	20.a.1) RNO 1) WHEN time and manpower permit, THEN complete the shutdown of the C-htr drain pumps. REFER TO OP/1/B/6250/004 (Feedwater Heater Vents, Drains and Bleed System). <ol style="list-style-type: none"> Verify both CF Pumps - IN SERVICE. Shutdown one CF pump as necessary. REFER TO OP/1/A/6250/001 (Condensate and Feedwater System). Shutdown excess Condensate Booster Pumps. REFER TO OP/1/A/6250/001 (Condensate and Feedwater System). Shutdown excess Hotwell Pumps. REFER TO OP/1/A/6250/001 (Condensate and Feedwater System).

Op Test No.:	<u>301</u>	Scenario #	<u>2</u>	Event #	<u>4</u>	Page	<u>25</u>	of	<u>41</u>
Event Description: Zone B Lockout with failure of automatic Turbine runback									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>21. Reset steam dump valves as follows:</p> <ul style="list-style-type: none"> 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"> • "C-7A LOSS OF LOAD INTLK COND DUMP" • "C-7B LOSS OF LOAD INTLK ATMOS DUMP". f. IF "T-AVG" mode of operation is available, THEN ensure steam dump valves in "T-AVG" mode. g. Verify "STM DUMP CTRL" - IN AUTO.
	RO	22. Verify reactor power - GREATER THAN 15%.
	RO	23. Verify CA pumps - OFF.
	RO	24. Verify reactor power change – GREATER THAN <u>OR</u> EQUAL TO 15% IN A 1 HOUR PERIOD.
	RO or BOP	<p>25. Notify the following sections to take appropriate samples:</p> <ul style="list-style-type: none"> • Radiation Protection to sample and analyze gaseous effluents. REFER TO Selected Licensee Commitments Manual, Section 16.11-6. • 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).

Op Test No.:	301	Scenario #	2	Event #	4	Page	26	of	41
Event Description: Zone B Lockout with failure of automatic Turbine runback									
Time	Position	Applicant's Actions or Behavior							

	SRO	<p>26. Ensure compliance with appropriate Tech Specs:</p> <ul style="list-style-type: none"> 3.1.1 (Shutdown Margin (SDM)) 3.1.6 (Control Bank Insertion Limits) 3.8.1 (AC Sources - Operating) SLC 16.8-2 (230 KV Switchyard Systems).
<p>NOTE TO EVALUATOR: The SRO will determine that the following Tech Spec Conditions should be entered:</p> <ul style="list-style-type: none"> 3.1.6 (Control Bank Insertion Limits) Condition A (Verify SDM is within limit specified in the COLOR - 1 hour <u>OR</u> Initiate boration to restore SDM to within limit – 1 hour, <u>AND</u> Restore control banks within limits - 2 hours), 3.8.1 (AC Sources – Operating) Condition A (Perform SR 3.8.1.1 for OPERABLE offsite circuit - 1 hour <u>and</u> Restore offsite circuit to OPERABLE status - 72 hours), SLC 16.8-2 (230 kV Switchyard Systems) Condition A (Return switchyard equipment to normal COMMITMENT alignment - In accordance with the Electronic Risk Assessment Tool). 		
	BOP	27. Notify Reactor Group Engineer of occurrence.
	SRO	28. Determine long term plant status. <u>RETURN TO</u> OP/1/A/6100/003 (Controlling Procedure For Unit Operation).
END OF EVENT 4		

Op Test No.: 301 Scenario # 2 Event # 5 Page 27 of 41

Event Description: Main Turbine Loss of Lube Oil Pressure with a failure of the turbine to trip or runback. Manual reactor trip required.

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

EVENT 5		
Indications: 1AD-1, A/2 'BEARING OIL LO PRESS TURB TRIP' 1AD-1, E/8 'TURB GEN HI VIBRATION' 1AD-1 F/6 'H2/KG PANEL TROUBLE'		
	RO	Recognize Turbine trip failure
	RO	Attempt to trip the turbine
	RO	Attempt to manually decrease turbine load
	RO	Recognize Control Valve #1 failure.
CRITICAL TASK	RO	Manually trip the reactor.
	RO or BOP	Close all MSIVs and MSIV Bypass valves.
	CREW	Enter EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)
NOTE TO EVALUATOR: Due to the immediate action nature of the event, it is not anticipated that the crew will have time to make a plant page announcing the entry into AP/1/A/5500/002, Turbine Generator Trip.		
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/002, Turbine Generator Trip		
	RO	1. Verify reactor power - LESS THAN 69%.
	RO	2. Verify Turbine Trip: <ul style="list-style-type: none"> All turbine stop valves - CLOSED.
	RO	2. RNO Perform the following: <ol style="list-style-type: none"> Trip turbine. IF turbine will not trip, THEN: <ol style="list-style-type: none"> Depress "MANUAL" pushbutton on turbine control panel. Rapidly unload turbine by simultaneously depressing "CONTROL VALVE LOWER" and "FAST RATE" pushbuttons. IF turbine will not runback, THEN: <ol style="list-style-type: none"> Trip reactor.

Op Test No.:	301	Scenario #	2	Event #	5	Page	28	of	41
Event Description: Main Turbine Loss of Lube Oil Pressure with a failure of the turbine to trip or runback. Manual reactor trip required.									
Time	Position	Applicant's Actions or Behavior							

	RO or BOP	b) CLOSE: <ul style="list-style-type: none"> All MSIVs All MSIV bypass valves.
	CREW	c) <u>GO TO</u> EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
TRANSITION TO E-0 (Reactor Trip or Safety Injection)		
END OF EVENT 5		

Op Test No.:	<u>301</u>	Scenario #	<u>2</u>	Event #	<u>6, 7 and 8</u>	Page	<u>29</u>	of	<u>41</u>
Event Description:		A Loop Steam Line Break Inside Containment, 1NI-9A will not open and 1NI-10B opens in manual, Both trains of auto Feedwater Isolation fail.							
Time	Position	Applicant's Actions or Behavior							

EVENTS 6, 7 and 8		
NOTE TO EVALUATOR: The following steps are from EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)		
	RO or BOP	1. Monitor Enclosure 1 (Foldout Page).
	RO	2. Verify Reactor Trip: <ul style="list-style-type: none"> All rod bottom lights - LIT All reactor trip and bypass breakers - OPEN I/R power - DECREASING.
	RO	3. Verify Turbine Trip: <ul style="list-style-type: none"> All turbine stop valves - CLOSED
	RO	3. RNO Perform the following: <ol style="list-style-type: none"> Trip turbine. IF turbine will not trip, THEN: <ol style="list-style-type: none"> Depress "MANUAL" pushbutton on turbine control panel. Rapidly unload turbine by simultaneously depressing the "CONTROL VALVE LOWER" and "FAST RATE" pushbuttons. IF turbine will not runback, THEN CLOSE: <ul style="list-style-type: none"> All MSIVs All MSIV bypass valves.
	BOP	4. Verify 1ETA and 1ETB - ENERGIZED.
	RO	5. Verify S/I is actuated: <ol style="list-style-type: none"> "SAFETY INJECTION ACTUATED" status light (1SI-13) – LIT Both E/S load sequencer actuated status lights (1SI-14) - LIT.
	RO	6. Announce "Unit 1 Safety Injection".
	SRO	7. Determine required notifications: <ul style="list-style-type: none"> REFER TO RP/0/A/5000/001 (Classification Of Emergency) REFER TO RP/0/B/5000/013 (NRC Notification Requirements).

Op Test No.:	<u>301</u>	Scenario #	<u>2</u>	Event #	<u>6, 7 and 8</u>	Page	<u>30</u>	of	<u>41</u>
Event Description:		A Loop Steam Line Break Inside Containment, 1NI-9A will not open and 1NI-10B opens in manual, Both trains of auto Feedwater Isolation fail.							
Time	Position	Applicant's Actions or Behavior							

	RO or BOP	8. Verify all Feedwater Isolation status lights (1SI-5) - LIT
CRITICAL TASK	RO	8. RNO Perform the following: a. Initiate Feedwater Isolation.
NOTE TO EVALUATOR: Step 8.b. RNO will not apply.		
END OF EVENT 8		
	BOP	9. Verify Phase A Containment Isolation status as follows: a. Phase A "RESET" lights - DARK.
	BOP	b. Monitor Light Panel Group 5 St lights on energized train(s) - LIT.
	BOP	10. Verify proper Phase B actuation as follows: a. Verify Containment pressure - HAS REMAINED LESS THAN 3 PSIG
NOTE TO EVALUATOR: Depending on the speed of the crew, containment pressure may not have exceeded 3 psig at this time.		
	BOP	10. RNO a. Perform the following: 1) Verify Phase B Isolation has actuated as follows: a) Phase B Isolation "RESET" lights - DARK.
NOTE TO EVALUATOR: Step 10 RNO a.1) b) will not apply.		
	BOP	c) Verify following monitor light panel lights - LIT: • Group 1 Sp lights • Group 5 Sp lights • Group 5 St light L/11.
NOTE TO EVALUATOR: Step 10 RNO a.1) d) will not apply.		
	RO or BOP	10. RNO a. 2) Stop all NC pumps.
	BOP	10. RNO a. 3) Maintain seal injection flow.
	BOP	10. RNO a. 4) Energize H ₂ igniters.

Op Test No.:	301	Scenario #	2	Event #	6, and 7	Page	31	of	41
Event Description: A Loop Steam Line Break Inside Containment, 1NI-9A will not open and 1NI-10B opens in manual.									
Time	Position	Applicant's Actions or Behavior							

	RO or BOP	10. RNO a. 5) Dispatch operator to perform the following: a) Secure all ice condenser air handling units. <u>REFER TO</u> EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11 (Securing All Ice Condenser Units). b) Place containment H ₂ analyzers in service. <u>REFER TO</u> OP/1/A/6450/010 (Containment Hydrogen Control Systems).
	BOP	10. RNO a. 6) WHEN 9 minutes has elapsed, THEN verify proper VX system operation. <u>REFER TO</u> Enclosure 5 (VX System Operation).
	SRO	10. RNO a. 7) <u>GO TO</u> Step 11.
	RO	11. Verify proper CA pump status as follows: a. Motor driven CA pumps - ON. b. 3 S/G N/R levels - GREATER THAN 11%.
	BOP	12. Verify all of the following S/I pumps - ON: <ul style="list-style-type: none"> NV pumps ND pumps NI pumps.
NOTE TO EVALUATOR: The crew may decide to not transition to the RNO due to 1A NI Pump tagged out.		
	BOP	13. Verify all KC pumps - ON.
	BOP	14. Verify all Unit 1 and Unit 2 RN pumps - ON.
	BOP	14. RNO Perform the following: a. IF any Unit 2 RN pump off, THEN start affected pump(s).
NOTE TO EVALUATOR: RNO Step 14.b. will not apply.		
	BOP	15. Verify proper ventilation systems operation as follows: <ul style="list-style-type: none"> <u>REFER TO</u> Enclosure 2 (Ventilation System Verification). Notify Unit 2 operator to perform Enclosure 3 (Opposite Unit Ventilation Verification).
NOTE TO EVALUATOR: SRO hands Enclosure 3 to a Unit 2 operator and sets Enclosure 3 off to the side.		
	RO	16. Verify all S/G pressures - GREATER THAN 775 PSIG.

Op Test No.:	<u>301</u>	Scenario #	<u>2</u>	Event #	<u>6, and 7</u>	Page	<u>32</u>	of	<u>41</u>
Event Description:		A Loop Steam Line Break Inside Containment, 1NI-9A will not open and 1NI-10B opens in manual.							
Time	Position	Applicant's Actions or Behavior							

	RO	16. RNO Perform the following: a. Verify Main Steam Isolation as follows: <ul style="list-style-type: none"> • All MSIVs - CLOSED • All MSIV bypass valves - CLOSED • All S/G PORVs - CLOSED.
NOTE TO EVALUATOR: Step 16 RNO b. will not apply		
	RO	17. Verify proper S/I flow as follows:
	RO	a. "NV S/I FLOW" - INDICATING FLOW.
	RO	b. NC pressure - LESS THAN 1620 PSIG.
	RO	17.b. RNO b. Perform the following: 1) Ensure ND pump miniflow valve on operating ND pump(s) - OPEN.
NOTE TO EVALUATOR: Step 17 RNO b. 2) will not apply		
	SRO	3) <u>GO TO</u> Step 18.
	RO or BOP	18. WHEN time and manpower permit (within two hours of event), THEN monitor Spent Fuel Pool level and temperature. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring).
	RO	19. Control S/G levels as follows: a. Verify total CA flow - GREATER THAN 450 GPM.
NOTE TO EVALUATOR: Total CA flow may not be > 450 gpm due to being under operator control, in which case, the RNO for 19 a. will not apply.		
	RO	b. WHEN each S/G N/R level greater than 11% (29% ACC), THEN control feed flow to maintain that S/G N/R level between 11% (29% ACC) and 50%.
	RO	20. Verify all CA isolation valves - OPEN.
	BOP	21. Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.
	BOP	21. RNO Align equipment.
END EVENT 7		

Op Test No.: 301 Scenario # 2 Event # 6 Page 33 of 41

Event Description: A Loop Steam Line Break Inside Containment.

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE Enclosure 4 (NC Temperature Control) shall remain in effect until subsequent procedures provide alternative NC temperature control guidance.

	RO	22. Control NC temperature. REFER TO Enclosure 4 (NC Temperature Control).
	BOP	23. Verify Pzr PORV and Pzr Spray Valve status as follows: a. All Pzr PORVs - CLOSED.
	BOP	23. b. Normal Pzr spray valves - CLOSED.
	BOP	23. c. At least one Pzr PORV isolation valve - OPEN.
	RO or BOP	24. Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.
	RO or BOP	25. Verify main steamlines intact: <ul style="list-style-type: none"> All S/G pressures - STABLE OR INCREASING ALL S/Gs - PRESSURIZED.
	CREW	25. RNO IF pressure in any S/G is decreasing in an uncontrolled manner OR any S/G is depressurized, THEN perform the following: a. Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). b. GO TO EP/1/A/5000/E-2 (Faulted Steam Generator Isolation).

TRANSITION TO EP/1/A/5000/E-2 (Faulted Steam Generator Isolation)

NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.

Op Test No.:	<u>301</u>	Scenario #	<u>2</u>	Event #	<u>6</u>	Page	<u>34</u>	of	<u>41</u>
Event Description: A Loop Steam Line Break Inside Containment.									
Time	Position	Applicant's Actions or Behavior							

EP/1/A/5000/E-2 (Faulted Steam Generator Isolation)		
NOTE TO EVALUATOR: The following steps are from E-2 (Faulted Steam Generator Isolation)		
	RO or BOP	1. Monitor Enclosure 1 (Foldout Page).
	RO or BOP	2. Maintain any faulted S/G or secondary break isolated during subsequent recovery actions unless needed for NC System cooldown.
	RO or BOP	3. Verify the following valves - CLOSED: <ul style="list-style-type: none"> All MSIVs All MSIV bypass valves.
	RO or BOP	4. WHEN TSC staffed, THEN notify TSC of the following: <ul style="list-style-type: none"> IF feedline OR steamline break has occurred inside doghouse, THEN ensure affected doghouse curtains are opened within 24 hours of rupture inside of the doghouse.
	RO or BOP	5. Verify any S/G pressure - STABLE OR INCREASING.
	RO or BOP	6. Identify faulted S/G(s) as follows: <ul style="list-style-type: none"> Verify any S/G pressure - DECREASING IN AN UNCONTROLLED MANNER OR Verify any S/G - DEPRESSURIZED.
	RO or BOP	7. Maintain at least one intact S/G available for NC System cooldown in subsequent steps.
	RO or BOP	8. Verify faulted S/G(s) PORV - CLOSED.
	RO or BOP	9. Ensure CA System valve control - RESET.

Op Test No.: 301 Scenario # 2 Event # 6 Page 35 of 41

Event Description: A Loop Steam Line Break Inside Containment.

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE TO EVALUATOR: The actions of step 10.c.1) may have been performed by the RO during performance of Enclosure 4 (NC Temperature Control) of EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection)

CRITICAL TASK	RO or BOP	<p>10. Isolate all faulted S/G(s) as follows:</p> <ul style="list-style-type: none"> • S/G 1A: <ol style="list-style-type: none"> a. Verify S/G 1A Feedwater Isolation status light (1SI-5) - LIT. b. CLOSE the following valves: <ol style="list-style-type: none"> 1) 1SM-77A (S/G 1A Otlit Hdr Bldwn C/V). 2) 1CA-62A (CA Pmp A Disch To S/G 1A Isol). 3) 1CA-66B (CA Pmp 1 Disch To S/G 1A Isol). c. Verify the following blowdown isolation valves - CLOSED: <ol style="list-style-type: none"> 1) 1BB-56A (S/G 1A Bldwn Cont Isol Insd). 2) 1BB-148B (S/G 1A Bldwn Cont Isol Byp). 3) 1BB-57B (S/G 1A Bldwn Cont Isol Otsd).
	RO	11. WHEN NC T-Hots start to increase, THEN dump steam from intact S/G PORVs to stabilize NC T-Hots.
	BOP	<p>12. Verify secondary radiation normal as follows:</p> <ol style="list-style-type: none"> a. Ensure the following signals - RESET: <ol style="list-style-type: none"> 1) Phase A Containment Isolations. 2) CA System valve control 3) KC NC NI NM St signals.
NOTE TO EVALUATOR: CA System valve control was previously reset by the RO in order to throttle S/G N/R levels as directed by E-0.		

Op Test No.: 301 Scenario # 2 Event # 6 Page 36 of 41

Event Description: A Loop Steam Line Break Inside Containment.

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE TO EVALUATOR: The BOP opens the following valves when aligning the S/Gs for chemistry sample in step b. below:

- 1NM-191B (S/G 1A SMPL HDR CONT ISOL)
- 1NM-201A (S/G 1B SMPL HDR CONT ISOL)
- 1NM-211B (S/G 1C SMPL HDR CONT ISOL)
- 1NM-221A (S/G 1D SMPL HDR CONT ISOL)
- 1NM-190A (S/G 1A BLDWN SMPL CONT ISOL)
- 1NM-200B (S/G 1B BLDWN SMPL CONT ISOL)
- 1NM-210A (S/G 1C BLDWN SMPL CONT ISOL)
- 1NM-220B (S/G 1D BLDWN SMPL CONT ISOL)

	BOP	b. Align all S/Gs for Chemistry sampling.
	RO or BOP	c. Perform at least one of the following: <ul style="list-style-type: none"> • Notify Chemistry to sample all S/Gs for activity. OR <ul style="list-style-type: none"> • Notify RP to frisk all cation columns for activity.
	BOP	d. Verify the following EMF trip 1 lights - DARK: <ul style="list-style-type: none"> • 1EMF-33 (Condenser Air Ejector Exhaust) • 1EMF-26 (Steamline 1A) • 1EMF-27 (Steamline 1B) • 1EMF-28 (Steamline 1C) • 1EMF-29 (Steamline 1D).
	BOP	e. Verify S/G(s) fault - INSIDE CONTAINMENT.
	RO or BOP	f. WHEN activity results are reported, THEN notify station management to evaluate SG(s) activity results.

Op Test No.:	301	Scenario #	2	Event #	6	Page	37	of	41
Event Description: A Loop Steam Line Break Inside Containment.									
Time	Position	Applicant's Actions or Behavior							

	RO	13. Verify S/I termination criteria: a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.
	RO	b. Verify secondary heat sink as follows: <ul style="list-style-type: none"> Any intact S/G N/R level – GREATER THAN 11% (29% ACC) OR <ul style="list-style-type: none"> Total feed flow to intact S/Gs - GREATER THAN 450 GPM.
	RO	c. NC pressure - STABLE OR INCREASING.
	BOP	d. Pzr level - GREATER THAN 11% (30% ACC).
NOTE TO EVALUATOR: If the BOP was slow to open 1NI-10B (NV PUMP C/L INJ ISOL), Pzr level may be less than 30% in which the CREW will transition to E-1 per the RNO. REFER to Attachment 14.		
	CREW	e. <u>GO TO</u> EP/1/A/5000/ES-1.1 (Safety Injection Termination).
NOTE TO EVALUATOR: The SRO will conduct a “Crew Brief” or a “Focus Brief” to summarize the event.		
TRANSITION TO EP/1/A/5000/ES-1.1 (Safety Injection Termination)		

Op Test No.:	301	Scenario #	2	Event #	6	Page	38	of	41
Event Description: A Loop Steam Line Break Inside Containment.									
Time	Position	Applicant's Actions or Behavior							

EP/1/A/5000/ES-1.1 (Safety Injection Termination)		
NOTE TO EVALUATOR: The following steps are from ES-1.1 (Safety Injection Termination)		
	RO and BOP	1. Monitor Enclosure 1 (Foldout Page).
	BOP	2. Reset the following: a. ECCS. b. D/G load sequencers. c. Phase A. d. Phase B. e. IF AT ANY TIME B/O occurs, THEN restart S/I equipment previously on.
NOTE TO EVALUATOR: Phase A was previously reset by the BOP as directed by E-2.		
	BOP	3. Establish VI to Containment as follows: <ul style="list-style-type: none"> Ensure 1VI-77B (VI Cont Isol) - OPEN. Verify VI pressure - GREATER THAN 85 PSIG.
	BOP	4. Ensure only one NV pump - ON.
NOTE TO EVALUATOR: BOP will secure one NV pump.		
	RO or BOP	5. Verify NC pressure - STABLE OR INCREASING.
	BOP	6. Verify VI pressure - GREATER THAN 50 PSIG.
	BOP	7. Isolate NV S/I flowpath as follows: a. Verify the following valves - OPEN: <ul style="list-style-type: none"> 1NV-252A (NV Pumps Suct From FWST) 1NV-253B (NV Pumps Suct From FWST).
	BOP	b. Verify the following valves - OPEN: <ul style="list-style-type: none"> 1NV-203A (NV Pumps A&B Recirc Isol) 1NV-202B (NV Pumps A&B Recirc Isol)
	BOP	c. CLOSE the following valves: <ul style="list-style-type: none"> 1NI-9A (NV Pmp C/L Inj Isol) 1NI-10B (NV Pmp C/L Inj Isol)
END OF EVENT 6		
END OF SCENARIO		

Attachment List

Scenario 2

ATTACHMENT 1 -	Crew Critical Task Summary
ATTACHMENT 2 -	Shift Turnover Information
ATTACHMENT 3 –	OP/1/A/6150/009 Enclosure 4.5 (Manual Operation of the Makeup Controls), rev. 079
ATTACHMENT 4 –	AP/1/A/5500/021 Enclosure 1 (Foldout Page), rev. 042
ATTACHMENT 5 –	AP/0/A/5500/020 Enclosure 1 (Foldout Page), rev. 043
ATTACHMENT 6	AP/1/A/5500/003 Enclosure 3 (Rod Insertion Limit Boration), rev. 041
ATTACHMENT 7 –	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page), rev. 042
ATTACHMENT 8	EP/1/A/5000/E-0 Enclosure 2 (Ventilation System Verification), rev. 042
ATTACHMENT 9 –	EP/1/A/5000/E-0 Enclosure 4 (NC Temperature Control), rev. 042
ATTACHMENT 10 –	EP/1/A/5000/E-0 Enclosure 5 (VX System Operation), rev. 042
ATTACHMENT 11 –	EP/1/A/5000/G-1 Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring), rev. 007
ATTACHMENT 12 –	EP/1/A/5000/E-2 Enclosure 1 (Foldout Page), rev. 015
ATTACHMENT 13 –	EP/1/A/5000/ES-1.1 Enclosure 1 (Foldout Page), rev. 033
ATTACHMENT 14 –	EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant), rev 028

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	UNSAT	CT #	CRITICAL TASK
		C-1	Isolate feed/steam to/from faulted S/G before a transition out of E-2.
		C-2	Manually trip the main turbine before a severe (orange-path) challenge develops to either subcriticality or the integrity CSF or before transition to ECA-2.1, whichever happens first.

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION			
Unit 1 Status			
Power Level	Power History	NCS Boron	Xenon
100%	EOL	90 PPM	per OAC
Controlling Procedure			
<ul style="list-style-type: none">OP/1/A/6100/003 (Controlling Procedure for Unit Operation), Enclosure 4.3 (Unit Operation Between 85% and 100% Power) is in progress up to step 3.21.			
Other Information Needed to Assume the Shift			
<ul style="list-style-type: none">1B NI (Safety Injection) Pump and the 1D RC (Condenser Circulating Water) Pump are tagged out for preventative maintenance. Direction for the crew is to decrease power per the reactivity management plan to ~98% in preparation for removing the 1C1 C Heater Drain Pump for maintenance.			
NEOs Available			
Six NEOs are available as listed on the status board			
METEOROLOGICAL CONDITIONS			
<ul style="list-style-type: none">Upper wind direction = 315 degrees, speed = 10 mphLower wind direction = 315 degrees, speed = 10.5 mphForecast calls for Severe Thunderstorm Watch for the next 4 hours.			

**NRC INITIAL LICENSE EXAM
SCENARIO # 3**

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

Facility:	Catawba NRC Exam 2014	Scenario No.:	3	Op Test No.:	2014301
Examiners:	_____	Operators:	SRO		
	_____		RO		
	_____		BOP		
<p>Initial Conditions: IC# 178; Unit 1 is at 100% power, BOL. Unit 2 is at 100%. 1B NI (Safety Injection) Pump and the 1D RC (Condenser Circulating Water) Pump are tagged out for preventative maintenance.</p>					
<p>Turnover: Unit 1 is at 100% power, BOL. Unit 2 is at 100%. 1B NI (Safety Injection) Pump and the 1D RC (Condenser Circulating Water) Pump are tagged out for preventative maintenance. Borate the NC (Reactor Coolant) System in preparation for swapping Hotwell pumps and Condensate Booster pumps.</p>					

Event No.	Malf. No.	Event Type*	Event Description
1	---	N-BOP N-SRO	Borate the NC (Reactor Coolant) System
2	IRX003A	C-RO C-SRO	Continuous rod motion (insertion). AP/15
3	IPE003B	C-BOP TS-SRO	1NC-27 (Pzr Spray from Loop A) fails open. AP/11
4	RN002B	C-BOP C-SRO TS-SRO	1B RN (Nuclear Service Water) Strainer Hi D/P. AP/20
5	EGB003 IRX009	R-RO C-SRO TS-SRO	KG (Stator Cooling) Turbine runback, Manual Rod Insertion AP/03
6	IRX007D1	C-RO C-SRO	Multiple Control Rods drop
7	NC005D4	M-ALL	Rod Ejection, LOCA
8	CA004A CA004B	C-RO	Both CA (Auxiliary Feedwater) pumps fail to start. 1A starts in manual.
9	ISE011B	C-BOP	Aux Building Unfiltered Exhaust fans fail to stop on S/I

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

Appendix D

Catawba NRC Exam May 2014 Scenario 3 NUREG 1021 Revision 9

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

Scenario 3 – Summary

Initial Condition IC 178

IC# 178; Unit 1 is at 100% power, MOL. Unit 2 is at 100%. 1B NI (Safety Injection) Pump and the 1D RC (Condenser Circulating Water) Pump are tagged out for preventative maintenance.

Turnover:

Unit 1 is at 100% power, MOL. Unit 2 is at 100%. 1B NI (Safety Injection) Pump and the 1D RC (Condenser Circulating Water) Pump are tagged out for preventative maintenance. Borate the NC (Reactor Coolant) System in preparation for swapping Hotwell pumps and Condensate Booster pumps.

Event 1

Borate the NC system in preparation for swapping Hotwell Pumps and Condensate Booster Pumps.

Event 2

Continuous rod motion (insertion). AP/15

Event 3

1NC-27 (Pzr Spray from Loop A) fails open. AP/11

Event 4

1B RN (Nuclear Service Water) strainer Hi D/P. AP/20

Event 5

KG (Stator Cooling) turbine runback, manual rod insertion AP/03

Event 6

Multiple control rods drop

Event 7

Rod ejection, LOCA

Event 8

Both CA (Auxiliary Feedwater) pumps fail to auto start. 1A starts in manual.

Event 9

Aux. Bldg. Unfiltered Exhaust fans fail to stop on SI.

Critical Task 1 – Manually close Pzr spray valve prior to ESF actuation or Rx trip.

Critical task 2 - Manually trip reactor for two or more rods dropped.

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

EXERCISE GUIDE WORKSHEET

1. INITIAL CONDITIONS:

1.1 Reset to IC #178

START

TIME: _____

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		1	MAL-OV0797B (IREDJ5040 RODS IN DEMAND fail to FALSE/TRUE)	TRUE				2
		n/a	MAL-IRX003A (UNCONTROLLED ROD INSERTION)	AUTO				2
		5	IPE003B (PZR SPRAY VLV NC-27 FAIL, NO MAN CTRL)	100				3
		7	MAL-RN002B (RN STRAINER 1B HI D/P)	100				4
		16	LOA-VC038 (MNL RST OF LATCH FOR CHILLER A HI COND PRESS TRP DUE TO LOSS RN)	RESET				4
		9	LOA-EGB003 (KG PUMPS)	STOP BOTH				5
		2	IRX009 (RODS FAIL TO MOVE)	AUTO				5
		11	MAL-IRX007D1 (DROP ROD GROUP CBD1)					6
		14	MAL-NC005D4 (ROD D4 EJECTION)	2000	3 SEC			7
		14	MAL-EDA001C5 (ROD C5 DRPI-OPEN/SHORTED COIL)	BOTH	3 SEC			7
		14	MAL-EDA001E3 (ROD E3 DRPI-OPEN/SHORTED COIL)	BOTH	3 SEC			7
		14	MAL-EDA001D4 (ROD D4 DRPI-OPEN/SHORTED COIL)	BOTH	3 SEC			7
		n/a	MAL-CA004A (FAILURE OF CA PUMP A TO START)	AUTO				8
		n/a	MAL-CA004B (FAILURE OF CA PUMP B TO START)	BOTH				8
		n/a	MAL-ISE011B (AUX BLDG FANS FAIL TO AUTO STOP)					9
		n/a	LOA-NI004 (RACKOUT NI PMP 1B)	RACKOUT				
		n/a	LOA-RC068 (RACKOUT RC PMP 1D)	RACKOUT				

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

			Ensure TRIGGER 2 = x01i123g					
			Ensure TRIGGER 14 = x01o063g I x01o066g					
			Ensure TRIGGER 16 = x11o038r I x14o013r I x01o066g					
			Place red collars on the 1B NI Pump and the 1D RC Pump.					

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

2. SIMULATOR BRIEFING

2.1 Control Room Assignments:

Position	Name
CRS	
RO	
BOP	

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

3. EXERCISE PRESENTATION

3.1 Familiarization Period

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

3.2 **Scenario EVENT 1**, Borate the NC System

3.3 **Scenario EVENT 2**, Continuous Rod Motion

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 1 to give the control rods a signal to start stepping in.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to investigate the problem with the control rods, REPEAT back the information.

3.4 **Scenario EVENT 3**, 1NC-27 fails open

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 5 to cause 1NC-27 to fail open.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to investigate the problem with 1NC-27, REPEAT the information.

3.5 **Scenario EVENT 4**, 1B RN Strainer Hi D/P

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 7 to cause the 1B RN Strainer Hi D/P.

Appendix D

Catawba NRC Exam May 2014 Scenario 3 NUREG 1021 Revision 9

Page 6 of 40

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to investigate the problem with 1B RN Strainer and/or breaker, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF an Operator and/or Maintenance are dispatched to investigate the 1B RN Strainer and/or breaker, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Environmental Chemistry is contacted, REPEAT back the information.

3.6 Scenario EVENT 5, KG Turbine Runback

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 9 to cause the KG Pumps to trip.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is contacted to write a w/r on the KG pump, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator and/or Maintenance is dispatched to investigate the KG pump, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF the SOC is notified of current unit status, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF RP is notified to sample and analyze gaseous effluents, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Primary Chemistry is notified to sample for isotopic analysis of iodine, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF the Reactor Group Engineer is notified of the occurrence, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator dispatched to complete the shutdown of the C Heater Drain Pumps, REPEAT back the information.

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

3.7 Scenario EVENTS 6, 7, 8, and 9

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 11 to cause Control Bank D Group 1 rods to drop.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator and/or Maintenance are dispatched to investigate the 1B CA Pump and/or breaker, REPEAT the order.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to secure all ice condenser air handling units and place Hydrogen Analyzers in service, REPEAT the order.

✓	BOOTH INSTRUCTOR ACTION
	IF Chemistry is notified to sample all S/Gs for activity, REPEAT the order.

✓	BOOTH INSTRUCTOR ACTION
	IF RP is notified to frisk all cation columns for activity, REPEAT the order.

Op Test No.:	<u>301</u>	Scenario #	<u>3</u>	Event #	<u>1</u>	Page	<u>9</u>	of	<u>40</u>
Event Description: NC (Reactor Coolant) System boration									
Time	Position	Applicant's Actions or Behavior							

NOTE TO EVALUATOR: Crew begins with a power decrease. BOP performs a boration per OP/1/A/6150/009, Enclosure 4.2. Initial conditions are complete. A reactivity management brief was performed during turnover. Step 3.1 is complete.

	BOP	Perform a boration.
NOTE TO EVALUATOR: Applicant may perform a boration per OP/1/A/6150/009, Boron Concentration Control, Enclosure 4.5 (Manual Operation Of The Makeup Controls). Refer to Attachment 3.		
NOTE TO EVALUATOR: The following actions are from OP/1/A/6150/009, Boron Concentration Control, Enclosure 4.2 (Boration).		
	BOP	3.2 Ensure the following valve control switches in "AUTO": <ul style="list-style-type: none"> • 1NV-238A (B/A To Blender Ctrl Vlv) • 1NV-186A (B/A Blender Otlt To VCT Otlt)
	BOP	3.3 Ensure 1NV-238A (B/A Xfer Pmp To Blender Ctrl) controller in auto.
	BOP	3.4 Ensure at least one boric acid transfer pump is in "AUTO" or "ON".
	BOP	3.5 Record the desired volume of boric acid to be added. _____ gallons
	BOP	3.6 Adjust the boric acid counter to the desired volume of boric acid to be added. (R.M.)
	BOP	3.7 IF the blender is set up for automatic makeup per Enclosure 4.1 (Automatic Makeup), record the setpoint of the controller for 1NV-238A (B/A Xfer Pmp To Blender Ctrl). _____ gpm
	BOP	3.8 Place the "NC MAKEUP MODE SELECT" switch in "BORATE".
NOTE: Boric Acid flow rates > 32 gpm may result in a boric acid flow deviation annunciator.		

Op Test No.:	301	Scenario #	3	Event #	1	Page	10	of	40
Event Description: NC (Reactor Coolant) System boration									
Time	Position	Applicant's Actions or Behavior							

	BOP	3.9 IF required, adjust the controller for 1NV-238A (B/A Xfer Pmp To Blender Ctrl) to the desired flow.
NOTE TO EVALUATOR: Step 3.10 will be N/A'd		
	BOP	<p>3.11 IF AT ANY TIME it is desired to divert letdown to the RHT manually operate 1NV-172A (3-Way Divert To VCT-RHT) as follows:</p> <p>3.11.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the "RHT" position.</p> <p>3.11.2 Ensure VCT level is monitored continuously while diverting to the RHT.</p> <p>NOTE: Procedure may continue while performing the following step.</p> <p>3.11.3 WHEN desired VCT level is reached return 1NV-172A (3-Way Divert To VCT-RHT) to auto as follows:</p> <p>3.11.3.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "VCT" position.</p> <p>3.11.3.2 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "AUTO" position.</p>
	BOP	3.12 IF AT ANY TIME during the makeup it becomes necessary to change the makeup flow rate, adjust the setpoint for 1NV-238A (B/A Xfer Pmp To Blender Ctrl) as necessary to achieve the desired flow.

Op Test No.: 301 Scenario # 3 Event # 1 Page 11 of 40

Event Description: NC (Reactor Coolant) System boration

Time	Position	Applicant's Actions or Behavior
	BOP	<p>3.13 IF AT ANY TIME while boration is in progress it becomes necessary to stop the boration, perform the following:</p> <p>3.13.1 Place the "NC MAKEUP CONTROL" switch to the "STOP" position.</p> <p>3.13.2 Ensure the following valves close: (R.M.)</p> <ul style="list-style-type: none"> • 1NV-238A (B/A To Blender Ctrl Vlv) • 1NV-186A (B/A Blender Otlt To VCT Otlt) <p>3.13.3 Record boric acid volume added as indicated on the Boric Acid counter. _____ gallons</p> <p>3.13.4 WHEN conditions allow resuming the boration, perform the following:</p> <p>3.13.4.1 Determine remaining volume to be added by subtracting the amount previously added (Step 3.13.3) from the desired volume to be added (Step 3.5).</p> <p>_____ - _____ = _____ gallons (Step 3.5) (Step 3.13.3)</p> <p>3.13.4.2 Adjust boric acid counter to the volume of boric acid determined in Step 3.13.4.1. (R.M.)</p> <p>3.13.4.3 Place the "NC MAKEUP CONTROL" switch in the "START" position. (R.M.)</p> <p>3.13.4.4 Verify the following:</p> <ul style="list-style-type: none"> • 1NV-238A (B/A To Blender Ctrl Vlv) modulates to establish desired flow • 1NV-186A (B/A Blender Otlt To VCT Otlt) opens <p>3.13.4.5 IF in "AUTO", verify the boric acid pump starts.</p>
	BOP	<p>3.14 WHILE makeup is in progress, monitor the following for expected results:</p> <ul style="list-style-type: none"> • Control rod motion • NC System Tavg • Reactor Power
	BOP	<p>3.15 Place the "NC MAKEUP CONTROL" switch to the "START" position. (R.M.)</p>

Op Test No.:	301	Scenario #	3	Event #	1	Page	12	of	40
Event Description: NC (Reactor Coolant) System boration									
Time	Position	Applicant's Actions or Behavior							

	BOP	3.16 Verify the following: <ul style="list-style-type: none"> 1NV-238A (B/A To Blender Ctrl Vlv) modulates to establish desired flow 1NV-186A (B/A Blender Otlt To VCT Otlt) opens
	BOP	3.17 IF in "AUTO", verify the boric acid transfer pump starts.
	BOP	3.18 Verify proper flow by observing the Boric Acid Counter. {PIP 96-0137}
NOTE: The boric acid counter may count up 1 - 5 gallons after termination.		
	BOP	3.19 WHEN the desired volume of boric acid is reached on the boric acid counter, ensure the following valves close: (R.M.) <ul style="list-style-type: none"> 1NV-238A (B/A To Blender Ctrl Vlv) 1NV-186A (B/A Blender Otlt To VCT Otlt)
NOTE TO EVALUATOR: Step 3.20 will be N/A'd		
	BOP	3.21 IF automatic makeup is desired, perform one of the following: <div style="margin-left: 20px;"> 3.21.1 IF it is desired to change the blender outlet boron concentration, refer to Enclosure 4.1 (Automatic Makeup). OR 3.21.2 IF makeup at the previous concentration is acceptable AND the system was previously aligned per Enclosure 4.1 (Automatic Makeup), perform the following: <div style="margin-left: 20px;"> 3.21.2.1 Ensure the controller for 1NV-238A (B/A Xfer Pmp To Blender Ctrl) is set to the value recorded in Step 3.7. (R.M.) 3.21.2.2 Place the "NC MAKEUP MODE SELECT" switch in "AUTO". 3.21.2.3 Place the "NC MAKEUP CONTROL" switch to the "START" position. (R.M.) </div> </div>
NOTE TO EVALUATOR: Step 3.22 will be N/A'd		
END OF BORATION		
END OF EVENT 1		
Booth Operator will insert Trigger 1 for EVENT 2 at discretion of lead examiner.		

Op Test No.:	301	Scenario #	3	Event #	2	Page	13	of	40
Event Description: Continuous rod motion (insertion)									
Time	Position	Applicant's Actions or Behavior							

EVENT 2		
Indications: An audible clicking noise will be heard as the control rods begin to insert without a demand signal present.		
	RO	Recognize rod motion without demand and place the "CRD BANK SELECT" switch in MAN.
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/015, Rod Control Malfunctions, Case II (Continuous Rod Movement).		
	RO	1. Ensure "CRD BANK SELECT" switch - IN MANUAL.
	RO	2. Verify all rod motion - STOPS.
NOTE For T-Ref failures, T-Ref will need to be determined for current power level.		
	RO	3. Manually adjust control rods as necessary to maintain T-Avg within 1°F of T-Ref
	BOP or RO	4. Verify the following channels - NORMAL FOR EXISTING PLANT CONDITIONS: <ul style="list-style-type: none"> NC Loop A T-Avg NC Loop B T-Avg NC Loop C T-Avg NC Loop D T-Avg
	BOP or RO	5. Determine and correct cause of continuous rod movement.
	SRO	6. Ensure compliance with appropriate Tech Specs: <ul style="list-style-type: none"> 3.1.1 (Shutdown Margin (SDM)) 3.1.4 (Rod Group Alignment Limits) 3.1.5 (Shutdown Bank Insertion Limits) 3.1.6 (Control Bank Insertion Limits) 3.3.1 (Reactor Trip Instrumentation) 3.3.2 (ESFAS Instrumentation) 3.4.2 (RCS Minimum Temperature for Criticality).
NOTE TO EVALUATOR: The SRO will determine that no Tech Spec entries are required.		
Booth Operator will insert Trigger 5 for EVENT 3 at discretion of lead examiner.		

Op Test No.:	301	Scenario #	3	Event #	2	Page	14	of	40
Event Description: Continuous rod motion (insertion)									
Time	Position	Applicant's Actions or Behavior							

	SRO	7. Determine required notifications: <ul style="list-style-type: none"> REFER TO RP/0/A/5000/001 (Classification Of Emergency) REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
	CREW	8. <u>WHEN</u> rod control problem is repaired, <u>THEN</u> perform the following: <ol style="list-style-type: none"> Ensure T-Avg - WITHIN 1°F OF T-REF. <u>WHEN</u> desired, <u>THEN</u> place control rods in "AUTO". Ensure steam dumps - IN DESIRED MODE FOR EXISTING PLANT CONDITIONS.
	SRO	9. Determine long term plant status. <u>RETURN TO</u> procedure in effect.
NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.		
END OF EVENT 2		

Op Test No.:	301	Scenario #	3	Event #	3	Page	15	of	40
Event Description: 1NC-27 (Pzr Spray Valve) fails open									
Time	Position	Applicant's Actions or Behavior							

EVENT 3		
Indications:	OAC point C1L4455 'NORMAL SPRAY FLOW ACTIVATED' 1AD-6, F/8 'PZR LO PRESS CONTROL'	
	BOP	Recognizes 1NC-27 (PZR SPRAY CTRL FRM LOOP A) is open
	BOP	Verifies Pressurizer pressure is normal
	BOP	Places controller for 1NC-27 in Manual.
	BOP	Places key switch for 1NC-27 (PZR SPRAY VLV MODE SELECT) to FAIL CLOSED.
NOTE TO EVALUATOR: The crew will make a plant page announcing the entry into AP/1/A/5500/011, Pressurizer Pressure Anomalies.		
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/011, Pressurizer Pressure Anomalies, Case I (Pressurizer Pressure Decreasing)		
	BOP	1. Verify all Pzr PORVs – CLOSED.
NOTE Control rods may withdraw on decreasing NC pressure.		
	BOP	2. Verify Pzr spray valve(s) – CLOSED.
CRITICAL TASK	BOP	2.a. RNO Perform the following: a. CLOSE affected spray valve(s). b. IF affected spray valve(s) will not close, THEN perform the following: 1) Select "FAIL CLOSED" for affected spray valve(s) mode select switch: • "1 NC-27 PZR SPRAY VLV MODE SELECT" • "1 NC-29 PZR SPRAY VLV MODE SELECT".
NOTE TO EVALUATOR: Step 2 RNO b. 2) may apply.		
	BOP	2) IF AT ANY TIME the Control Room Supervisor determines that a reactor trip is required, THEN: a) Trip reactor. b) WHEN reactor power less than 5%, THEN stop NC Pumps 1A and 1B. c) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
	SRO	3) IF NC pressure is stable OR increasing, THEN GO TO Step 3.

Op Test No.:	301	Scenario #	3	Event #	3	Page	16	of	40
Event Description: 1NC-27 (Pzr Spray Valve) fails open									
Time	Position	Applicant's Actions or Behavior							

	BOP	3. Verify all Pzr heaters – ENERGIZED.
	BOP	4. Ensure 1NV-37A (NV Supply To Pzr Aux Spray) – CLOSED.
NOTE Positive reactivity is inserted during an increase in NC pressure which may cause auto rod insertion.		
	BOP	5. Verify NC pressure – STABLE OR INCREASING.
	RO and BOP	6. WHEN NC pressure is stable, THEN: <ul style="list-style-type: none"> Stabilize unit at appropriate power level. Adjust the following as required to maintain T-Avg within 1°F of T-Ref: <ul style="list-style-type: none"> Turbine load Control rods Boron concentration.
NOTE TO EVALUATOR: Step 7 does not apply.		
	BOP	8. Ensure compliance with appropriate Tech Specs: <ul style="list-style-type: none"> 3.3.1 (Reactor Trip System (RTS) Instrumentation) 3.3.2 (Engineered Safety Features Actuation System (ESFAS) Instrumentation) 3.3.3 (Post Accident Monitoring (PAM) Instrumentation) 3.3.4 (Remote Shutdown System) <li style="background-color: yellow;">3.4.1 (RCS Pressure, Temperature, and Flow Departure From Nucleate Boiling (DNB) Limits) 3.4.4 (RCS Loops – MODES 1 and 2) 3.4.5 (RCS Loops – MODE 3) 3.4.6 (RCS Loops – MODE 4) 3.4.9 (Pressurizer) 3.4.10 (Pressurizer Safety Valves) 3.4.11 (Pressurizer Power Operated Relief Valves (PORVs)) 3.4.13 (RCS Operational Leakage).
NOTE TO EVALUATOR: Tech Spec 3.4.1 (RCS Pressure, Temperature and Flow Departure From Nucleate Boiling (DNB) Limits) Condition A (Restore DNB parameter(s) to within limits within 2 hours) should be entered. This condition is likely to be cleared by the time Tech Specs are reviewed per the AP.		

Op Test No.:	301	Scenario #	3	Event #	3	Page	17	of	40
Event Description: 1NC-27 (Pzr Spray Valve) fails open									
Time	Position	Applicant's Actions or Behavior							

NOTE TO EVALUATOR: The SRO will conduct a "Crew Update" to inform the crew of any Tech Spec conditions that have been entered.		
	SRO	9. Determine long term plant status. <u>RETURN TO</u> procedure in effect.
NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.		
Booth Operator will insert Trigger 7 for Event 4 at the discretion of the lead examiner.		
END OF EVENT 3		

Op Test No.:	301	Scenario #	3	Event #	4	Page	18	of	40
Event Description: 1B RN (Nuclear Service Water) Strainer Hi D/P									
Time	Position	Applicant's Actions or Behavior							

EVENT 4		
Indications:	1AD-12, A/2 'RN ESSENTIAL HDR A PRESSURE LO' 1AD-12, A/4 'RN PUMP B FLOW-HI/LO' 1AD-12, A/5 'RN ESSENTIAL HDR B PRESSURE LO' 1AD-12, C/5 'RN PMP B STRAINER HI D/P'	
	BOP	Recognize 1B RN Pump Strainer Hi D/P.
	CREW	Enter AP/0/A/5500/020, Loss of Nuclear Service Water
	BOP	Start an RN Pump
	BOP	Stop 1B RN Pump
NOTE TO EVALUATOR: The crew will make a plant page announcing the entry into AP/0/A/5500/020, Loss of Nuclear Service Water		
NOTE TO EVALUATOR: The crew will may initially choose to take actions of the annunciator response per OP/1/A/6100/010 M, C/5 (RN PMP B STRAINER HI D/P). See Attachment		
NOTE TO EVALUATOR: The following steps are from AP/0/A/5500/020, Loss of Nuclear Service Water, Case I (Loss of RN Train).		
	BOP	1. Start idle RN pump(s) as required.
	SRO	2. Ensure Unit 1 and Unit 2 OATC monitors Enclosure 1 (Foldout Page).
	BOP or SRO	3. Verify RN System in normal alignment as follows: <ul style="list-style-type: none"> Both RN Supply headers - ALIGNED AND <ul style="list-style-type: none"> Both RN Discharge headers - ALIGNED
	BOP	4. Verify each operating RN pump discharge flow - GREATER THAN 8,600 GPM.

Op Test No.: 301 Scenario # 3 Event # 4 Page 19 of 40

Event Description: 1B RN (Nuclear Service Water) Strainer Hi D/P

Time	Position	Applicant's Actions or Behavior
	BOP	<p>4. RNO Perform the following:</p> <ol style="list-style-type: none"> Stop any RN pump(s) not required to support system operation. Ensure the following suction valves to lake - OPEN: <ul style="list-style-type: none"> 1RN-1A (RN P/H Pit A Isol From Lake) 1RN-2B (RN P/H Pit A Isol From Lake) 1RN-5A (RN P/H Pit B Isol From Lake) 1RN-6B (RN P/H Pit B Isol From Lake) Ensure the following essential header isolation valves for required trains - OPEN: <ul style="list-style-type: none"> 1RN-67A (RN Hdr 1A Supply Isol) 1RN-69B (RN Hdr 1B Supply Isol) 2RN-67A (RN Hdr 2A Supply Isol) 2RN-69B (RN Hdr 2B Supply Isol) Ensure the following RN to RL discharge valves - OPEN: <ul style="list-style-type: none"> 1RN-57A (Station RN Disch To RL Sys) 1RN-843B (Station RN Disch To RL Sys) Ensure one of the following RL discharge valves - OPEN: <ul style="list-style-type: none"> 1RL-54 (RN System Disch To A RL Header) OR 1RL-62 (RN System Disch To B RL Header) Ensure the following station RN discharge header crossover valves - OPEN: <ul style="list-style-type: none"> 1RN-54A (Station RN Disch Hdr X-Over) 1RN-53B (Station RN Disch Hdr X-Over)
NOTE TO EVALUATOR: Step 4 RNO 4.g. will not apply.		
	BOP	<p>4. RNO h. Verify the following alarms - DARK:</p> <ul style="list-style-type: none"> 1AD-12, C/2 "RN PMP A STRAINER HI D/P" 1AD-12, C/5 "RN PMP B STRAINER HI D/P" 2AD-12, C/2 "RN PMP A STRAINER HI D/P" 2AD-12, C/5 "RN PMP B STRAINER HI D/P".

Op Test No.:	301	Scenario #	3	Event #	4	Page	20	of	40
Event Description: 1B RN (Nuclear Service Water) Strainer Hi D/P									
Time	Position	Applicant's Actions or Behavior							

NOTE TO EVALUATOR: It is anticipated that the CRS will read step 4 RNO 4.i., but the action will not be taken at this time		
	BOP	4. RNO i. IF any of the previous alarms lit, THEN backflush affected strainer. REFER TO OP/0/A/6400/006C (Nuclear Service Water System).
	BOP	5. Verify each operating RN pump discharge flow - LESS THAN 23,000 GPM.
	BOP	6. Ensure RN pumps - IN OPERATION AS NEEDED.
NOTE TO EVALUATOR: The KC heat exchanger outlet mode switches will be in the "KC Temp" position if the corresponding train of KC is in service. Otherwise, it will be in the "Miniflow" position.		
	BOP	7. Ensure proper alignment of RN to KC Hxs as follows: a. Verify RN - ALIGNED TO IN SERVICE KC HX(S). b. Ensure KC Hx Otl Mode switches -PROPERLY ALIGNED.
	BOP	8. Verify each operating RN pump discharge flow - GREATER THAN 8,600 GPM.
	BOP	9. Verify RN - AVAILABLE TO ALL UNIT 1 AND UNIT 2 D/G(S).
NOTE TO EVALUATOR: The BOP determines that no changes have occurred to the VC/YC (Control Room Ventilation and Chilled Water System) via the OAC or on rear of 1MC-3 in the following step.		
	BOP	10. Determine VC/YC status as follows: • Verify VC/YC - ALIGNED TO OPERATING RN TRAIN. • Verify YC Chiller - RUNNING.
	CREW	11. Determine and correct cause of loss of RN train.

Op Test No.:	301	Scenario #	3	Event #	4	Page	21	of	40
Event Description: 1B RN (Nuclear Service Water) Strainer Hi D/P									
Time	Position	Applicant's Actions or Behavior							

	SRO	<p>12. Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual:</p> <ul style="list-style-type: none"> SLC 16.7-6 (RN Discharge Instrumentation) 3.6.5 (Containment Air Temperature) 3.6.6 (Containment Spray System) 3.6.17 (Containment Valve Injection Water System (CVIWS)) 3.7.5 (Auxiliary Feedwater (AFW) System) 3.7.7 (Component Cooling Water (CCW) System) 3.7.8 (Nuclear Service Water System (NSWS)) 3.7.10 (Control Room Area Ventilation System (CRAVS)) 3.7.11 (Control Room Area Chilled Water System (CRACWS)) 3.8.1 (A.C. Sources - Operating) 3.8.2 (A.C. Sources - Shutdown).
NOTE TO EVALUATOR: T.S. 3.7.8 Condition A (Restore train to OPERABLE status within 72 hours) should be entered.		
NOTE TO EVALUATOR: The SRO will conduct a "Crew Update" to inform the crew of any Tech Spec conditions that have been entered.		
Booth Operator will insert Trigger 9 for EVENT 5 at the discretion of the lead examiner.		
	SRO	<p>13. Determine required notifications:</p> <ul style="list-style-type: none"> REFER TO RP/0/A/5000/001(Classification Of Emergency) REFER TO RP/0/B/5000/013 (NRC Notification Requirements)
	BOP	14. Notify Environmental Chemistry of any RN pump shifts that have occurred.
	SRO	15. Determine long term plant status. <u>RETURN TO</u> procedure in effect.
NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.		
END OF EVENT 4		

Op Test No.:	301	Scenario #	3	Event #	5	Page	22	of	40
Event Description: KG (Stator Cooling) Turbine runback, Manual rod insertion									
Time	Position	Applicant's Actions or Behavior							

EVENT 5		
Indications:	1AD-1, F/4 'TURB RUNBACK INITIATED' 1AD-1, F/6 'H2-KG PANEL TROUBLE'	
	RO	Recognize Turbine runback
	RO	Recognize Control Rods fail to insert
	RO	Ensure 'CRD Bank Select' Switch to 'MAN'
	RO	Insert Control Rods to maintain Tavg within 1 deg of Tref
	CREW	Enter AP/1/A/5500/003, Load Rejection
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/003, Load Rejection, Case 1 (Switchyard Available)		
	RO	1. Verify turbine load - DECREASING IN AUTOMATIC.
	RO	2. Verify proper reactor response: <ul style="list-style-type: none"> Control rods - IN "AUTO" AND STEPPING IN P/R neutron flux - DECREASING.
	RO	2. RNO IF T-Avg is greater than 1.5°F higher than T-Ref, THEN insert control rods as required to maintain T-Avg within 1°F of T-Ref.
NOTE TO EVALUATOR: The intent of EVENT 5 is for a reactivity manipulation for the RO position. The scenario will continue at the discretion of the lead examiner.		
Booth Operator will insert Trigger 11 for EVENT 6 at the discretion of the lead examiner.		

Op Test No.:	301	Scenario #	3	Event #	5	Page	23	of	40
Event Description: KG (Stator Cooling) Turbine runback, Manual rod insertion									
Time	Position	Applicant's Actions or Behavior							

	RO	3. Verify proper steam dump operation as follows: <ol style="list-style-type: none"> Verify T-Ref instrumentation - AVAILABLE. "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT. Verify the following: "C-7A LOSS OF LOAD INTLK COND DUMP" status light (1SI 18) - LIT. Steam dump valves - MODULATING. T-Avg - DECREASING TO T-REF.
	BOP	4. Verify Pzr PORV and Pzr spray valve status as follows: <ol style="list-style-type: none"> All Pzr PORVs - CLOSED. Normal Pzr spray valves - CLOSED.
	BOP	5. Verify proper CM System operation as follows: <ol style="list-style-type: none"> WHEN reactor power is less than 75%, THEN ensure both C-htr drain pumps - OFF. Verify reactor power - GREATER THAN 56% PRIOR TO THE EVENT. Verify standby hotwell pump(s) - ON.
NOTE TO EVALUATOR: The crew will determine that the RNO for step 5.c. will not be necessary		
	BOP	d. Verify standby condensate booster pump(s) - ON
NOTE TO EVALUATOR: The crew will determine that the RNO for step 5.d. will not be necessary		
	BOP	6. Verify the following generator alarms - DARK: <ul style="list-style-type: none"> 1AD-11, C/1 "GEN BKR A OVER CURRENT" 1AD-11, F/1 "GEN BKR B OVERCURRENT".
	RO	7. Verify S/G levels are adequate as follows: <ul style="list-style-type: none"> All S/G low level alert alarms (1AD-4) - DARK All S/G low CF flow alarms (1AD-4) - DARK.
	RO	8. Verify reactor power - GREATER THAN 20%.
	RO	9. IF AT ANY TIME reactor power is less than or equal to 20%, THEN perform Step 8 RNO.

Op Test No.:	<u>301</u>	Scenario #	<u>3</u>	Event #	<u>5</u>	Page	<u>24</u>	of	<u>40</u>
Event Description: KG (Stator Cooling) Turbine runback, Manual rod insertion									
Time	Position	Applicant's Actions or Behavior							

	BOP	10. Verify AS header pressure - GREATER THAN OR EQUAL TO 140 PSIG.
	BOP	10. RNO Adjust 1AS-2 (Main Stm To Aux Steam) as required to maintain AS header pressure between 140 PSIG and 150 PSIG.
	RO	11. Adjust 1TL-4 (Stm Seal Reg Byp) as necessary to maintain steam seal pressure between 4 PSIG - 6 PSIG.
	BOP	12. Monitor Enclosure 3 (Rod Insertion Limit Boration).
	RO	13. Verify reactor power - LESS THAN 30%.
	RO	13. RNO Perform the following: a. IF the runback target load is less than 30%, THEN : 1) WHEN time and personnel permit, THEN perform applicable steps of OP/1/A/6100/003 (Controlling Procedure For Unit Operation).
	SRO	2) Do not continue in this procedure until reactor power is less than 30%. 3) WHEN reactor power is less than 30%, THEN GO TO Step 14.
	RO	14. Verify the "RESET" light on "AMSAC FOR CF VALVES" switch - DARK.
	BOP	15. Verify the following PCBs - CLOSED: <ul style="list-style-type: none"> • Generator breaker 1A • Generator breaker 1B • PCB 14 • PCB 15 • PCB 17 • PCB 18.
	RO	16. Adjust power factor as necessary. REFER TO Unit 1 Revised Data Book Figure 43.

Op Test No.: 301 Scenario # 3 Event # 5 Page 25 of 40

Event Description: KG (Stator Cooling) Turbine runback, Manual rod insertion

Time	Position	Applicant's Actions or Behavior
	RO and BOP	<p>17. WHEN the appropriate runback target load is reached, THEN:</p> <ul style="list-style-type: none"> Stabilize unit at appropriate power level. Maintain control rods above insertion limits. Adjust the following as required to maintain T-Avg within 1°F of T-Ref: <ul style="list-style-type: none"> Turbine load Control rods Boron concentration.
	RO or BOP	18. Notify System Operating Center (SOC) using the red dispatcher telephone of current unit status.
	CREW	19. Determine and correct cause of load rejection.
	BOP	20. Shut down unnecessary plant equipment as follows: <ol style="list-style-type: none"> Restore CM and CF as follows: <ol style="list-style-type: none"> Verify C-htr drain pumps - ON.
	BOP	20.a.1) RNO 1) WHEN time and manpower permit, THEN complete the shutdown of the C-htr drain pumps. REFER TO OP/1/B/6250/004 (Feedwater Heater Vents, Drains and Bleed System).
	BOP	<ol style="list-style-type: none"> Verify both CF Pumps - IN SERVICE. Shutdown one CF pump as necessary. REFER TO OP/1/A/6250/001 (Condensate and Feedwater System). Shutdown excess Condensate Booster Pumps. REFER TO OP/1/A/6250/001 (Condensate and Feedwater System). Shutdown excess Hotwell Pumps. REFER TO OP/1/A/6250/001 (Condensate and Feedwater System).
	BOP	<ol style="list-style-type: none"> RC pump(s) and cooling tower fans. REFER TO OP/1/B/6400/001A (Condenser Circulating Water System).

Op Test No.: 301 Scenario # 3 Event # 5 Page 26 of 40

Event Description: KG (Stator Cooling) Turbine runback, Manual rod insertion

Time	Position	Applicant's Actions or Behavior
	RO	<p>21. Reset steam dump valves as follows:</p> <ul style="list-style-type: none"> 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"> • "C-7A LOSS OF LOAD INTLK COND DUMP" • "C-7B LOSS OF LOAD INTLK ATMOS DUMP". f. IF "T-AVG" mode of operation is available, THEN ensure steam dump valves in "T-AVG" mode. g. Verify "STM DUMP CTRL" - IN AUTO.
	RO	22. Verify reactor power - GREATER THAN 15%.
	RO	23. Verify CA pumps - OFF.
	RO	24. Verify reactor power change – GREATER THAN <u>OR</u> EQUAL TO 15% IN A 1 HOUR PERIOD.
	RO or BOP	<p>25. Notify the following sections to take appropriate samples:</p> <ul style="list-style-type: none"> • Radiation Protection to sample and analyze gaseous effluents. REFER TO Selected Licensee Commitments Manual, Section 16.11-6. • Primary Chemistry to sample for isotopic analysis of iodine. REFER TO Tech Specs 3.4.16 (Sample must be taken between 2 hours and 6 hours following last power change greater than or equal to 15% rated thermal power within a 1 hour period).
	SRO	<p>26. Ensure compliance with appropriate Tech Specs:</p> <ul style="list-style-type: none"> • 3.1.1 (Shutdown Margin (SDM)) • 3.1.6 (Control Bank Insertion Limits) • 3.8.1 (AC Sources - Operating) • SLC 16.8-2 (230 KV Switchyard Systems).
NOTE TO EVALUATOR: The SRO will determine that Tech Spec 3.1.6 Condition A (1 hour and 2 hours) should be entered.		
	BOP	27. Notify Reactor Group Engineer of occurrence.
	SRO	28. Determine long term plant status. <u>RETURN TO</u> OP/1/A/6100/003 (Controlling Procedure For Unit Operation).
END OF EVENT 5		

Op Test No.:	301	Scenario #	3	Event #	6	Page	27	of	40
Event Description: Multiple Control Rods drop									
Time	Position	Applicant's Actions or Behavior							

EVENT 6		
INDICATIONS: 1AD-2, D/9 'RPI AT BOTTOM ROD DROP' 1AD-2, E/9 'RPI TWO OR MORE RODS AT BOTTOM'		
	RO	Recognize multiple dropped control rods and perform the Immediate Actions of AP/1/A/5500/014 (Control Rod Misalignment), Case II (Dropped Control Rod)
NOTE TO EVALUATOR:		Due to the immediate action nature of the event, it is not anticipated that the crew will have time to make a plant page announcing the entry into AP/1/A/5500/014 (Control Rod Misalignment).
NOTE TO EVALUATOR:		The following steps are from AP/1/A/5500/014 (Control Rod Misalignment). The actions will be taken, however the procedure will not be read by the CRS, since these are Immediate Actions.
	RO	1. Verify only one rod - DROPPED OR MISALIGNED
CRITICAL TASK	RO	1. RNO <u>IF</u> two or more rods are dropped <u>OR</u> misaligned by greater than 24 steps, <u>THEN</u>: a. Manually trip Reactor.
	CREW	b. <u>GO TO</u> EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).
END OF EVENT 6		
TRANSITION TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)		

Op Test No.:	301	Scenario #	3	Event #	7, 8 and 9	Page	28	of	40
Event Description: Rod Ejection, LOCA, Both CA (Auxiliary Feedwater) pumps fail to start. 1A starts in manual. Aux Building Unfiltered Exhaust fans fail to stop on S/I.									
Time	Position	Applicant's Actions or Behavior							

EVENTS 7, 8 AND 9		
NOTE TO EVALUATOR: The following steps are from EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)		
	RO and BOP	1. Monitor Enclosure 1 (Foldout Page).
	RO	2. Verify Reactor Trip: Perform the following: <ul style="list-style-type: none"> All rod bottom lights - LIT All reactor trip and bypass breakers - OPEN I/R power - DECREASING.
	RO	2. RNO Perform the following: <ul style="list-style-type: none"> a. Trip reactor.
NOTE TO EVALUATOR: RNO Step 2.b. will not apply		
	RO	3. Verify Turbine Trip: Perform the following: <ul style="list-style-type: none"> All turbine stop valves - CLOSED
	BOP	4. Verify 1ETA and 1ETB - ENERGIZED.
	RO	5. Verify S/I is actuated: <ul style="list-style-type: none"> a. "SAFETY INJECTION ACTUATED" status light (1SI-13) – LIT b. Both E/S load sequencer actuated status lights (1SI-14) - LIT.
	RO	6. Announce "Unit 1 Safety Injection".
	SRO	7. Determine required notifications: <ul style="list-style-type: none"> <u>REFER TO</u> RP/0/A/5000/001(Classification Of Emergency) <u>REFER TO</u> RP/0/B/5000/013 (NRC Notification Requirements).
	RO or BOP	8. Verify all Feedwater Isolation status lights (1SI-5) - LIT
	BOP	9. Verify Phase A Containment Isolation status as follows: <ul style="list-style-type: none"> a. Phase A "RESET" lights - DARK.
	BOP	<ul style="list-style-type: none"> b. Monitor Light Panel Group 5 St lights on energized train(s) - LIT.
	BOP	10. Verify proper Phase B actuation as follows: <ul style="list-style-type: none"> a. Verify Containment pressure - HAS REMAINED LESS THAN 3 PSIG

Op Test No.:	301	Scenario #	3	Event #	7, 8 and 9	Page	29	of	40
Event Description: Rod Ejection, LOCA, Both CA (Auxiliary Feedwater) pumps fail to start. 1A starts in manual. Aux Building Unfiltered Exhaust fans fail to stop on S/I.									
Time	Position	Applicant's Actions or Behavior							

	RO or BOP	b. IF AT ANY TIME containment pressure exceeds 3 PSIG while in this procedure, THEN perform Step 10.a.
	RO	11. Verify proper CA pump status as follows: a. Motor driven CA pumps - ON.
	BOP	11.a. RNO a. Perform the following for affected train(s): 1) Reset ECCS. 2) Reset D/G load sequencer(s).
	RO	3) Start affected pump(s).
	RO AND BOP	4) IF AT ANY TIME B/O occurs, THEN restart S/I equipment previously on.
END OF EVENT 8		
	RO	b. 3 S/G N/R levels - GREATER THAN 11%.
	BOP	12. Verify all of the following S/I pumps - ON: <ul style="list-style-type: none"> NV pumps ND pumps NI pumps.
NOTE TO EVALUATOR: The crew may decide to not transition to the RNO due to 1A NI Pump tagged out.		

Op Test No.:	301	Scenario #	3	Event #	7 and 9	Page	30	of	40
Event Description: Rod Ejection, LOCA, Aux Building Unfiltered Exhaust fans fail to stop on S/I.									
Time	Position	Applicant's Actions or Behavior							

	BOP	13. Verify all KC pumps - ON.
	BOP	14. Verify all Unit 1 and Unit 2 RN pumps - ON.
NOTE TO EVALUATOR: The SRO may have the BOP secure the 1B (Nuclear Service Water) Pump due the Hi strainer D/P		
	BOP	15. Verify proper ventilation systems operation as follows: <ul style="list-style-type: none"> <u>REFER TO</u> Enclosure 2 (Ventilation System Verification). Notify Unit 2 operator to perform Enclosure 3 (Opposite Unit Ventilation Verification).
NOTE TO EVALUATOR: SRO hands Enclosure 3 to a Unit 2 operator and sets Enclosure 3 off to the side.		
NOTE TO EVALUATOR: The BOP will correct Event 9 while performing Enclosure 2		
END OF EVENT 9		
	RO	16. Verify all S/G pressures - GREATER THAN 775 PSIG.
	RO	17. Verify proper S/I flow as follows: <ul style="list-style-type: none"> 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.
	RO	17.d. RNO d. Perform the following: <ul style="list-style-type: none"> 1) Ensure ND pump miniflow valve on operating ND pump(s) - OPEN.
NOTE TO EVALUATOR: Step 17 RNO b. 2) will not apply		
	SRO	3) <u>GO TO</u> Step 18.
	RO or BOP	18. <u>WHEN</u> time and manpower permit (within two hours of event), <u>THEN</u> monitor Spent Fuel Pool level and temperature. <u>REFER TO</u> EP/1/A/5000/G-1(Generic Enclosures), Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring).
	RO	19. Control S/G levels as follows: <ul style="list-style-type: none"> a. Verify total CA flow - GREATER THAN 450 GPM. b. <u>WHEN</u> each S/G N/R level greater than 11% (29% ACC), <u>THEN</u> control feed flow to maintain that S/G N/R level between 11% (29% ACC) and 50%.

Op Test No.:	301	Scenario #	3	Event #	7	Page	31	of	40
Event Description: Rod Ejection, LOCA,									
Time	Position	Applicant's Actions or Behavior							

	RO	20. Verify all CA isolation valves - OPEN.
	BOP	21. Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.
	BOP	21. RNO Align equipment.
NOTE Enclosure 4 (NC Temperature Control) shall remain in effect until subsequent procedures provide alternative NC temperature control guidance.		
	RO	22. Control NC temperature. REFER TO Enclosure 4 (NC Temperature Control).
	BOP	23. Verify Pzr PORV and Pzr Spray Valve status as follows: a. All Pzr PORVs - CLOSED.
	BOP	23. b. Normal Pzr spray valves - CLOSED.
	BOP	23. c. At least one Pzr PORV isolation valve - OPEN.
	RO or BOP	24. Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.
	RO or BOP	24. RNO IF any NV OR NI pump on, THEN perform the following: a. Ensure all NC pumps - OFF. b. Maintain seal injection flow.
	RO or BOP	25. Verify main steamlines intact: • All S/G pressures - STABLE OR INCREASING • ALL S/Gs - PRESSURIZED.
	BOP	26. Verify S/G tubes are intact as follows: • Verify the following EMF trip 1 lights - DARK: • 1EMF-33 (Condenser Air Ejector Exhaust) • 1EMF-26 (Steamline 1A) • 1EMF-27 (Steamline 1B) • 1EMF-28 (Steamline 1C) • 1EMF-29 (Steamline 1D). • All S/G levels - STABLE OR INCREASING IN A CONTROLLED MANNER.
	BOP	27. Verify NC System intact as follows: • Containment pressure - LESS THAN 1 PSIG.

Op Test No.:	<u>301</u>	Scenario #	<u>3</u>	Event #	<u>7</u>	Page	<u>32</u>	of	<u>40</u>
Event Description: Rod Ejection, LOCA,									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>27. RNO Perform the following:</p> <p>a. Energize H2 igniters.</p> <p>b. Dispatch operator to perform the following:</p> <ol style="list-style-type: none"> 1) Secure all ice condenser air handling units. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11(Securing All Ice Condenser Units). 2) Place containment H2 analyzers in service. REFER TO OP/1/A/6450/010 (Containment Hydrogen Control Systems). <p>c. IF both the following conditions exist,</p> <ul style="list-style-type: none"> • Containment pressure – BETWEEN 1 PSIG AND 3 PSIG • Containment pressure – HAS REMAINED LESS THAN 3 PSIG <p>THEN start one VX fan and secure normal containment ventilation. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 18 (VX and Containment Ventilation Control).</p>
	CREW	<p>d. Concurrently:</p> <ul style="list-style-type: none"> • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees • GO TO EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant.
<p>TRANSITION TO EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant)</p>		
<p>NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.</p>		

Op Test No.: 301 Scenario # 3 Event # 7 Page 33 of 40

Event Description: Rod Ejection, LOCA,

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE TO EVALUATOR: The following steps are from EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant)

	RO and BOP	1. Monitor Enclosure 1 (Foldout Page).
	RO or BOP	2. Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.
	RO or BOP	2. RNO IF any NV OR NI pump is on, THEN perform the following: a. Ensure all NC pumps - OFF. b. Maintain seal injection flow.
	BOP	3. Verify main steamlines intact: • All S/G pressures - STABLE OR INCREASING • All S/Gs - PRESSURIZED
	RO	4. Control intact S/G N/R 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 11% (29% ACC) and 50%.
	BOP	5. Reset the following: a. ECCS. b. D/G load sequencers. c. Phase A d. Phase B. e. IF AT ANY TIME B/O occurs, THEN restart S/I equipment previously on.
	BOP	6. Establish VI to Containment as follows: • Ensure 1VI-77B (VI Cont Isol) - OPEN. • Verify VI pressure - GREATER THAN 85 PSIG.
	RO	7. Verify secondary radiation - NORMAL: a. Ensure the following signals - RESET: 1) CA System valve control
	BOP	2) KC NC NI NM St signals.

Op Test No.: 301 Scenario # 3 Event # 7 Page 34 of 40

Event Description: Rod Ejection, LOCA,

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE TO EVALUATOR: The BOP opens the following valves when aligning the S/Gs for chemistry sample in step b. below:

- 1NM-191B (S/G 1A SMPL HDR CONT ISOL)
- 1NM-201A (S/G 1B SMPL HDR CONT ISOL)
- 1NM-211B (S/G 1C SMPL HDR CONT ISOL)
- 1NM-221A (S/G 1D SMPL HDR CONT ISOL)
- 1NM-190A (S/G 1A BLDWN SMPL CONT ISOL)
- 1NM-200B (S/G 1B BLDWN SMPL CONT ISOL)
- 1NM-210A (S/G 1C BLDWN SMPL CONT ISOL)
- 1NM-220B (S/G 1D BLDWN SMPL CONT ISOL)

	BOP	b. Align all S/Gs for Chemistry sampling.
	RO or BOP	c. Perform at least one of the following: <ul style="list-style-type: none"> • Notify Chemistry to sample all S/Gs for activity. OR <ul style="list-style-type: none"> • Notify RP to frisk all cation columns for activity.
	BOP	d. Verify the following EMF trip 1 lights - DARK: <ul style="list-style-type: none"> • 1EMF-33 (Condenser Air Ejector Exhaust) • 1EMF-26 (Steamline 1A) • 1EMF-27 (Steamline 1B) • 1EMF-28 (Steamline 1C) • 1EMF-29 (Steamline 1D).
	RO	e. Verify all S/Gs - INTACT <ul style="list-style-type: none"> • All S/G pressures - STABLE OR INCREASING • All S/Gs - PRESSURIZED

Op Test No.: 301 Scenario # 3 Event # 7 Page 35 of 40

Event Description: Rod Ejection, LOCA,

Time	Position	Applicant's Actions or Behavior
	RO or BOP	f. WHEN activity results are reported, THEN verify all S/Gs indicate no activity.
	BOP	8. Verify Pzr PORVs and Isolation Valves: a. Power to all Pzr PORV isolation valves - AVAILABLE. b. All Pzr PORVs – CLOSED.
	BOP	c. Any Pzr PORV isolation valve - OPEN.
	RO or BOP	d. IF AT ANY TIME any Pzr PORV opens due to high pressure, THEN after Pzr pressure decreases to less than 2315 PSIG, ensure PORV closes or is isolated.
	RO or BOP	9. Verify S/I termination criteria: a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.
	SRO	9.a. RNO a. GO TO Step 9.f.
	RO or BOP	f. Monitor S/I termination criteria. REFER TO Enclosure 2 (S/I Termination Criteria).
	CREW	g. IF AT ANY TIME S/I termination criteria met while in this procedure, THEN RETURN TO Step 9.
	RO or BOP	10. Determine if ND pumps should be stopped: a. NC pressure - GREATER THAN 285 PSIG. b. NC pressure - STABLE OR INCREASING
	SRO	10.b. RNO b. GO TO Step 11.
	RO	11. Verify NC and S/G pressures as follows: a. All S/G pressures - STABLE OR INCREASING.
	RO or BOP	b. NC pressure - STABLE OR DECREASING.

Op Test No.: 301 Scenario # 3 Event # 7 Page 36 of 40

Event Description: Rod Ejection, LOCA,

Time	Position	Applicant's Actions or Behavior
	BOP	<p>12. Verify D/Gs should be stopped:</p> <ul style="list-style-type: none"> a. Any D/G - ON. b. Verify 1ETA is energized by offsite power as follows: <ul style="list-style-type: none"> • "D/G 1A BKR TO ETA" - OPEN • 1ETA - ENERGIZED. c. Dispatch operator to stop 1A D/G and place in standby readiness. REFER TO OP/1/A/6350/002 (Diesel Generator Operation). d. Verify 1ETB is energized by offsite power as follows: <ul style="list-style-type: none"> • "D/G 1B BKR TO ETB" - OPEN • 1ETB - ENERGIZED. e. Dispatch operator to stop 1B D/G and place in standby readiness. REFER TO OP/1/A/6350/002 (Diesel Generator Operation).
	BOP	<p>13. Obtain containment H₂ concentration as follows:</p> <ul style="list-style-type: none"> a. Ensure operator dispatched to secure all ice condenser air handling units. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11 (Securing All Ice Condenser Units). b. Verify containment H₂ analyzers - IN SERVICE
	CREW	<p>13.b. RNO b. Perform the following:</p> <ul style="list-style-type: none"> 1) Dispatch operator to place containment H₂ analyzers in service. REFER TO OP/1/A/6450/010 (Containment Hydrogen Control Systems). 2) WHEN H₂ analyzers are in service, THEN perform Steps 13.c through 13.e. 3) GO TO Step 14.
	BOP	<p>14. Initiate evaluation of plant status as follows:</p> <ul style="list-style-type: none"> a. Verify Cold Leg Recirc capability from at least one train: <ul style="list-style-type: none"> • A Train: <ul style="list-style-type: none"> • 1A ND pump - AVAILABLE • 1NI-185A (ND Pump 1A Cont Sump Suct) – POWER AVAILABLE OR • B Train: <ul style="list-style-type: none"> • 1B ND pump - AVAILABLE • 1NI-184B (ND Pump 1B Cont Sump Suct) – POWER AVAILABLE

Op Test No.:	301	Scenario #	3	Event #	7	Page	37	of	40
Event Description: Rod Ejection, LOCA,									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>b. Determine if leak is in auxiliary building:</p> <p>1) Verify auxiliary building radiation:</p> <ul style="list-style-type: none"> • All area monitor EMF trip 1 lights - DARK. • EMF-41 (Aux Bldg Ventilation) trip 1 light – DARK <p>NOTE The following step is checking for a significant NC leak into the ND System.</p> <p>2) Verify NC to ND pressure boundary intact as follows:</p> <ul style="list-style-type: none"> • ND Pressure - NORMAL • ND Temperature - NORMAL • ND Flow – NORMAL <p>c. Determine if NC is leaking into KC system:</p> <ul style="list-style-type: none"> • 1EMF-46A (COMPONENT COOLING TRAIN A) trip 1 light - DARK. • 1EMF-46B (COMPONENT COOLING TRAIN B) trip 1 light - DARK. <p>d. Ensure KC NC NI NM St signals - RESET</p> <p>e. WHEN TSC is staffed, THEN notify TSC to perform Enclosure 4 (TSC Actions).</p>
	RO or BOP	<p>15. Determine if NC System cooldown and depressurization is required:</p> <p>a. NC pressure - GREATER THAN 285 PSIG</p>
	CREW	<p>b. GO TO EP/1/A/5000/ES-1.2 (Post LOCA Cooldown And Depressurization)</p>
TRANSITION TO EP/1/A/5000/ES-1.2 (Post LOCA Cooldown And Depressurization)		
END OF SCENARIO		

Attachment List

Scenario 3

ATTACHMENT 1 -	Crew Critical Task Summary
ATTACHMENT 2 -	Shift Turnover Information
ATTACHMENT 3 –	OP/1/A/6150/009 Enclosure 4.5 (Manual Operation of the Makeup Controls), rev. 079
ATTACHMENT 4 –	AP/0/A/5500/020 Enclosure 1 (Foldout Page), rev. 043
ATTACHMENT 5 –	AP/1/A/5500/003 Enclosure 3 (Rod Insertion Limit Boration), rev. 041
ATTACHMENT 6	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page), rev. 042
ATTACHMENT 7 –	EP/1/A/5000/E-0 Enclosure 2 (Ventilation System Verification), rev. 042
ATTACHMENT 8	EP/1/A/5000/E-0 Enclosure 4 (NC Temperature Control), Rev. 042
ATTACHMENT 9 –	EP/1/A/5000/G-1 Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring), rev. 007
ATTACHMENT 10 –	EP/1/A/5000/G-1 Enclosure 18 (VX and Containment Ventilation Control), rev. 007
ATTACHMENT 11 –	EP/1/A/5000/E-1 Enclosure 1 (Foldout Page), rev. 028
ATTACHMENT 12 –	EP/1/A/5000/E-1 Enclosure 2 (S/I Termination Criteria), rev. 028

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	UNSAT	CT #	CRITICAL TASK
		C-1	Manually close Pzr spray valve prior to ESF actuation or Rx trip.
		C-2	Manually trip reactor for two or more rods dropped.

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION			
Unit 1 Status			
Power Level	Power History	NCS Boron	Xenon
100%	BOL	1162 PPM	per OAC
Controlling Procedure			
<ul style="list-style-type: none"> OP/1/A/6100/003 (Controlling Procedure for Unit Operation), Enclosure 4.3 (Unit Operation Between 85% and 100% Power) is in progress through step 3.16. 			
Other Information Needed to Assume the Shift			
<ul style="list-style-type: none"> Unit 1 is at 100% power, BOL. Unit 2 is at 100%. 1B NI (Safety Injection) Pump and the 1D RC (Condenser Circulating Water) Pump are tagged out for preventative maintenance. Borate the NC (Reactor Coolant) System in preparation for swapping Hotwell pumps and Condensate Booster pumps. 			
NEOs Available			
Six NEOs are available as listed on the status board			
METEOROLOGICAL CONDITIONS			
<ul style="list-style-type: none"> Upper wind direction = 315 degrees, speed = 10 mph Lower wind direction = 315 degrees, speed = 10.5 mph Forecast calls for Severe Thunderstorm Watch for the next 4 hours. 			

**NRC INITIAL LICENSE EXAM
SCENARIO # 4**

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

Facility:	Catawba NRC Exam 2014	Scenario No.: 4	Op Test No.: 2014301
Examiners:	_____	Operators:	SRO
	_____		RO
	_____		BOP
<p>Initial Conditions: IC# 179; Unit 1 is at 25% power, MOL. Unit 2 is at 100%. The 1A KF (Fuel Pool Cooling) Pump is tagged out for preventative maintenance. The 1A2 CFPT MOP is tagged out for motor replacement.</p>			
<p>Turnover: Unit 1 is at 25% power, MOL. Unit 2 is at 100%. The 1A KF (Fuel Pool Cooling) Pump is tagged out for preventative maintenance. The 1A2 CFPT MOP is tagged out for motor replacement. Increase Power per the reactivity plan.</p>			
Event No.	Malf. No.	Event Type*	Event Description
1	---	N-BOP R-RO N-SRO	Power increase.
2	SGL005C	C-RO C-SRO	1CF-46 (S/G 1C CF CTRL) fails open. AP/06
3	VLVNC005F	C-BOP TS-SRO	1NC-32B (PZR PORV) fails open. AP/11
4	KC029	C-BOP C-SRO TS-SRO	1B1 KC (Component Cooling) Pump trips. AP/21
5	SG001B	C-RO C-SRO	1B S/G tube leak
6	SG001B	M-ALL	1B S/G tube rupture
7	SM002B	C-RO	1SV-13 (S/G 1B PORV) fails open
8	ISE003A NV025A	C-BOP	A Train Phase A Failure, 1NV-91B (NC PUMPS SEAL RET CONT ISOL) failure to close
<p>* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor</p>			

Appendix D

Catawba NRC Exam May 2014 Scenario 4 NUREG 1021 Revision 9

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

Scenario 4 – Summary

Initial Condition IC 179

IC# 179; Unit 1 is at 25% power, MOL. Unit 2 is at 100%. The 1A KF (Fuel Pool Cooling) Pump is tagged out for preventative maintenance. The 1A2 CFPT MOP is tagged out for motor replacement.

Turnover:

Unit 1 is at 25% power, MOL. Unit 2 is at 100%. The 1A KF (Fuel Pool Cooling) Pump is tagged out for preventative maintenance. The 1A2 CFPT MOP is tagged out for motor replacement. Increase Power per the reactivity plan.

Event 1

Increase power per turnover.

Event 2

1CF-46 (S/G 1C CF CTRL) fails open. AP/06

Event 3

1NC-32B (PZR PORV) fails open. AP/11

Event 4

1B1 KC (Component Cooling) Pump trips. AP/21

Event 5

1B S/G tube leak.

Event 6

Tube leak increases to a tube rupture and requires a reactor trip.

Event 7

1SV-13 (S/G 1B PORV) fails open.

Event 8

A Train Phase A fail to complete; 1NV-91B (NC Pumps Seal Ret Cont Isol) failure to close.

Critical Task 1 – Manually control feedwater to prevent reaching an S/G Hi Hi level Turbine trip or Lo Lo level Rx trip.

Critical Task 2 – Close the block valve upstream of the stuck open PZR PORV.

Critical Task 3 – Isolate feed/steam to/from ruptured S/G before a transition to ECA-3.1.

Critical task 4 - Terminate S/I before water release occurs from the ruptured S/G PORV or safety.

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

EXERCISE GUIDE WORKSHEET

1. INITIAL CONDITIONS:

1.1 Reset to IC #179

START TIME:

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		1	MAL-SGL005C (S/G C HI PWR LVL CONTROLLER FAILURE)	-100		2 MIN		2
		3	VLV-NC005F (NC32B PZR PORV FAIL TO POSITION)	1				3
		5	LOA-KC029 (RACKOUT KC PMP 1B1)	RACK OUT				4
		7	MAL-SG001B (S/G B TUBE LEAK)	370		3 MIN		5
		12	MAL-SM002B (S/G PORV SV13 FAILURE)	100				7
		14	MAL-SM002B (S/G PORV SV13 FAILURE)	100			1 SEC	7
		n/a	MAL-ISE003A (AUTO PHASE A ISOL SIGNAL TRN A)	BLOCK				8
		n/a	VLV-NV025A (NV-91B SEAL RTN ISOL CONT VLV FAIL AUTO ACTIONS)					8
		n/a	OVR-FWP019A (CFPT 1A MOP 1A2 OFF LT)	OFF				
		n/a	OVR-FWP019B (CFPT 1A MOP1A2 ON LT)	OFF				
		n/a	LOA-KF004 (RACKOUT KF PMP A)	RACK OUT				
			Ensure TRIGGER 12 = x01o063g I x01o066g					
			Ensure TRIGGER 14 = x02o091b					
			Place red collars on the 1A KF Pump and the 1A2 CFPT MOP					

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

2. SIMULATOR BRIEFING

2.1 Control Room Assignments:

Position	Name
CRS	
RO	
BOP	

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

3. EXERCISE PRESENTATION

3.1 Familiarization Period

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

3.2 Scenario EVENT 1, Power Increase

✓	BOOTH INSTRUCTOR ACTION
	IF the SOC is called to be informed of the power increase, REPEAT the information.

3.3 Scenario EVENT 2, 1CF-46 Fails Open

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 1 to fail 1CF-46 (S/G 1C CF CTRL) open.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to investigate the problem with 1CF46, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to locally investigate 1CF-46, REPEAT back the information.

3.4 Scenario EVENT 3, 1NC-32B Fails Open

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 3 1NC-32B to fail open.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to write a w/r for the 1NC-32B, REPEAT back the information..

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

3.5 Scenario EVENT 4, 1B1 KC Pump Trips

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 5 to trip the 1B1 KC pump.
✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to investigate the 1B1 KC Pump/ Breaker, REPEAT back the information.
✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to investigate the problem with 1B1 KC Pump/Breaker, REPEAT back the information.
✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to Check out the 1B2 KC Pump, REPEAT back the information.
✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to Check out the 1B NV Pump, REPEAT back the information.
✓	BOOTH INSTRUCTOR ACTION
	IF Engineering contacted per the annunciator response for 1AD-7, F/3, REPEAT back the information.

3.6 Scenario EVENT 5, 6, 7 and 8

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 7 to cause a tube leak on the 1B S/G.
✓	BOOTH INSTRUCTOR ACTION
	IF Chemistry is contacted to verify chemistry valves per 1EMF-33 alarm response, REPEAT back the order
✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to unlock and close 1SA-1, REPEAT back the order
✓	BOOTH INSTRUCTOR ACTION
	IF RP is notified to frisk all cation columns for activity, REPEAT the information and order.
✓	BOOTH INSTRUCTOR ACTION
	If Chemistry is notified to sample all S/Gs for activity, REPEAT back the information.

Appendix D

Catawba NRC Exam May 2014 Scenario 4 NUREG 1021 Revision 9
Page 6 of 36

Op Test No.: 301 Scenario # 4 Event # 1 Page 7 of 36

Event Description: Power Increase

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

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

	BOP	Perform a dilution.
	RO	Input targets into the main turbine control panel.

NOTE TO EVALUATOR: The crew may decide to input targets to the main turbine prior to performing a dilution.

NOTE TO EVALUATOR: Applicant may perform a dilution per OP/1/A/6150/009, Boron Concentration Control, Enclosure 5 (Manual Operation Of The Makeup Controls). Refer to Attachment 3.

NOTE TO EVALUATOR: The following actions are taken from OP/1/6150/009, Boron Concentration Control, Enclosure 4.3 (Dilution).

	BOP	3.2 IF the blender is set for automatic makeup per Enclosure 4.1 (Automatic Makeup), record the setpoint on 1NV-242A (RMWST To B/A Blender Ctrl): _____ gpm
	BOP	3.3 Ensure the following valve control switches in "AUTO": <ul style="list-style-type: none"> • 1NV-242A (RMWST To B/A Blender Ctrl) • 1NV-181A (B/A Blender Otlt To VCT)
	BOP	3.4 Ensure 1NV-242A (RMWST To B/A Blender Ctrl) controller in auto.
	BOP	3.5 Ensure at least one reactor makeup water pump is in "AUTO" or "ON".
	BOP	3.6 Record the desired volume of reactor makeup water to be added. _____ gallons
	BOP	3.7 Adjust the total makeup counter to the desired volume of reactor makeup water to be added. (R.M.)
	BOP	3.8 Place the "NC MAKEUP MO2DE SELECT" switch to the "DILUTE" position.

Op Test No.: 301 Scenario # 4 Event # 1 Page 8 of 36
 Event Description: Power Increase

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE: High letdown flow rates result in increased backpressure on the letdown line. If letdown flow is > 90 gpm, it may be desirable to reduce flow rate to 80 gpm to avoid the Rx Make-up Flow Deviation alarm and associated automatic actions.

	BOP	3.9 IF required, adjust the setpoint for 1NV-242A (RMWST To B/A Blender Ctrl) to the desired flow.
--	-----	---

NOTE TO EVALUATOR: Step 3.10 will not apply.

	BOP	<p>3.11 IF AT ANY TIME it is desired to divert letdown to the RHT manually operate 1NV-172A (3-Way Divert To VCT-RHT) as follows:</p> <p>3.11.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the "RHT" position.</p> <p>3.11.2 Ensure VCT level is monitored continuously while diverting to the RHT.</p> <p>NOTE: Procedure may continue while performing the following step.</p> <p>3.11.3 WHEN desired VCT level is reached return 1NV-172A (3-Way Divert To VCT-RHT) to auto as follows:</p> <p>3.11.3.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "VCT" position.</p> <p>3.11.3.2 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "AUTO" position.</p>
	BOP	3.12 IF AT ANY TIME during the makeup it becomes necessary to change the makeup flow rate, adjust the setpoint for 1NV-238A (B/A Xfer Pmp To Blender Ctrl) as necessary to achieve the desired flow.

Op Test No.: 301 Scenario # 4 Event # 1 Page 9 of 36

Event Description: Power Increase

Time	Position	Applicant's Actions or Behavior
	BOP	<p>3.13 IF AT ANY TIME while dilution is in progress it becomes necessary to stop the dilution, perform the following:</p> <p>3.13.1 Place the "NC MAKEUP CONTROL" switch to the "STOP" position.</p> <p>3.13.2 Ensure the following valves close:</p> <ul style="list-style-type: none"> • 1NV-242A (RMWST To B/A Blender Ctrl) • 1NV-181A (B/A Blender Otlt To VCT) <p>3.13.3 IF in "AUTO", verify the reactor makeup water pump stops.</p> <p>3.13.4 Record reactor makeup water volume added as indicated on the total makeup counter.</p> <p>_____ gallons</p> <p>3.13.5 WHEN conditions allow resuming the dilution, perform the following:</p> <p>3.13.5.1 Determine remaining volume to be added by subtracting the amount previously added (Step 3.13.4) from the desired volume to be added (Step 3.6).</p> <p>_____ - _____ = _____ gallons (Step 3.6) (Step 3.13.4)</p> <p>3.13.5.2 Adjust total makeup counter to the volume of reactor makeup water determined in Step 3.13.5.1. (R.M.)</p> <p>3.13.5.3 Place the "NC MAKEUP CONTROL" switch in the "START" position. (R.M.)</p> <p>3.13.5.4 Verify the following:</p> <ul style="list-style-type: none"> • 1NV-242A (RMWST To B/A Blender Ctrl) modulates to establish desired flow • 1NV-181A (B/A Blender Otlt To VCT) opens <p>3.13.5.5 IF in "AUTO", verify the reactor makeup water pump starts.</p>
	BOP	<p>3.14 WHILE makeup is in progress, monitor the following for expected results:</p> <ul style="list-style-type: none"> • Control rod motion • NC System Tavg • Reactor Power

Op Test No.:	301	Scenario #	4	Event #	1	Page	10	of	36
Event Description: Power Increase									
Time	Position	Applicant's Actions or Behavior							

NOTE: If a small makeup is being performed, placekeeping for Steps 3.15 through 3.17 may be performed after Step 3.18 is performed.		
	BOP	3.15 Place the "NC MAKEUP CONTROL" switch to the "START" position. (R.M.)
	BOP	3.16 Verify the following: <ul style="list-style-type: none"> 1NV-242A (RMWST To B/A Blender Ctrl) modulates to establish desired flow 1NV-181A (B/A Blender Otlt To VCT) opens
	BOP	3.17 IF in "AUTO", verify the reactor makeup water pump starts.
NOTE: The boric acid counter may count up 1 - 5 gallons after termination.		
	BOP	3.18 WHEN the desired volume of reactor makeup water is reached on the total makeup counter, ensure the following valves close. (R.M.) <ul style="list-style-type: none"> 1NV-242A (RMWST To B/A Blender Ctrl) 1NV-181A (B/A Blender Otlt To VCT)
	BOP	3.19 IF automatic makeup is desired, perform one of the following: <div style="margin-left: 20px;"> 3.19.1 IF it is desired to change the blender outlet boron concentration, refer to Enclosure 4.1 (Automatic Makeup). OR 3.19.2 IF makeup at the previous concentration is acceptable AND the system was previously aligned per Enclosure 4.1 (Automatic Makeup), perform the following: <div style="margin-left: 20px;"> 3.19.2.1 Ensure the controller for 1NV-242A (RMWST To B/A Blender Ctrl) is set to the value recorded in Step 3.2. (R.M.) 3.19.2.2 Place the "NC MAKEUP MODE SELECT" switch in "AUTO". 3.19.2.3 Place the "NC MAKEUP CONTROL" switch to the "START" position. (R.M.) </div> </div>

Op Test No.: 301 Scenario # 4 Event # 1 Page 11 of 36

Event Description: Power Increase

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE TO EVALUATOR: The following steps are from OP/1/B/6300/001, Turbine Generator, Enclosure 4.2 (Load Changing) starting at step 3.1.2.

	RO	<p>3.1.2 Increase turbine generator load by performing the following:</p> <p>3.1.2.1 Select "LOAD RATE" and verify it illuminates.</p> <p>3.1.2.2 Input the desired load rate.</p> <p>3.1.2.3 Select "ENTER" or "OK" and verify "LOAD RATE" goes dark.</p> <p>3.1.2.4 Select "TARGET" and verify it illuminates.</p> <p>3.1.2.5 Input the desired load target.</p> <p>3.1.2.6 Select "ENTER" and verify "TARGET" light goes dark.</p> <p>3.1.2.7 Verify new load target appears on Target Display.</p> <p>3.1.2.8 Select "GO" and verify it illuminates to start load increase.</p> <p>3.1.2.9 Coordinate with Secondary Chemistry to adjust S/G blowdown flowrates to obtain maximum blowdown for the appropriate load.</p>
Booth Operator will insert Trigger 1 for EVENT 2 at the discretion of the lead examiner.		
END OF EVENT 1		

Op Test No.:	301	Scenario #	4	Event #	2	Page	12	of	36
Event Description: 1CF-46 (S/G 1C CF CTRL) fails open.									
Time	Position	Applicant's Actions or Behavior							

EVENT 2		
Indications: 1AD-4, A/3 'S/G C FLOW MISMATCH CF>STM' 1AD-4, B/3 'S/G C LEVEL DEVIATION'		
	RO	Place 1CF-46 (S/G C Feed Reg Vlv) in 'Manual' and throttle as necessary to control 1C S/G level.
NOTE TO EVALUATOR: The crew will make a plant page announcing the entry into AP/1/A/5500/006, Loss of S/G Feedwater.		
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/006, Loss of S/G Feedwater, Case III (CF Control Not in Auto).		
	CREW	1. <u>IF AT ANY TIME</u> S/G levels approaching: <ul style="list-style-type: none"> 83% N/R level (S/G HI-HI Level Turb Trip) <u>OR</u> <ul style="list-style-type: none"> 11% N/R level (S/G LO-LO Level Rx Trip). <u>THEN:</u> <ol style="list-style-type: none"> Manually trip reactor. <u>GO TO</u> EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
	RO or BOP	2. Verify the following: <ul style="list-style-type: none"> At least one CF pump - IN SERVICE 1AD-3, C/6 "CF ISOL TRN A" - DARK 1AD-3, D/6 "CF ISOL TRN B" - DARK.
	RO or BOP	3. <u>IF AT ANY TIME</u> any CF main feed reg valve in manual, <u>THEN</u> ensure associated feed reg bypass valve in manual.
Booth Operator will insert Trigger 3 for EVENT 3 at the discretion of the lead examiner.		
	RO or BOP	4. Verify CF pump speed controller for in Perform the following: service CF pump(s): <ul style="list-style-type: none"> IN AUTO RESPONDING ADEQUATELY
	RO or BOP	5. Verify all S/G CF control valves: <ul style="list-style-type: none"> IN AUTO RESPONDING ADEQUATELY

Op Test No.: 301 Scenario # 4 Event # 2 Page 13 of 36

Event Description: 1CF-46 (S/G 1C CF CTRL) fails open.

Time	Position	Applicant's Actions or Behavior
CRITICAL TASK	RO or BOP	<p>5. RNO Perform the following for the affected S/G(s):</p> <ol style="list-style-type: none"> Ensure affected controller(s) – IN MANUAL. IF AT ANY TIME S/G level not on program, THEN adjust CF flow to obtain a slight trend in the appropriate direction. IF AT ANY TIME control valve adjustment is required, THEN attempt to maintain CF/SM D/P constant during CF control valve adjustments
	RO or BOP	<p>6. Verify the following:</p> <ul style="list-style-type: none"> S/G level(s) - STABLE S/G level(s) - APPROXIMATELY AT PROGRAM Malfunction - CORRECTED.
	CREW	<p>6. RNO Perform the following:</p> <ol style="list-style-type: none"> Continue to control CF/SM D/P and S/G CF Flow rates to stabilize level in affected S/G(s) approximately at program level. WHEN all the following conditions met: <ul style="list-style-type: none"> S/G level(s) - STABLE S/G level(s) - APPROXIMATELY AT PROGRAM Malfunction - CORRECTED. THEN GO TO Step 7. Do not continue in this procedure until all conditions met.
NOTE TO EVALUATOR: RNO Step 6.b will not be met during this scenario.		
NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.		
END OF EVENT 2		

Op Test No.:	301	Scenario #	4	Event #	3	Page	14	of	36
Event Description: 1NC-32B (PZR PORV) fails open.									
Time	Position	Applicant's Actions or Behavior							

EVENT 3		
Indications:	1AD-6, E/10 'PZR PORV DISCH HI TEMP' 1AD-6, F/8 'PZR LO PRESS CONTROL' OAC pt C1Q0758 'VLV NC32B PZR POWER OPERATED RELIEF' - OPEN	
	BOP	Attempt to close 1NC-32B (PZR PORV)
CRITICAL TASK	BOP	Close 1NC-31B (PZR PORV ISOL)
NOTE TO EVALUATOR: The crew will make a plant page announcing the entry into AP/1/A/5500/011, Pressurizer Pressure Anomalies.		
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/011, Pressurizer Pressure Anomalies, Case I (Pressurizer Pressure Decreasing).		
	BOP	1. Verify all PZR PORVs - CLOSED.
	BOP	1. RNO Perform the following: a. CLOSE PZR PORV(s).
CRITICAL TASK	BOP	b. IF any PZR PORV cannot be closed, THEN: 1) Close the affected PORV(s) isolation valve.
NOTE TO EVALUATOR: Step 2) of RNO will not apply.		
NOTE Control rods may withdraw on decreasing NC pressure.		
	BOP	2. Verify PZR spray valve(s) – CLOSED.
	BOP	3. Verify all PZR heaters – ENERGIZED.
	BOP	4. Ensure 1NV-37A (NV Supply To PZR Aux Spray) – CLOSED.
NOTE Positive reactivity is inserted during an increase in NC pressure which may cause auto rod insertion.		
	BOP	5. Verify NC pressure – STABLE OR INCREASING.
	RO and BOP	6. WHEN NC pressure is stable, THEN : <ul style="list-style-type: none"> Stabilize unit at appropriate power level. Adjust the following as required to maintain T-Avg within 1°F of T-Ref: <ul style="list-style-type: none"> Turbine load Control rods Boron concentration.

Op Test No.: 301 Scenario # 4 Event # 3 Page 15 of 36

Event Description: 1NC-32B (Pzr PORV) fails open.

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE TO EVALUATOR: Step 7 does not apply.

	BOP	8. Ensure compliance with appropriate Tech Specs: <ul style="list-style-type: none"> 3.3.1 (Reactor Trip System (RTS) Instrumentation) 3.3.2 (Engineered Safety Features Actuation System (ESFAS) Instrumentation) 3.3.3 (Post Accident Monitoring (PAM) Instrumentation) 3.3.4 (Remote Shutdown System) 3.4.1 (RCS Pressure, Temperature, and Flow Departure From Nucleate Boiling (DNB) Limits) 3.4.4 (RCS Loops – MODES 1 and 2) 3.4.5 (RCS Loops – MODE 3) 3.4.6 (RCS Loops – MODE 4) 3.4.9 (Pressurizer) 3.4.10 (Pressurizer Safety Valves) 3.4.11 (Pressurizer Power Operated Relief Valves (PORVs)) 3.4.13 (RCS Operational Leakage).
NOTE TO EVALUATOR: Tech Spec 3.4.1 (RCS Pressure, Temperature, and Flow Departure From Nucleate Boiling (DNB) Limits) Condition A (Restore DNB parameter(s) to within limit within 2 hours) should be entered. This condition is likely to be cleared by the time Tech Specs are reviewed per the AP. Tech Spec 3.4.11 (Pressurizer Power Operated Relief Valves (PORVs)) Condition B (Close associated block valves within 1 hour AND Remove power from associated block valves within 1 hour AND Restore PORV(s) to OPERABLE status within 72 hours.		
NOTE TO EVALUATOR: The SRO will conduct a "Crew Update" to inform the crew of any Tech Spec conditions that have been entered.		
	SRO	9. Determine long term plant status. <u>RETURN TO</u> procedure in effect.
NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.		
Booth Operator will insert Trigger 5 for Event 4 at the discretion of the lead examiner.		
END OF EVENT 3		

Op Test No.:	<u>301</u>	Scenario #	<u>4</u>	Event #	<u>4</u>	Page	<u>16</u>	of	<u>36</u>
Event Description: 1B1 KC (Component Cooling) pump trips									
Time	Position	Applicant's Actions or Behavior							

EVENT 4		
Indications:	1AD-6, C/1-4 'NCP A,B,C,D MTR UPPER BRG KC OUTLET HI/LOW FLOW' 1AD-6, D/1-4 'NCP A,B,C,D MTR LOWER BRG KC OUTLET LO FLOW' 1AD-6, E/1-4 'NCP A,B,C,D THERMAL BARRIER KC OUTLET HI/LO FLOW' 1AD-7, D/1 'SEAL WATER HX KC HI/LO FLOW' 1AD-7, D/3 'NV PMP B OIL COOLER LO FLOW' 1AD-7, F/3 'LETDN HX OUTLET HI TEMP' 1AD-11, D/1 '4 KV ESS PWR TRAIN B TROUBLE' 1AD-13, F/2 'FUEL POOL COOL HX B KC OUTLET HI/LO FLOW' 1AD-20, A/1 'KC SUPPLY HDR FLOW TO NCP BRGS LOW' 1AD-21, A/1 'KC SUPPLY HDR FLOW TO NCP BRGS LOW'	
	BOP	BOP recognizes trip of 1B1 KC pump.
	SRO	CREW ENTERS AP/1/A/5500/021
NOTE TO EVALUATOR: The crew will make a plant page announcing the entry into AP/1/A/5500/021, Loss of Component Cooling.		
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/021, Loss of Component Cooling.		
CAUTION Failure to restore NC pump seal cooling via thermal barrier cooling or NV seal injection within 10 minutes will cause damage to the NC pump seals resulting in NC inventory loss.		
	RO and BOP	1. Monitor Enclosure 1 (Foldout Page).
	BOP	2. Verify the following: <ul style="list-style-type: none"> At least one KC pump - ON. AND <ul style="list-style-type: none"> Flow to KC loads presently in service.
	BOP	2. RNO Perform the following: <u>a. Start additional KC pump(s) as necessary.</u>
NOTE TO EVALUATOR: Step 2 RNO b. will not apply		
	SRO	3. <u>IF AT ANY TIME</u> all KC pumps are lost, <u>THEN RETURN TO STEP 2.</u>

Op Test No.: 301 Scenario # 4 Event # 4 Page 17 of 36

Event Description: 1B1 KC (Component Cooling) pump trips

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE Uncooled letdown may result in loss of NV pumps within a matter of minutes.

	BOP	4. Verify the following: <ul style="list-style-type: none"> 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - DARK AND At least one KC pump - ON.
	SRO	5. <u>IF AT ANY TIME</u> 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" LIT, <u>THEN</u> perform Step 4 RNO.
	BOP	6. Verify both KC surge tank levels - 50% - 90% AND STABLE.
	BOP	7. Start additional KC pump(s) as necessary to supply any KC loads presently in service.

CAUTION 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.

	BOP	8. Verify KC flow to NC pumps as follows: <ul style="list-style-type: none"> 1AD-20, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK 1AD-21, A/1 "KC SUPPLY HDR FLOW TO NCP BRGS LOW" - DARK.
	BOP	9. Verify KC available as follows: <p>a. Verify the following Train A KC non-essential header isolation valves - OPEN:</p> <ul style="list-style-type: none"> 1KC-230A (Rx Bldg Non-Ess Hdr Isol) 1KC-3A (Rx Bldg Non-Ess Ret Hdr Isol) 1KC-50A (Aux Bldg Non-Ess Hdr Isol) 1KC-1A (Aux Bldg Non-Ess Ret Hdr Isol).
	BOP	9. b. Verify the following Train B KC non-essential header isolation valves -OPEN: <ul style="list-style-type: none"> 1KC-228B (Rx Bldg Non-Ess Hdr Isol) 1KC-18B (Rx Bldg Non-Ess Ret Hdr Isol) 1KC-53B (Aux Bldg Non-Ess Hdr Isol) 1KC-2B (Aux Bldg Non-Ess Ret Hdr Isol).
	BOP	9. c. Start additional KC pump(s) as necessary to supply any KC loads presently in service.
	BOP	10. Verify KC surge tank levels normal as follows: <p>a. Verify both KC surge tank levels - 50% - 90% AND STABLE.</p>
	SRO	10. b. <u>GO TO</u> Step 14.

Op Test No.:	301	Scenario #	4	Event #	4	Page	18	of	36
Event Description: 1B1 KC (Component Cooling) pump trips									
Time	Position	Applicant's Actions or Behavior							

NOTE TO EVALUATOR: The KC heat exchanger outlet mode switches will be in the "KC Temp" position if the corresponding train of KC is in service. Otherwise, it will be in the "Miniflow" position.		
	BOP	14. Ensure KC heat exchanger outlet mode switches - PROPERLY ALIGNED.
	CREW	15. Determine and correct cause of loss of KC.
	SRO	16. Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual: <ul style="list-style-type: none"> SLC 16.9-7 (Boration Systems Flow Path- Shutdown) SLC 16.9-8 (Boration Systems Flow Path- Operating) SLC 16.9-9 (Boration Systems Pumps -Shutdown) SLC 16.9-10 (Boration Systems Charging Pumps - Operating) 3.5.2 (ECCS - Operating) 3.5.3 (ECCS - Shutdown) 3.6.6 (Containment Spray System) 3.7.5 (Auxiliary Feedwater (AFW) System) 3.7.7 (Component Cooling Water (CCW) System).
NOTE TO EVALUATOR: T.S 3.7.7 (Component Cooling Water (CCW) System) Condition A (Restore CCW train to OPERABLE status within 72 hours) should be entered.		
NOTE TO EVALUATOR: The SRO will conduct a "Crew Update" to inform the crew of any Tech Spec conditions that have been entered.		
Booth Operator will insert Trigger 7 for EVENT 5 at the discretion of the lead examiner.		
	SRO	17. Determine required notifications: <ul style="list-style-type: none"> <u>REFER TO</u> RP/0/A/5000/001(Classification Of Emergency) <u>REFER TO</u> RP/0/B/5000/013 (NRC Notification Requirements).
NOTE TO EVALUATOR: Step 18 will not apply.		
	BOP	19. Verify KC surge tanks level as follows: <ul style="list-style-type: none"> Greater than 50% Stable or increasing

Op Test No.:	<u>301</u>	Scenario #	<u>4</u>	Event #	<u>4</u>	Page	<u>19</u>	of	<u>36</u>
Event Description: 1B1 KC (Component Cooling) pump trips									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>20. WHEN plant conditions permit, THEN perform the following:</p> <ul style="list-style-type: none"> Return KC pumps to normal operation. REFER TO OP/1/A/6400/005 (Component Cooling Water System). Return NV Pump 1A to normal cooling as applicable. REFER TO Enclosure 2 (Alternate Cooling To NV Pump 1A).
	BOP	<p>21. Verify the following:</p> <ul style="list-style-type: none"> 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - DARK 1AD-7, H/3 "VCT HI TEMP" - DARK Normal letdown - IN SERVICE.
	BOP	<p>22. Ensure VCT and letdown path aligned as follows:</p> <p>a. IF desired to align NV pump suction to VCT, then perform the following:</p> <ol style="list-style-type: none"> OPEN the following valves: <ul style="list-style-type: none"> 1NV-188A (VCT Otlt Isol) 1NV-189B (VCT Otlt Isol). CLOSE the following valves: <ul style="list-style-type: none"> 1NV-252A (NV Pumps Suct From FWST) 1NV-253B (NV Pumps Suct From FWST). <p>b. WHEN NV suction aligned to VCT, THEN momentarily place 1NV-172A (3-Way Divert To VCT-RHT) to "VCT" position and return to "AUTO".</p> <p>c. IF desired to restore letdown flow through NV demineralizers, THEN momentarily place 1NV-153A (Letdn Hx Otlt 3-Way Valve) to "DEMIN" position and return to "AUTO".</p>
	SRO	<p>23. Determine long term plant status. RETURN TO procedure in affect.</p>
<p>NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.</p>		
<p>END OF EVENT 4</p>		

Op Test No.:	301	Scenario #	4	Event #	5	Page	20	of	36
Event Description: 1B S/G Tube Leak									
Time	Position	Applicant's Actions or Behavior							

EVENT 5		
Indications:	1RAD-1, B/1 '1EMF33 CSAE EXHAUST HI RAD' 1RAD-1, B/5 '1EMF-72 S/G A LEAKAGE HI RAD' 1RAD-1, C/1 '1EMF-73 S/G D LEAKAGE HI RAD' 1RAD-3, E/5 '1EMF 26,27,28,29 S/G A,B,C,D, STEAM LINE – 1EMF 27	
	CREW	Recognizes symptoms of a S/G tube leak
	BOP	Selects "AUTO" on Unit 1 CSAE EXH switch on panel 1MC-13 per the annunciator response for 1RAD-1, B/1 (1EMF CSAE EXHAUST HI RAD).
	CREW	Enter AP/1/A/5500/010, Reactor Coolant Leak, Case I (Steam Generator Tube Leak)
NOTE TO EVALUATOR: The crew will make a plant page announcing the entry into AP/1/A/5500/010, Reactor Coolant Leak.		
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/010, Reactor Coolant Leak, Case I (Steam Generator Tube Leak)		
	RO and BOP	1. Monitor Enclosure 1 (Case I Steam Generator Tube Leak Foldout Page).
	BOP	2. Verify Pzr level - STABLE OR INCREASING.
	BOP	2. RNO: Perform the following: a. Maintain charging flow less than 180 GPM. b. THROTTLE 1NV-294 (NV Pmps A&B Disch Flow Ctrl) to stabilize Pzr level.
NOTE TO EVALUATOR: Crew determines that step 2 RNO c. does not apply		
	BOP	c. <u>IF</u> Pzr level stable OR increasing, <u>THEN GO TO</u> Step 3.

Op Test No.:	<u>301</u>	Scenario #	<u>4</u>	Event #	<u>5</u>	Page	<u>21</u>	of	<u>36</u>
Event Description: 1B S/G Tube Leak									
Time	Position	Applicant's Actions or Behavior							

NOTE TO EVALUATOR: The crew will eventually recognize that pressurizer level cannot be maintained and manually trip the reactor and manually initiate safety injection per Enclosure 1, and then transition to E-0 (Reactor Trip or Safety Injection).

	BOP	<p>d. IF Pzr level continues to decrease, THEN perform the following:</p> <p>1) Reduce letdown flow to 45 GPM as follows:</p> <p>a) IF 1NV-10A (Letdn Orif 1B Otlt Cont Isol) open, THEN perform the following:</p> <p>(1) Control 1NV-148 (Letdn Press Control) to establish letdown pressure between 375 – 400 PSIG.</p> <p>(2) THROTTLE 1NV-849 (Letdn Flow Var Orif Ctrl) for 45 GPM letdown flow.</p> <p>(3) WHEN 45 GPM letdown flow established, THEN adjust 1NV-148 (Letdn Press Control) to maintain letdown pressure at 350 PSIG.</p> <p>(4) WHEN letdown pressure is stable at 350 PSIG, THEN place 1NV-148 (Letdn Press Control) in auto.</p>
	BOP	<p>2) IF Pzr level continues to decrease, THEN ensure the following valves closed:</p> <ul style="list-style-type: none"> • 1NV-10A (Letdn Orif 1B Otlt Cont Isol) • 1NV-11A (Letdn Orif 1C Otlt Cont Isol) • 1NV-13A (Letdn Orif 1A Otlt Cont Isol).

NOTE TO EVALUATOR: Crew determines that step 2 RNO d.3) does not apply.

	CREW	<p>4) IF Pzr level continues to decrease OR Pzr level cannot be maintained greater than 4%, THEN perform the following:</p> <p>a) Trip reactor.</p> <p>b) WHEN reactor tripped verified, THEN initiate S/I.</p> <p>c) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).</p>
--	------	---

END EVENT 5

NOTE TO EVALUATOR: The SRO will conduct a "Focus Brief" to give the crew direction.

TRANSITION TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)

Op Test No.:	301	Scenario #	4	Event #	6, 7 and 8	Page	22	of	36
Event Description: 1B S/G Tube Rupture, 1SV-13 (S/G PORV) fails open, A Train Phase A failure with 1NV-91B (NC PUMPS SEAL RET CONT ISOL) failure to close.									
Time	Position	Applicant's Actions or Behavior							

EVENTS 6, 7, AND 8		
NOTE TO EVALUATOR: The following steps are from EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)		
	RO and BOP	1. Monitor Enclosure 1 (Foldout Page).
	RO	2. Verify Reactor Trip: <ul style="list-style-type: none"> All rod bottom lights - LIT All reactor trip and bypass breakers - OPEN I/R power - DECREASING.
	RO	3. Verify Turbine Trip: <ul style="list-style-type: none"> All turbine stop valves - CLOSED
	BOP	4. Verify 1ETA and 1ETB - ENERGIZED.
	RO	5. Verify S/I is actuated: <ul style="list-style-type: none"> a. "SAFETY INJECTION ACTUATED" status light (1SI-13) – LIT b. Both E/S load sequencer actuated status lights (1SI-14) - LIT.
	RO	6. Announce "Unit 1 Safety Injection".
	SRO	7. Determine required notifications: <ul style="list-style-type: none"> REFER TO RP/0/A/5000/001(Classification Of Emergency) REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
	RO or BOP	8. Verify all Feedwater Isolation status lights (1SI-5) - LIT
	BOP	9. Verify Phase A Containment Isolation status as follows: <ul style="list-style-type: none"> a. Phase A "RESET" lights - DARK.
	BOP	9. a. RNO a. Initiate Phase A Isolation.
	BOP	b. Monitor Light Panel Group 5 St lights on energized train(s) - LIT.
	BOP	9. b. RNO b. Align valves as necessary to ensure each penetration isolated by at least one isolation valve.
END OF EVENT 8		

Op Test No.:	301	Scenario #	4	Event #	6 and 7	Page	23	of	36
Event Description: 1B S/G Tube Rupture, 1SV-13 (S/G PORV) fails open									
Time	Position	Applicant's Actions or Behavior							

	BOP	b. Monitor Light Panel Group 5 St lights on energized train(s) - LIT.
	BOP	10. Verify proper Phase B actuation as follows: a. Verify Containment pressure - HAS REMAINED LESS THAN 3 PSIG
	RO or BOP	b. <u>IF AT ANY TIME</u> containment pressure exceeds 3 PSIG while in this procedure, <u>THEN</u> perform Step 10.a.
	RO	11. Verify proper CA pump status as follows: a. Motor driven CA pumps - ON. b. 3 S/G N/R levels - GREATER THAN 11%.
	BOP	12. Verify all of the following S/I pumps - ON: <ul style="list-style-type: none"> NV pumps ND pumps NI pumps.
	BOP	13. Verify all KC pumps - ON.
	BOP	13. RNO Perform the following for affected train(s): a. Reset ECCS. b. Reset D/G load sequencer(s). c. Start affected pump(s).
	RO and BOP	d. <u>IF AT ANY TIME</u> B/O occurs, <u>THEN</u> restart S/I equipment previously on.
NOTE TO EVALUATOR: RNO Step 13.e. will not apply		
	BOP	14. Verify all Unit 1 and Unit 2 RN pumps - ON.
	BOP	15. Verify proper ventilation systems operation as follows: <ul style="list-style-type: none"> <u>REFER TO</u> Enclosure 2 (Ventilation System Verification). Notify Unit 2 operator to perform Enclosure 3 (Opposite Unit Ventilation Verification).
NOTE TO EVALUATOR: SRO hands Enclosure 3 to a Unit 2 operator and sets Enclosure 3 off to the side.		
	RO	16. Verify all S/G pressures - GREATER THAN 775 PSIG.
	RO	17. Verify proper S/I flow as follows: a. "NV S/I FLOW" - INDICATING FLOW.

Op Test No.:	301	Scenario #	4	Event #	6 and 7	Page	24	of	36
Event Description: 1B S/G Tube Rupture, 1SV-13 (S/G PORV) fails open									
Time	Position	Applicant's Actions or Behavior							

	RO	b. NC pressure - LESS THAN 1620 PSIG.
	RO	17.b. RNO b. Perform the following: 1) Ensure ND pump miniflow valve on operating ND pump(s) - OPEN.
NOTE TO EVALUATOR: Step 17 RNO b. 2) will not apply		
	SRO	3) <u>GO TO</u> Step 18.
	RO or BOP	18. <u>WHEN</u> time and manpower permit (within two hours of event), <u>THEN</u> monitor Spent Fuel Pool level and temperature. <u>REFER TO</u> EP/1/A/5000/G-1(Generic Enclosures), Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring).
	RO	19. Control S/G levels as follows: a. Verify total CA flow - GREATER THAN 450 GPM.
NOTE TO EVALUATOR: Total CA flow may not be > 450 gpm due to being under operator control, in which case, the RNO for 19 a. will not apply.		
	RO	b. <u>WHEN</u> each S/G N/R level greater than 11% (29% ACC), <u>THEN</u> control feed flow to maintain that S/G N/R level between 11% (29% ACC) and 50%.
	RO	20. Verify all CA isolation valves - OPEN.
	BOP	21. Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.
NOTE Enclosure 4 (NC Temperature Control) shall remain in effect until subsequent procedures provide alternative NC temperature control guidance.		
	RO	22. <u>Control NC temperature. REFER TO Enclosure 4 (NC Temperature Control).</u>
	BOP	23. Verify Pzr PORV and Pzr Spray Valve status as follows: a. All Pzr PORVs - CLOSED.
	BOP	23. RNO a. <u>IF</u> Pzr pressure is less than 2315 PSIG, <u>THEN</u> perform the following: 1) CLOSE Pzr PORV(s). 2) <u>IF</u> any Pzr PORV cannot be closed, <u>THEN</u> CLOSE its isolation valve.
NOTE TO EVALUATOR: Step 23 RNO.a.3) will not apply		

Op Test No.:	301	Scenario #	4	Event #	6 and 7	Page	25	of	36
Event Description: 1B S/G Tube Rupture, 1SV-13 (S/G PORV) fails open									
Time	Position	Applicant's Actions or Behavior							

	BOP	23. b. Normal Pzr spray valves - CLOSED.
	BOP	23. c. At least one Pzr PORV isolation valve - OPEN.
	RO or BOP	24. Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.
	RO or BOP	25. Verify main steamlines intact: <ul style="list-style-type: none"> All S/G pressures - STABLE OR INCREASING ALL S/Gs - PRESSURIZED.
NOTE TO EVALUATOR: If the crew has not addressed the failed open S/G PORV, they may transition to the RNO and go to EP/1/A/5000/E-2 (Faulted Steam Generator Isolation). REFER to Attachment 10.		
	BOP	26. Verify S/G tubes are intact as follows: <ul style="list-style-type: none"> Verify the following EMF trip 1 lights - DARK: <ul style="list-style-type: none"> 1EMF-33 (Condenser Air Ejector Exhaust) 1EMF-26 (Steamline 1A) 1EMF-27 (Steamline 1B) 1EMF-28 (Steamline 1C) 1EMF-29 (Steamline 1D). All S/G levels - STABLE OR INCREASING IN A CONTROLLED MANNER.
	CREW	26. RNO <u>IF</u> any EMF trip 1 light is lit <u>OR</u> any S/G level is increasing in an uncontrolled manner, <u>THEN</u> concurrently: <ul style="list-style-type: none"> Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). <u>GO TO</u> EP/1/A/5000/E-3 (Steam Generator Tube Rupture).
NOTE TO EVALUATOR: Due to the time critical nature of the event, the SRO will not perform a "Crew Brief" or a "Focus Brief".		
TRANSITION TO EP/1/A/5000/E-3 (Steam Generator Tube Rupture)		

Op Test No.:	<u>301</u>	Scenario #	<u>4</u>	Event #	<u>6 and 7</u>	Page	<u>26</u>	of	<u>36</u>
Event Description: 1B S/G Tube Rupture, 1SV-13 (S/G PORV) fails open									
Time	Position	Applicant's Actions or Behavior							

NOTE TO EVALUATOR: The following actions are from EP/1/A/5000/E-3 (Steam Generator Tube Rupture).		
	RO and BOP	1. Monitor Enclosure 1 (Foldout Page).
	CREW	2. Identify ruptured S/G(s) as follows: <ul style="list-style-type: none"> S/G level - INCREASING IN AN UNCONTROLLED MANNER. OR Chemistry or RP has determined ruptured S/G OR Any of the following EMF trip 1 lights - LIT: <ul style="list-style-type: none"> 1EMF-26 (Steamline 1A) 1EMF-27 (Steamline 1B) 1EMF-28 (Steamline 1C) 1EMF-29 (Steamline 1D).
	RO	3. Verify at least one intact S/G - AVAILABLE FOR NC SYSTEM COOLDOWN.
	RO	4. Isolate flow from ruptured S/G(s) as follows: a. Verify all ruptured S/G(s) PORV - CLOSED.
CRITICAL TASK	RO	4.a. RNO a. WHEN ruptured S/G(s) pressure less than 1090 PSIG, THEN perform the following: 1) Ensure ruptured S/G(s) PORV - CLOSED.
END OF EVENT 7		
NOTE TO EVALUATOR: RNO Steps 4.a.2) and 4.a.3) will not apply.		
	RO	b. Verify S/G(s) 1B and 1C - INTACT.
CRITICAL TASK	RO	4.b. RNO b. Perform the following: 1) IF both motor driven CA pumps available, THEN CLOSE "CAPT TRIP T/V CTRL".
NOTE TO EVALUATOR: RNO Step 4.b.2) will not apply.		

Op Test No.:	301	Scenario #	4	Event #	6	Page	27	of	36
Event Description: 1B S/G Tube Rupture									
Time	Position	Applicant's Actions or Behavior							

	RO or BOP	3) IF S/G 1B ruptured, THEN perform the following: a) Dispatch two operators to unlock and close 1SA-1 (1B S/G Main Steam to CAPT Maintenance Isol) (DH-624, FF-53, Rm 572) (Breakaway lock).
NOTE TO EVALUATOR: The Crew may determine that radiation may be too high to perform RNO step 4.b.3)a) and perform 4.b.3)b) instead.		
	RO or BOP	b) IF 1SA-1 cannot be closed, THEN dispatch two operators to unlock and close 1SA-3 (1B S/G Main Steam to CAPT Stop Check) (AB-551, DD-53, Rm 217) (Breakaway lock).
NOTE TO EVALUATOR: RNO Step 4.b.4) will not apply		
	RO	5) WHEN ruptured S/G steam supply to CA Pump #1 isolated, THEN OPEN "CAPT TRIP T/V CTRL".
CRITICAL TASK	RO	c. Isolate blowdown and steam drain on all ruptured S/G(s) as follows: • S/G 1B 1) Close 1SM-76B (S/G 1B Otlt Hdr Bldwn C/V). 2) Verify the following blowdown isolation valves - CLOSED: a) 1BB-19A (S/G 1B Bldwn Cont Isol Insd). b) 1BB-150B (S/G 1B Bldwn Cont Isol Byp). c) 1BB-21B (S/G 1D Bldwn Cont Isol Otsd).
CRITICAL TASK	RO	5. Close the following valves on all ruptured S/G(s): • MSIV • MSIV bypass valve.
CRITICAL TASK	RO	6. Control ruptured S/G(s) level as follows: a. Verify ruptured S/G(s) N/R level - GREATER THAN 11% (29% ACC). b. Isolate feed flow to all ruptured S/G(s) as follows: • S/G 1B: 1) CLOSE 1CA-58A (CA Pmp A Disch To S/G 1B Isol). 2) CLOSE 1CA-54B (CA Pmp 1 Disch To S/G 1B Isol). c. IF AT ANY TIME ruptured S/G(s) N/R level is less than 11% (29% ACC), THEN perform Step 6.
	RO	7. Verify all ruptured S/G(s) pressure - GREATER THAN 320 PSIG.

Op Test No.:	301	Scenario #	4	Event #	6	Page	28	of	36
Event Description: 1B S/G Tube Rupture									
Time	Position	Applicant's Actions or Behavior							

	BOP	8. Verify any NC pump - ON.
	BOP	9. Verify Pzr pressure - GREATER THAN 1955 PSIG.
NOTE <ul style="list-style-type: none"> 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, maintaining steam pressure negative rate less than 2 psig per second will prevent a Main Steam Isolation. OAC graphic SMRATES to monitor S/G pressure rates can be accessed via a hot button in the center of the SM graphic. 		
	RO	10. Initiate NC System cooldown as follows: <ol style="list-style-type: none"> Determine required core exit temperature based on lowest ruptured S/G pressure from table below:
NOTE TO EVALUATOR: SRO and BOP will use the table in step 10 to determine target core exit temperature. Refer to Attachment 12.		
	RO	<ol style="list-style-type: none"> Ensure ruptured S/G(s) isolated as follows: <ol style="list-style-type: none"> Verify the following valves on all ruptured S/G(s) - CLOSED: <ul style="list-style-type: none"> MSIV MSIV bypass valves. Verify S/G PORV on ruptured S/G(s) - CLOSED OR ISOLATED.
NOTE TO EVALUATOR: Step 10.b.3) will not apply.		
	RO	<ol style="list-style-type: none"> Verify the condenser is available as follows: <ul style="list-style-type: none"> "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT MSIV on intact S/G(s) - OPEN. Verify steam dumps - IN PRESSURE MODE.
	RO	10.d. RNO Place steam dumps in pressure mode as follows: <ol style="list-style-type: none"> Place "STM DUMP CTRL" M/A station in manual. Adjust "STM DUMP CTRL" M/A station output to match "% STM DUMP DEMAND" (1SMP5211). WHEN output on the "STM DUMP CTRL" M/A station is equal to the "% STM DUMP DEMAND" (1SMP5211), THEN place the steam dumps in pressure mode.

Op Test No.:	301	Scenario #	4	Event #	6	Page	29	of	36
Event Description: 1B S/G Tube Rupture									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>e. WHEN "P-12 LO-LO TAVG" status light (1SI-18) is lit, THEN place the steam dump interlock bypass switches in "BYP INTLK."</p> <p>f. Dump steam to condenser from intact S/G(s) at maximum rate while attempting to avoid a Main Steam Isolation.</p>
	BOP	g. Verify main steam isolation blocked status lights (1SI-13) - LIT.
	BOP	<p>10.g. RNO Perform the following:</p> <p>1) Depressurize NC System to less than 1955 PSIG using one of the following:</p> <ul style="list-style-type: none"> Pzr spray OR Pzr PORV. <p>2) WHEN "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) is lit, THEN perform the following:</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>
	RO	h. WHEN core exit T/Cs are less than required temperature, THEN stabilize core exit T/Cs less than required temperature.
	RO	<p>11. Control intact S/G levels as follows:</p> <p>a. Verify N/R level in all intact S/Gs - GREATER THAN 11% (29% ACC).</p> <p>b. Throttle feed flow to maintain all intact S/G N/R levels between 16% (29% ACC) and 50%.</p>
	BOP	<p>12. Verify Pzr PORV and isolation valve status as follows:</p> <p>a. Power to all Pzr PORV isolation valves - AVAILABLE.</p> <p>b. All Pzr PORVs - CLOSED.</p>
	BOP	<p>12.b. RNO b. IF Pzr pressure is less than 2315 PSIG, THEN perform the following:</p> <p>1) CLOSE Pzr PORV(s).</p> <p>2) IF any Pzr PORV cannot be closed, THEN CLOSE its isolation valve.</p>

Op Test No.:	<u>301</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>30</u>	of	<u>36</u>
Event Description: 1B S/G Tube Rupture									
Time	Position	Applicant's Actions or Behavior							

NOTE TO EVALUATOR: RNO Steps 12.b.3) and 12.b.4) will not apply.

	BOP	c. At least one Pzr PORV isolation valve - OPEN.
	RO or BOP	d. IF AT ANY TIME a Pzr PORV opens due to high pressure, WHEN Pzr pressure decreases to less than 2315 PSIG, ensure the valve closes or is isolated.
	BOP	13. Reset the following: a. ECCS. b. D/G load sequencers. c. Phase A d. Phase B.
	RO or BOP	e. IF AT ANY TIME B/O occurs, THEN restart S/I equipment previously on.
	BOP	14. Establish VI to containment as follows: • Ensure 1VI-77B (VI Cont Isol) - OPEN. • Verify VI pressure - GREATER THAN 85 PSIG.
	BOP	15. Determine if ND pumps should be stopped: a. Any ND pump - ON. b. Any running ND pump suction – ALIGNED TO FWST. c. NC pressure - GREATER THAN 285 PSIG. d. Stop all ND pump(s) with suction aligned to FWST. e. IF AT ANY TIME NC pressure decreases to less than 285 PSIG in an uncontrolled manner, THEN restart ND pumps.
	RO	16. Verify ruptured S/G(s) - IDENTIFIED.
	RO	17. Verify if NC System cooldown should be stopped: a. Verify core exit T/Cs - LESS THAN REQUIRED TEMPERATURE.
NOTE TO EVALUATOR: At this point the required temperature may not have been reached. The crew will hold per the RNO for step 17.a.		
	SRO	17.a RNO Do not continue in this procedure until core exit T/Cs are less than required temperature.
	RO	b. Stop NC System cooldown. c. Stabilize core exit T/Cs - LESS THAN REQUIRED TEMPERATURE.

Op Test No.:	301	Scenario #	4	Event #	6	Page	31	of	36
Event Description: 1B S/G Tube Rupture									
Time	Position	Applicant's Actions or Behavior							

	RO	18. Verify ruptured S/G(s) pressure is under operator control as follows: a. All ruptured S/G(s) pressure - STABLE OR INCREASING. b. IF AT ANY TIME ruptured S/G(s) pressure is decreasing while in this procedure, THEN perform Step 18.
	RO or BOP	19. Verify NC subcooling based on core exit T/Cs - GREATER THAN 20°F.
	BOP	20. Depressurize NC System using PZR Spray as follows: a. Verify normal Pzr spray flow - AVAILABLE. b. Initiate NC depressurization using maximum available spray. c. IF AT ANY TIME during this step one of the following conditions exists, THEN GO TO Step 21: <ul style="list-style-type: none"> • Spray valves not effective in reducing NC pressure OR <ul style="list-style-type: none"> • Ruptured S/G(s) NR level approaching 83% (75% ACC). d. Do not continue until at least one of the following conditions satisfied: <ul style="list-style-type: none"> • Both of the following: <ul style="list-style-type: none"> • NC pressure - LESS THAN RUPTURED S/G(s) PRESSURE • Pzr level - GREATER THAN 11% (30% ACC) OR <ul style="list-style-type: none"> • Both of the following: <ul style="list-style-type: none"> • NC pressure - WITHIN 300 PSIG OF RUPTURED S/G(s) PRESSURE • Pzr level - GREATER THAN 41% (50% ACC) OR <ul style="list-style-type: none"> • Pzr level - GREATER THAN 68% (50% ACC) OR <ul style="list-style-type: none"> • NC subcooling based on core exit T/Cs - LESS THAN 0°F. e. CLOSE normal Pzr spray valves. f. Verify 1NV-37A (NV Supply To Pzr Aux Spray) – CLOSED
	SRO	g. Observe Caution prior to Step 23 and GO TO Step 23.
NOTE TO EVALUATOR: The crew may decide that spray valves are not effective and transition to step 21.		

Op Test No.:	<u>301</u>	Scenario #	<u>4</u>	Event #	<u>6</u>	Page	<u>32</u>	of	<u>36</u>
Event Description: 1B S/G Tube Rupture									
Time	Position	Applicant's Actions or Behavior							

	BOP	21. Depressurize NC System using Pzr PORV as follows: a. Verify at least one Pzr PORV - AVAILABLE. b. OPEN one Pzr PORV. c. Do not continue until at least one of the following conditions satisfied: <ul style="list-style-type: none"> NC subcooling based on core exit T/Cs - LESS THAN 0°F OR Pzr level - GREATER THAN 68% (50% ACC) OR Both of the following: <ul style="list-style-type: none"> NC pressure - LESS THAN RUPTURED S/G(s) PRESSURE Pzr level - GREATER THAN 11% (30% ACC). d. CLOSE Pzr PORV. e. CLOSE Pzr spray valves.
	BOP	22. Verify NC pressure - INCREASING.
CAUTION S/I must be terminated when termination criteria are satisfied to prevent overfilling the ruptured S/G(s).		
	RO or BOP	23. 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"> N/R level in at least one intact S/G - GREATER THAN 11% (29% ACC) OR Total feed flow available to S/G(s) - GREATER THAN 450 GPM. c. NC pressure - STABLE OR INCREASING. d. Pzr level - GREATER THAN 11% (30% ACC).
	BOP	24. Stop S/I pumps as follows: a. Stop NI pumps. b. Ensure only one NV pump - ON.

Op Test No.:	301	Scenario #	4	Event #	6	Page	33	of	36
Event Description: 1B S/G Tube Rupture									
Time	Position	Applicant's Actions or Behavior							

CRITICAL TASK	BOP	<p>25. Isolate NV S/I flowpath as follows:</p> <p>a. Verify the following valves - OPEN:</p> <ul style="list-style-type: none"> • 1NV-252A (NV Pumps Suct From FWST) • 1NV-253B (NV Pumps Suct From FWST). <p>b. Ensure the following valves - OPEN:</p> <ul style="list-style-type: none"> • 1NV-203A (NV Pumps A&B Recirc Isol) • 1NV-202B (NV Pmps A&B Recirc Isol). <p>c. Close the following valves:</p> <ul style="list-style-type: none"> • 1NI-9A (NV Pmp C/L Inj Isol) • 1NI-10B (NV Pmp C/L Inj Isol).
END OF EVENT 6		
END OF SCENARIO		

Attachment List

Scenario 4

ATTACHMENT 1 -	Crew Critical Task Summary
ATTACHMENT 2 -	Shift Turnover Information
ATTACHMENT 3 –	OP/1/A/6150/009 Enclosure 4.5 (Manual Operation of the Makeup Controls), rev. 079
ATTACHMENT 4 –	AP/1/A/5500/021 Enclosure 1 (Foldout Page), rev. 042
ATTACHMENT 5 –	AP/1/A/5500/010 Enclosure 1 (Foldout Page), rev. 057
ATTACHMENT 6	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page), rev. 042
ATTACHMENT 7 –	EP/1/A/5000/E-0 Enclosure 2 (Ventilation System Verification), rev. 042
ATTACHMENT 8	EP/1/A/5000/E-0 Enclosure 4 (NC Temperature Control), rev. 042
ATTACHMENT 9 –	EP/1/A/5000/G-1 Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring), rev.007
ATTACHMENT 10 –	EP/1/A/5000/E-2 (Faulted Steam Generator Isolation), rev. 015
ATTACHMENT 11 –	EP/1/A/5000/E-3 Enclosure 1 (Foldout Page), rev. 043
ATTACHMENT 12 –	EP/1/A/5000/E-3 page 23 (Step 10 table)

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	UNSAT	CT #	CRITICAL TASK
		C-1	Manually control feedwater to prevent reaching an S/G Hi Hi level Turbine trip or Lo Lo level Rx trip.
		C-2	Close the block valve upstream of the stuck open PZR PORV.
		C-3	Isolate feed/steam to/from ruptured S/G before a transition to ECA-3.1.
		C-4	Terminate S/I before water release occurs from the ruptured S/G PORV or safety.

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION			
Unit 1 Status			
Power Level	Power History	NCS Boron	Xenon
25%	MOL	1168 PPM	per OAC
Controlling Procedure			
<ul style="list-style-type: none">OP/1/A/6100/003 (Controlling Procedure for Unit Operation), Enclosure 4.1 (Power Increase) is in progress up to step 3.21.			
Other Information Needed to Assume the Shift			
<ul style="list-style-type: none">Unit 2 is at 100%. The 1A KF (Fuel Pool Cooling) Pump is tagged out for preventative maintenance. The 1A2 CFPT MOP is tagged out for motor replacement. Increase Power per the reactivity plan.			
NEOs Available			
Six NEOs are available as listed on the status board			
METEOROLOGICAL CONDITIONS			
<ul style="list-style-type: none">Upper wind direction = 315 degrees, speed = 10 mphLower wind direction = 315 degrees, speed = 10.5 mphForecast calls for Severe Thunderstorm Watch for the next 4 hours.			

**NRC INITIAL LICENSE EXAM
SCENARIO # 5**

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

Facility:	Catawba NRC Exam 2014	Scenario No.:	5	Op Test No.:	2014301
Examiners:	_____	Operators:	SRO		
	_____		RO		
	_____		BOP		
Initial Conditions: IC# 180; Unit 1 is at 75% power, BOL. Unit 2 is at 100%. The 1A KF (Fuel Pool Cooling) Pump is tagged out for preventative maintenance. The 1A2 CFPT MOP is tagged out for motor replacement					
Turnover: Unit 1 is at 75% power, BOL. Increase power to 100% per the reactivity management plan.					
Event No.	Malf. No.	Event Type*	Event Description		
1	---	N-BOP R-RO N-SRO	Power increase.		
2	IDE005G	C-RO C-SRO	1SV-42 (SM ATMOS DUMP #7) fails open. AP/28		
3	ENB013A	C-BOP C-SRO TS-SRO	N41 fails low. AP/16		
4	NV015	C-BOP C-SRO	1NV-309 (SEAL WATER INJECTION FLOW) fails open. AP/08		
5	FW003	TS-SRO	FWST Level Ch 3 fails low		
6	NCP008A	C-RO C-SRO	1A NC (Reactor Coolant) Pump #1 Seal Failure. AP/08		
7	NC013A	M-ALL	LBLOCA		
8	CA013	C-RO C-SRO	1SA-5 fails open.		
9	VV003A VX004	C-BOP	Both Hydrogen Skimmer fans fail to start.		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Appendix D

Catawba NRC Exam May 2014 Scenario 5 NUREG 1021 Revision 9

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

Initial Condition IC #180

IC# 180; Unit 1 is at 75% power, BOL. Unit 2 is at 100%. The 1A KF (Fuel Pool Cooling) Pump is tagged out for preventative maintenance. The 1A2 CFPT MOP is tagged out for motor replacement.

Turnover:

IC# 180; Unit 1 is at 75% power, BOL. Unit 2 is at 100%. The 1A KF (Fuel Pool Cooling) Pump is tagged out for preventative maintenance. The 1A2 CFPT MOP is tagged out for motor replacement. Increase power to 100% per the reactivity management plan.

Event 1

Increase power.

Event 2

1SV-42 (SM ATMOS DUMP #7) fails open. AP/28

Event 3

N41 fails low. AP/16

Event 4

1NV-309 (SEAL WATER INJECTION FLOW) fails open. AP/08

Event 5

FWST Level Ch 3 fails low.

Event 6

1A NC (Reactor Coolant) Pump #1 Seal Failure. AP/08.

Event 7

LBLOCA

Event 8

1SA-5 fails open.

Event 9

Both Hydrogen Skimmer fans fail to start.

Critical Task 1 – Manually trip reactor on RCP seal failure prior to initiation of LOCA.

Critical Task 2 – Close or isolate atmospheric dump prior to exiting AP/28.

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

EXERCISE GUIDE WORKSHEET

1. INITIAL CONDITIONS:

1.1 Reset to IC #180

START

TIME:

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		1	MAL-IDE005G (ATM STEAM DUMP SV42 UNCONDITIONAL FAILURE)	100				2
		3	MAL-ENB013A (P/R 41 BLOWN FUSE)	INST				3
		5	MAL-NV015 (SEAL INJ FLOW CTRLR NV-309 FAILURE)	100		2 MIN		4
		8	MAL-NV015 (SEAL INJ FLOW CTRLR NV-309 FAILURE)	100		2 MIN	1 SEC	4
		11	XMT-FW003 [LFW_5120 WR FWST LVL CH 3 TO DCS (FWAA5120)]	0				5
		13	MAL-NCP008A (NCP A NO.1 SEAL FAILURE)	9		30 SEC		6
		16	MAL-NC013A NC COLD LEG A LEAK)	27.5				7
		18	VLV-CA031F (SA5 CA PMP TURB STM SPLY VL FAIL TO POSITION)	1				8
		n/a	MAL-VV003A (HYDROGEN SKIMMER FAN A AUTO FAILURE)					9
		18	LOA-VX004 (RACKOUT HYD SKIMMER FAN 1B)	RACK OUT	9 MIN			9
		n/a	OVR-FWP019A (CFPT 1A MOP 1A2 OFF LT)	OFF				
		n/a	OVR-FWP019B (CFPT 1A MOP1A2 ON LT)	OFF				
		n/a	LOA-KF004 (RACKOUT KF PMP A)	RACK OUT				
			Ensure TRIGGER 8 = DCS_SLIM9ManLight					
			Ensure TRIGGER 16 = x10o151g					
			Ensure TRIGGER 18 = x01o063g I x01o066g					
			Place red collars on the 1A KF Pump and the 1A2 CFPT MOP					

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

2. SIMULATOR BRIEFING

2.1 Control Room Assignments:

Position	Name
CRS	
RO	
BOP	

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

3. EXERCISE PRESENTATION

3.1 Familiarization Period

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

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

✓	BOOTH INSTRUCTOR ACTION
	IF the SOC is called to be informed of the power increase, REPEAT the information.

3.3 **Scenario EVENT 2**, 1SV-42 Fails Open

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 1 to cause 1SV-42 to fail open.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to investigate the problem with 1SV-42, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator and/or Maintenance is dispatched to investigate the problem with 1SV-42, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF RP is notified of the leak, REPEAT back the information.

3.4 **Scenario EVENT 3**, N-41 blown instrument fuse.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 3 to cause the instrument fuse for N-41 to blow.

Appendix D

Catawba NRC Exam May 2014 Scenario 5 NUREG 1021 Revision 9

Page 5 of 38

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

✓	BOOTH INSTRUCTOR ACTION
	IF IAE is contacted to fail bistables per model W/O #00874531, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is contacted to write a w/r for N41, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF the Reactor Group Engineer is notified of N41 failure, REPEAT back the information.

3.5 Scenario EVENT 4, 1NV-309 Fails Open

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 5 to fail 1NV-309 open.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to investigate the problem with 1NV-309, REPEAT back the information.

3.6 Scenario EVENT 5, FWST Level Channel 3 Fails Low

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 11 to cause FWST Level Channel 3 to fail low.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to issue Model W/O 01069041 to have IAE provide emergency repairs, REPEAT back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to write a w/r for the FWST Level Channel 3, REPEAT back the information.

3.7 Scenario EVENT 6, 7, 8 and 9

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 13 to cause 1A NC Pump #1 Seal failure.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to secure all ice condenser air handling units, REPEAT back the information

Catawba Nuclear Station NRC Exam May 2014

Appendix D

Scenario Outline

Form ES-D-1

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to place containment hydrogen analyzers in service, REPEAT back the information

✓	BOOTH INSTRUCTOR ACTION
	IF Chemistry is notified to sample all S/Gs for activity, REPEAT the order.

✓	BOOTH INSTRUCTOR ACTION
	IF RP is notified to frisk all cation columns for activity, REPEAT the order.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator dispatched to stop the 1A/1B D/G and place in standby readiness, REPEAT the order.

Op Test No.: 301 Scenario # 5 Event # 1 Page 8 of 38
 Event Description: Power Increase

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

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

	BOP	Perform a dilution.
	RO	Input targets into the main turbine control panel.

NOTE TO EVALUATOR: The crew may decide to input targets to the main turbine prior to performing a dilution.

NOTE TO EVALUATOR: Applicant may perform a dilution per OP/1/A/6150/009, Boron Concentration Control, Enclosure 5 (Manual Operation Of The Makeup Controls). Refer to Attachment 3.

NOTE TO EVALUATOR: The following actions are taken from OP/1/6150/009, Boron Concentration Control, Enclosure 4.3 (Dilution).

	BOP	3.2 IF the blender is set for automatic makeup per Enclosure 4.1 (Automatic Makeup), record the setpoint on 1NV-242A (RMWST To B/A Blender Ctrl): _____ gpm
	BOP	3.3 Ensure the following valve control switches in "AUTO": <ul style="list-style-type: none"> • 1NV-242A (RMWST To B/A Blender Ctrl) • 1NV-181A (B/A Blender Otlt To VCT)
	BOP	3.4 Ensure 1NV-242A (RMWST To B/A Blender Ctrl) controller in auto.
	BOP	3.5 Ensure at least one reactor makeup water pump is in "AUTO" or "ON".
	BOP	3.6 Record the desired volume of reactor makeup water to be added. _____ gallons
	BOP	3.7 Adjust the total makeup counter to the desired volume of reactor makeup water to be added. (R.M.)
	BOP	3.8 Place the "NC MAKEUP MODE SELECT" switch to the "DILUTE" position.

Op Test No.: 301 Scenario # 5 Event # 1 Page 9 of 38

Event Description: Power Increase

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE: High letdown flow rates result in increased backpressure on the letdown line. If letdown flow is > 90 gpm, it may be desirable to reduce flow rate to 80 gpm to avoid the Rx Make-up Flow Deviation alarm and associated automatic actions.

	BOP	3.9 IF required, adjust the setpoint for 1NV-242A (RMWST To B/A Blender Ctrl) to the desired flow.
--	-----	---

NOTE TO EVALUATOR: Step 3.10 will not apply.

	BOP	<p>3.11 IF AT ANY TIME it is desired to divert letdown to the RHT manually operate 1NV-172A (3-Way Divert To VCT-RHT) as follows:</p> <p>3.11.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the "RHT" position.</p> <p>3.11.2 Ensure VCT level is monitored continuously while diverting to the RHT.</p> <p>NOTE: Procedure may continue while performing the following step.</p> <p>3.11.3 WHEN desired VCT level is reached return 1NV-172A (3-Way Divert To VCT-RHT) to auto as follows:</p> <p>3.11.3.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "VCT" position.</p> <p>3.11.3.2 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "AUTO" position.</p>
	BOP	3.12 IF AT ANY TIME during the makeup it becomes necessary to change the makeup flow rate, adjust the setpoint for 1NV-242A (RMWST To B/A Blender Ctrl) as necessary to achieve the desired flow.

Op Test No.: 301 Scenario # 5 Event # 1 Page 10 of 38

Event Description: Power Increase

Time	Position	Applicant's Actions or Behavior
	BOP	<p>3.13 <u>IF AT ANY TIME</u> while dilution is in progress it becomes necessary to stop the dilution, perform the following:</p> <p>3.13.1 Place the "NC MAKEUP CONTROL" switch to the "STOP" position.</p> <p>3.13.2 Ensure the following valves close:</p> <ul style="list-style-type: none"> • 1NV-242A (RMWST To B/A Blender Ctrl) • 1NV-181A (B/A Blender Otlt To VCT) <p>3.13.3 <u>IF</u> in "AUTO", verify the reactor makeup water pump stops.</p> <p>3.13.4 Record reactor makeup water volume added as indicated on the total makeup counter.</p> <p>_____ gallons</p> <p>3.13.5 <u>WHEN</u> conditions allow resuming the dilution, perform the following:</p> <p>3.13.5.1 Determine remaining volume to be added by subtracting the amount previously added (Step 3.13.4) from the desired volume to be added (Step 3.6).</p> <p>_____ - _____ = _____ gallons (Step 3.6) (Step 3.13.4)</p> <p>3.13.5.2 Adjust total makeup counter to the volume of reactor makeup water determined in Step 3.13.5.1. (R.M.)</p> <p>3.13.5.3 Place the "NC MAKEUP CONTROL" switch in the "START" position. (R.M.)</p> <p>3.13.5.4 Verify the following:</p> <ul style="list-style-type: none"> • 1NV-242A (RMWST To B/A Blender Ctrl) modulates to establish desired flow • 1NV-181A (B/A Blender Otlt To VCT) opens <p>3.13.5.5 <u>IF</u> in "AUTO", verify the reactor makeup water pump starts.</p>
	BOP	<p>3.14 <u>WHILE</u> makeup is in progress, monitor the following for expected results:</p> <ul style="list-style-type: none"> • Control rod motion • NC System Tavg • Reactor Power

Op Test No.:	301	Scenario #	5	Event #	1	Page	11	of	38
Event Description: Power Increase									
Time	Position	Applicant's Actions or Behavior							

NOTE: If a small makeup is being performed, placekeeping for Steps 3.15 through 3.17 may be performed after Step 3.18 is performed.		
	BOP	3.15 Place the "NC MAKEUP CONTROL" switch to the "START" position. (R.M.)
	BOP	3.16 Verify the following: <ul style="list-style-type: none"> 1NV-242A (RMWST To B/A Blender Ctrl) modulates to establish desired flow 1NV-181A (B/A Blender Otlt To VCT) opens
	BOP	3.17 IF in "AUTO", verify the reactor makeup water pump starts.
NOTE: The total makeup counter may count up 1 - 5 gallons after termination.		
	BOP	3.18 WHEN the desired volume of reactor makeup water is reached on the total makeup counter, ensure the following valves close. (R.M.) <ul style="list-style-type: none"> 1NV-242A (RMWST To B/A Blender Ctrl) 1NV-181A (B/A Blender Otlt To VCT)
	BOP	3.19 IF automatic makeup is desired, perform one of the following: 3.19.1 IF it is desired to change the blender outlet boron concentration, refer to Enclosure 4.1 (Automatic Makeup). OR 3.19.2 IF makeup at the previous concentration is acceptable AND the system was previously aligned per Enclosure 4.1 (Automatic Makeup), perform the following: 3.19.2.1 Ensure the controller for 1NV-242A (RMWST To B/A Blender Ctrl) is set to the value recorded in Step 3.2. (R.M.) 3.19.2.2 Place the "NC MAKEUP MODE SELECT" switch in "AUTO". 3.19.2.3 Place the "NC MAKEUP CONTROL" switch to the "START" position. (R.M.)
NOTE TO EVALUATOR: Step 3.20 will be N/A'd		
END OF DILUTION		

Op Test No.: 301 Scenario # 5 Event # 1 Page 12 of 38

Event Description: Power Increase

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

NOTE TO EVALUATOR: The following steps are from OP/1/B/6300/001, Turbine Generator, Enclosure 4.2 (Load Changing) starting at step 3.1.2.

	RO	<p>3.1.2 Increase turbine generator load by performing the following:</p> <p>3.1.2.1 Select "LOAD RATE" and verify it illuminates.</p> <p>3.1.2.2 Input the desired load rate.</p> <p>3.1.2.3 Select "ENTER" or "OK" and verify "LOAD RATE" goes dark.</p> <p>3.1.2.4 Select "TARGET" and verify it illuminates.</p> <p>3.1.2.5 Input the desired load target.</p> <p>3.1.2.6 Select "ENTER" and verify "TARGET" light goes dark.</p> <p>3.1.2.7 Verify new load target appears on Target Display.</p> <p>3.1.2.8 Select "GO" and verify it illuminates to start load increase.</p> <p>3.1.2.9 Coordinate with Secondary Chemistry to adjust S/G blowdown flowrates to obtain maximum blowdown for the appropriate load</p>
Booth Operator will insert Trigger 1 for EVENT 2 at the discretion of the lead examiner.		
END OF EVENT 1		

Op Test No.: 301 Scenario # 5 Event # 2 Page 13 of 38

Event Description: 1SV-42 (SM ATMOS DUMP #7) fails open

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

EVENT 2		
Indications: OAC pt. C1Q0978 'VLV SV42 MAIN STEAM ATMOS DUMP NO. 7' – OPEN		
	RO	Recognize 1SV-42 open
	RO	Place "STEAM DUMP INTLK BYP" train A and/or Train B to "OFF RESET"
CRITICAL TASK	RO	Close 1SV-51 (SM ATMOS DUMP #7 ISOL)
	CREW	Enter AP/1/A/5500/028 (Secondary Steam Leak)
NOTE TO EVALUATOR: The following actions are from AP/1/A/5500/028 (Secondary Steam Leak).		
	RO and BOP	1. Monitor Enclosure 1 (Foldout Page).
	RO	2. Verify turbine – ONLINE.
	RO	3. Verify the following: <ul style="list-style-type: none"> Reactor power – LESS THAN OR EQUAL TO 100% POWER T-Avg – WITHIN 1.5°F OF T-Ref.
	RO	3. RNO Perform the following: <ul style="list-style-type: none"> a. Select "MANUAL" on turbine control panel. b. Depress "CONTROL VALVES LOWER" pushbutton and reduce turbine load to maintain: <ul style="list-style-type: none"> Reactor power – LESS THAN OR EQUAL TO 100% POWER T-Avg – WITHIN 1.5°F OF T-Ref.
	RO	4. Verify proper reactor response as follows: <ul style="list-style-type: none"> Control rods – IN AUTO AND STEPPING IN P/R neutron flux – DECREASING.
	RO	4 RNO IF T-Avg is greater than 1.5°F higher than T-Ref, THEN insert control rods as required to maintain T-Avg within 1°F of T-Ref.
	RO	5. IF AT ANY TIME reactor power is greater than 100%, THEN perform Step 3 RNO.

Op Test No.:	<u>301</u>	Scenario #	<u>5</u>	Event #	<u>2</u>	Page	<u>14</u>	of	<u>38</u>
Event Description: 1SV-42 (SM ATMOS DUMP #7) fails open									
Time	Position	Applicant's Actions or Behavior							

	BOP	6. Verify Pzr level – STABLE OR INCREASING.
	CRS	7. <u>IF AT ANY TIME</u> while in this procedure Pzr level is decreasing in an uncontrolled manner, <u>THEN RETURN TO Step 6.</u>
	RO or BOP	8. <u>IF AT ANY TIME</u> VCT level goes below 23%, <u>THEN</u> align NV pump suction to FWST as follows: a. OPEN the following valves: <ul style="list-style-type: none"> • 1NV-252A (NV Pumps Suct From FWST) • 1NV-253B (NV Pumps Suct From FWST). b. CLOSE the following valves: <ul style="list-style-type: none"> • 1NV-188A (VCT Otlt Isol) • 1NV-189B (VCT Otlt Isol).
	RO or BOP	9. Attempt to identify and isolate leak as follows: a. Verify the following conditions – NORMAL: <ul style="list-style-type: none"> • Containment temperature • Containment pressure • Containment humidity • Containment floor & equipment sump level. b. Dispatch operators to locate and identify source of steam leak. c. Verify S/G PORVs – CLOSED. d. Verify condenser dump valves – CLOSED. e. Verify atmospheric dump valves – CLOSED.
CRITICAL TASK	RO	9.e. RNO e. Perform the following: 1) Select "OFF RESET" on the following switches: <ul style="list-style-type: none"> • "STEAM DUMP INTLK BYP TRN A" • "STEAM DUMP INTLK BYP TRN B". 2) <u>IF</u> valve will not close, <u>THEN</u> CLOSE affected atmospheric dump valve isolation valve.
NOTE TO EVALUATOR: RNO Step 9.e.3) will not apply		
	RO	f. Verify CA PMP #1 – OFF.
NOTE TO EVALUATOR: The crew will determine step 9.g. does not apply		

Op Test No.:	301	Scenario #	5	Event #	2	Page	15	of	38
Event Description: 1SV-42 (SM ATMOS DUMP #7) fails open									
Time	Position	Applicant's Actions or Behavior							

	SRO	10. Determine required notifications: <ul style="list-style-type: none"> REFER TO RP/0/A/5000/001 (Classification Of Emergency) REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
	BOP	11. Notify RP of leak.
	RO	12. Verify – LEAK ISOLATED.
	SRO	13. Determine long term plant status. <u>RETURN TO</u> procedure and step in effect.
NOTE TO EVALUATOR: Tech Spec 3.4.1 (RCS Pressure, Temperature, and Flow Departure From Nucleate Boiling (DNB) Limits) Condition A (Restore DNB parameter(s) to within limit within 2 hours) may need to be entered if the crew was slow to isolate the leak. This may need to be addressed during follow up questioning.		
Booth Operator will insert Trigger 3 for Event 3 at the discretion of the lead examiner.		
END OF EVENT 2		

Op Test No.:	301	Scenario #	5	Event #	3	Page	16	of	38
Event Description: N-41 blown instrument fuse.									
Time	Position	Applicant's Actions or Behavior							

EVENT 3		
Indications:	1AD-2, A/1 'P/R HI NEUTRON FLUX RATE ALERT' 1AD-2, A/3 'P/R HI NEUTRON FLUX HI SET POINT ALERT' 1AD-2, B/1 'P/R LOWER DET HI FLUX DEV OR AUTO DEFEAT' 1AD-2, B/2 'P/R UPPER DET HI FLUX DEV OR AUTO DEFEAT' 1AD-2, B/3 'COMPARATOR P/R CHANNEL DEVIATION' 1AD-2, B/5 'P/R HI VOLTAGE FAILURE' 1AD-2, E/8 'OVER POWER ROD STOP' 1AD-2, F/10 'DCS TROUBLE'	
NOTE TO EVALUATOR: The crew will make a plant page announcing the entry into AP/1/A/5500/016, Malfunction of Nuclear Instrumentation System.		
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/016 Malfunction of Nuclear Instrumentation System, Case IV (Power Range Malfunction).		
	RO	1. Verify all rod motion – STOPPED.
	RO	2. Verify 1AD-2, E/8 “OVER POWER ROD STOP” – DARK.
		2. RNO Adjust Turbine load to maintain T-Avg at T-Ref.
	RO	3. Identify failed P/R channel: • N-41 (failed low) OR • N-42 OR • N-43 OR • N-44.
	RO	4. Ensure unaffected channels – OPERABLE.
	BOP	5. Request IAE to place the following bistables in the tripped condition. <u>REFER TO</u> Model W/O #00874531: • OT DELTA T • OP DELTA T.

Op Test No.:	301	Scenario #	5	Event #	3	Page	17	of	38
Event Description: N-41 blown instrument fuse.									
Time	Position	Applicant's Actions or Behavior							

	BOP	6. Perform the following actions at the Miscellaneous Control And Indication Panel: <ol style="list-style-type: none"> a. Place the appropriate "ROD STOP BYPASS" switch to the affected channel position. b. Verify the affected nuclear overpower rod stop channel bypassed status light (1SI-19) – LIT. c. Place "POWER MISMATCH BYPASS" switch to the affected channel position.
	BOP	7. Perform the following actions at the Detector Current Comparator panel: <ol style="list-style-type: none"> a. Place "UPPER SECTION" channel defeat switch to the affected channel. b. Verify the "CHANNEL DEFEAT" light for the upper section – LIT. c. Place "LOWER SECTION" channel defeat switch to the affected channel. d. Verify the "CHANNEL DEFEAT" light for the lower section – LIT.
	BOP	8. At the Comparator And Rate panel, place the "COMPARATOR CHANNEL DEFEAT" switch to the affected channel position.
NOTE The following annunciators will actuate in the following step: 1AD-2, A/1 "P/R/HI NEUTRON FLUX RATE ALERT" 1AD-2, A/3, "P/R/ HI NEUTRON FLUX HI SET POINT ALERT" 1AD-2, B/5, "P/R HI VOLTAGE FAILURE"		
	BOP	9. De-energize the affected channel as follows: <ol style="list-style-type: none"> a. Remove the control power fuses at Power Range A drawer.
NOTE Replacement of the affected P/R control power fuses shall not occur without authorization of the Superintendent of Operations or his designee.		
	BOP	<ol style="list-style-type: none"> 9.b. Request the OSM to maintain the control power fuses under his control. c. Verify the affected Power Range cabinet shows no physical signs of damage.
	CREW	10. Ensure affected channel bistables are in the required state. REFER TO Enclosure 1 (P/R Bistables That Must Be Tripped).
	RO	11. Ensure operable P/R channel selected to record on NIS RECORDER.

Op Test No.:	301	Scenario #	5	Event #	3	Page	18	of	38
Event Description: N-41 blown instrument fuse.									
Time	Position	Applicant's Actions or Behavior							

	RO	12. Adjust control rods to maintain T-Ave at T-Ref.
	RO	13. <u>WHEN</u> T-avg within 1°F of T-Ref, <u>AND</u> auto rod control desired, <u>THEN</u> return control rods to auto.
	CREW	14. Determine and correct cause of P/R malfunction.
	SRO	15. Ensure compliance with appropriate Tech Specs: <ul style="list-style-type: none"> 3.2.4 (Quadrant Power Tilt Ratio (QPTR)) 3.3.1 (Reactor Trip System (RTS) Instrumentation).
<p>NOTE TO EVALUATOR: The SRO should determine that the following Tech Spec 3.3.1 (Reactor Trip System (RTS) Instrumentation) conditions for associated functions should be entered:</p> <p>2. <u>Power Range Neutron Flux</u> a. High – Condition D (Perform SR 3.2.4.2 12 hours when > 75 % RTP <u>and</u> 72 hours to place the channel in trip)</p> <p>3. <u>Power Range Neutron Flux High Positive Rate</u> Condition D (Perform SR 3.2.4.2 12 hours when > 75 % RTP <u>and</u> 72 hours to place the channel in trip)</p> <p>6. <u>Overtemperature ΔT</u> Condition E (72 hours to place the channel in trip)</p> <p>7. <u>Overpower ΔT</u> Condition E (72 hours to place the channel in trip)</p> <p>16. <u>Reactor Trip System Interlocks</u> b. Low Power Reactor Trips Block, P-7, – Condition S (1 hour to verify interlock is in required state for existing conditions)</p> <p>c. Power Range Neutron Flux, P-8, - Condition S (1 hour to verify interlock is in required state for existing conditions)</p> <p>d. Power Range Neutron Flux, P-9, - Condition S (1 hour to verify interlock is in required state for existing conditions)</p> <p>e. Power Range Neutron Flux, P-10, - Condition R (1 hour to verify interlock is in required state for existing conditions)</p>		
<p>NOTE TO EVALUATOR: The SRO will conduct a “Crew Update” to inform the crew of any Tech Spec conditions that have been entered.</p>		

Op Test No.:	301	Scenario #	5	Event #	3	Page	19	of	38
Event Description: N-41 blown instrument fuse.									
Time	Position	Applicant's Actions or Behavior							

	SRO	16. Determine required notifications: <ul style="list-style-type: none"> REFER TO RP/0/A/5000/001 (Classification Of Emergency) REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
	BOP	17. Notify Reactor Group Engineer of occurrence.
	SRO	18. WHEN the affected P/R channel is repaired, THEN ensure IAE returns the channel to service.
	SRO	19. Determine long term plant status. RETURN TO procedure in effect.
Booth Operator will insert Trigger 5 for EVENT 4 at the discretion of the lead examiner.		
NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.		
END OF EVENT 3		

Op Test No.:	301	Scenario #	5	Event #	4	Page	20	of	38
Event Description: 1NV-309 (SEAL WATER INJECTION FLOW) fails open.									
Time	Position	Applicant's Actions or Behavior							

EVENT 4		
Indications: 1AD-7, C/4 'NCP SEAL WATER LO FLOW'		
	BOP	Recognize 1NV-309 failing open
	BOP	Take manual control of 1NV-309 and control seal water flow.
	CREW	Enter AP/1/A/5500/008, Malfunction of Reactor Coolant Pump, Case II (Loss of Seal Water Injection)
NOTE TO EVALUATOR: The crew will make a plant page announcing the entry into AP/1/A/5500/008, Malfunction of Reactor Coolant Pump		
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/008, Malfunction of Reactor Coolant Pump, Case II (Loss of Seal Water Injection).		
	RO and BOP	1. Monitor Enclosure 1 (Foldout Page).
CAUTION Failure to restore NC pump seal cooling within 10 minutes will cause damage to the NC pump seals resulting in NC inventory loss.		
	BOP	2. Verify the following parameters for all NC Pumps: <ul style="list-style-type: none"> #1 seal outlet temperature – LESS THAN 235°F Lower bearing temperature – LESS THAN 225°F #1 seal delta P – GREATER THAN 200 PSID.
	BOP	3. Verify 1AD-7, C/1 "NCP #1 SEAL LEAKOFF HI FLOW" – DARK.
NOTE In the following steps, seal injection flow should be established slowly to any NC pump that suffered a total loss of seal injection.		
	BOP	4. Verify "N/R CHRGR LN FLOW" – GREATER THAN OR EQUAL TO 32 GPM.
	BOP	5. Verify the following seal injection filter alarms – DARK: <ul style="list-style-type: none"> 1AD-7, B/4 "SEAL INJECTION FILTER A HI D/P" 1AD-7, E/4 "SEAL INJECTION FILTER B HI D/P".
	BOP	6. Verify "TOTAL SEAL WTR FLOW" – GREATER THAN OR EQUAL TO 32 GPM.

Op Test No.:	301	Scenario #	5	Event #	4	Page	21	of	38
Event Description: 1NV-309 (SEAL WATER INJECTION FLOW) fails open.									
Time	Position	Applicant's Actions or Behavior							

	BOP	6. RNO Perform the following: a. Slowly adjust 1NV-309 (Seal Water Injection Flow) to establish 32 GPM "TOTAL SEAL WTR FLOW". b. IF seal water injection flow is established, THEN: 1) Determine and correct the cause of loss of seal water injection.
	SRO	2) GO TO Step 9.
	BOP	9. Verify the following NC pump seal return isolation valves – OPEN: <ul style="list-style-type: none"> 1NV-52A (NC Pump 1A Seal Return) 1NV-63B (NC Pump 1B Seal Return) 1NV-74A (NC Pump 1C Seal Return) 1NV-85B (NC Pump 1D Seal Return).
	BOP	10. WHEN plant conditions allow, THEN perform PT/1/A/4150/001C (NC Pump Seal Injection Flow Verification).
	SRO	11. Ensure compliance with appropriate Tech Specs: <ul style="list-style-type: none"> 3.4.5 (RCS Loops – MODE 3) 3.4.6 (RCS Loops – MODE 4) 3.4.13 (RCS Operational Leakage) 3.5.5 (Seal Injection Flow) SLC 16.7-9 (Standby Shutdown System).
NOTE TO EVALUATOR: No Tech Spec conditions need to be entered.		
	SRO	12. Determine required notifications: <ul style="list-style-type: none"> REFER TO RP/0/A/5000/001 (Classification Of Emergency) REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
	CREW	13. Determine long term plant status. RETURN TO procedure in effect.
Booth Operator will insert Trigger 11 for EVENT 5 at the discretion of the lead examiner.		
NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.		
END OF EVENT 4		

Op Test No.:	301	Scenario #	5	Event #	5	Page	22	of	38
Event Description: FWST Level channel 3 fails low.									
Time	Position	Applicant's Actions or Behavior							

EVENT 5		
Indications:	1AD-9, B/4 'FWST LO LEVEL' 1AD-9, C/8 'FWST PRE-LO LEVEL' 1AD-9, FWST LO-LO LEVEL'	
	BOP	Recognize 1FWP5120 (FWST WR LEVEL CH 3) failed low.
	SRO	Enter Tech Spec 3.3.2 (Engineered Safety Feature Actuation System (ESFAS) Instrumentation) Condition N
NOTE TO EVALUATOR The following actions are taken from the annunciator response for 1AD/9, B/4 'FWST LO LEVEL'		
	BOP	IMMEDIATE ACTIONS: Verify low level by checking against the other channels.
NOTE TO EVALUATOR Supplementary Actions 1 and 2 will not apply and action 3 will not be necessary.		
	SRO	4. IF a channel failure has occurred, perform the following: 4.1 Refer to Tech Spec 3.3.2 for minimum operable channel requirements.
NOTE TO EVALUATOR: Tech Spec 3.3.2 (Engineered Safety Feature System (ESFAS) Instrumentation), Condition N (Place channel in bypass within 6 hours, <u>OR</u> Be in MODE 3 within 12 hours <u>AND</u> Be in MODE 5 within 42 hours) should be entered.		
Booth Operator will insert Trigger 13 for EVENT 6 at the discretion of the lead examiner.		
NOTE TO EVALUATOR: The SRO will conduct a "Crew Update" to inform the crew of any Tech Spec conditions that have been entered.		
	BOP	4.2 Issue the appropriate Model W/Os to have IAE provide emergency repairs on the affected channel(s): <ul style="list-style-type: none"> 01069039 – 1FWLT5000: Repair CH 1 FWST Level 01069040 – 1FWLT5010: Repair CH 2 FWST Level 01069041 – 1FWLT5120: Repair CH 3 FWST Level 01069042 – 1FWLT5130: Repair CH 4 FWST Level
	BOP	4.3 Initiate a work request to have the channel repaired.
NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.		
END OF EVENT 5		

Op Test No.: 301 Scenario # 5 Event # 6 Page 23 of 38

Event Description: 1A NC (Reactor Coolant) Pump #1 seal failure.

Time	Position	Applicant's Actions or Behavior
------	----------	---------------------------------

EVENT 6		
Indications:	1AD-7, C/1 'NCP #1 SEAL LEAKOFF HI FLOW'	
	CREW	Recognize 1A NC Pump seal failure.
	CREW	Enter AP/1/A/5500/008, Malfunction of Reactor Coolant Pump, Case I (NC Pump Seal Malfunction)
CRITICAL TASK	RO	Trip the Reactor
	BOP	Trip the 1A NC (Reactor Coolant) Pump
	CREW	GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)
NOTE TO EVALUATOR: The crew will make a plant page announcing the entry into AP/1/A/5500/008, Malfunction of Reactor Coolant Pump		
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/008, Malfunction of Reactor Coolant Pump, Case I (NC Pump Seal Malfunction).		
	RO AND BOP	1. Monitor Enclosure 1 (Foldout Page).
	BOP	2. Verify the following parameters for all NC Pumps: <ul style="list-style-type: none"> #1 seal outlet temperature - LESS THAN 235°F Lower bearing temperature - LESS THAN 225°F #1 seal delta P - GREATER THAN 200 PSID.
NOTE If seal maintenance has been performed, up to 24 hours of NC pump operation may be required before seals seat and operate properly.		
	BOP	3. Verify any NC pump #1 seal leakoff flow - GREATER THAN 6 GPM.
	BOP	4. WHEN NC loop flow indicates the affected NC pump(s) is stopped, THEN close the affected NC pump(s) seal return isolation valve. REFER TO Enclosure 1 (Foldout Page).
	BOP	5. Ensure the KC thermal barrier isolation valve for the affected NC pump(s) - OPEN: <ul style="list-style-type: none"> 1KC-394A (NC Pump 1A Therm Bar Otlt) 1KC-364B (NC Pump 1B Therm Bar Otlt) 1KC-345A (NC Pump 1C Therm Bar Otlt) 1KC-413B (NC Pump 1D Therm Bar Otlt).

Op Test No.:	301	Scenario #	5	Event #	6	Page	24	of	38
Event Description: 1A NC (Reactor Coolant) Pump #1 seal failure.									
Time	Position	Applicant's Actions or Behavior							

	BOP	6. Verify #1 seal leakoff flow - LESS THAN 7.5 GPM.
	SRO	6. RNO <u>GO TO</u> Step 12.
	RO	12. Shutdown the affected NC pump(s) within 5 minutes as follows: a. Verify Unit - IN MODE 1 OR 2.
NOTE TO EVALUATOR: Step 12.b will not apply		
CRITICAL TASK	RO	c. Trip reactor.
	BOP	d. WHEN reactor power less than 5%, THEN perform the following: 1) Trip the affected NC pump(s). 2) Ensure the normal spray valve associated with the tripped NC pump(s) - IN MANUAL AND CLOSED.
	SRO	e. <u>GO TO</u> EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
Transition to EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)		
END OF EVENT 6		

Op Test No.:	<u>301</u>	Scenario #	<u>5</u>	Event #	<u>7, 8 and 9</u>	Page	<u>25</u>	of	<u>38</u>
Event Description: LBLOCA, 1SA-5 (S/G 1C SM TO CAPT) fails open, Both Hydrogen Skimmer fans fail to start.									
Time	Position	Applicant's Actions or Behavior							

EVENTS 7, 8 AND 9		
NOTE TO EVALUATOR: The following steps are from EP/1/A/5000/E-0 (Reactor Trip or Safety Injection)		
	RO and BOP	1. Monitor Enclosure 1 (Foldout Page).
	RO	2. Verify Reactor Trip: Perform the following: <ul style="list-style-type: none"> All rod bottom lights - LIT All reactor trip and bypass breakers - OPEN I/R power - DECREASING.
	RO	3. Verify Turbine Trip: Perform the following: <ul style="list-style-type: none"> All turbine stop valves - CLOSED
	BOP	4. Verify 1ETA and 1ETB - ENERGIZED.
	RO	5. Verify S/I is actuated: <ul style="list-style-type: none"> a. "SAFETY INJECTION ACTUATED" status light (1SI-13) – LIT b. Both E/S load sequencer actuated status lights (1SI-14) - LIT.
	RO	6. Announce "Unit 1 Safety Injection".
	SRO	7. Determine required notifications: <ul style="list-style-type: none"> REFER TO RP/0/A/5000/001(Classification Of Emergency) REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
	RO or BOP	8. Verify all Feedwater Isolation status lights (1SI-5) - LIT
	BOP	9. Verify Phase A Containment Isolation status as follows: <ul style="list-style-type: none"> a. Phase A "RESET" lights - DARK.
	BOP	b. Monitor Light Panel Group 5 St lights on energized train(s) - LIT.
	BOP	10. Verify proper Phase B actuation as follows: <ul style="list-style-type: none"> a. Verify Containment pressure - HAS REMAINED LESS THAN 3 PSIG

Op Test No.:	301	Scenario #	5	Event #	7, 8 and 9	Page	26	of	38
Event Description: LBLOCA, 1SA-5 (S/G 1C SM TO CAPT) fails open, Both Hydrogen Skimmer fans fail to start.									
Time	Position	Applicant's Actions or Behavior							

	BOP	10. RNO a. Perform the following: 1) Verify Phase B Isolation has actuated as follows: a) Phase B Isolation "RESET" lights - DARK.
NOTE TO EVALUATOR: RNO Step 10.a.1)b) will not apply		
	BOP	c) Verify following monitor light panel lights - LIT: <ul style="list-style-type: none"> Group 1 Sp lights Group 5 Sp lights Group 5 St light L/11.
NOTE TO EVALUATOR: RNO Step 10.a.1)d) will not apply		
	RO or BOP	10. RNO a. 2) Stop all NC pumps.
	BOP	10. RNO a. 3) Maintain seal injection flow.
	BOP	10. RNO a. 4) Energize H₂ igniters.
	RO or BOP	10. RNO a. 5) Dispatch operator to perform the following: a) Secure all ice condenser air handling units. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11 (Securing All Ice Condenser Units). b) Place containment H ₂ analyzers in service. REFER TO OP/1/A/6450/010 (Containment Hydrogen Control Systems).
	BOP	10. RNO a. 6) WHEN 9 minutes has elapsed, THEN verify proper VX system operation. REFER TO Enclosure 5 (VX System Operation).
NOTE TO EVALUATOR: The BOP will correct Event 9 while performing Enclosure 5 by starting the 1A Hydrogen Skimmer Fan.		
END OF EVENT 9		
	SRO	10. RNO a. 7) GO TO Step 11.
	RO	11. 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.:	301	Scenario #	5	Event #	7 and 8	Page	27	of	38
Event Description: LBLOCA, 1SA-5 (S/G 1C SM TO CAPT) fails open									
Time	Position	Applicant's Actions or Behavior							
	BOP	12. Verify all of the following S/I pumps - ON: <ul style="list-style-type: none"> NV pumps ND pumps NI pumps. 							
	BOP	13. Verify all KC pumps - ON.							
	BOP	14. Verify all Unit 1 and Unit 2 RN pumps – ON.							
	BOP	15. Verify proper ventilation systems operation as follows: <ul style="list-style-type: none"> REFER TO Enclosure 2 (Ventilation System Verification). Notify Unit 2 operator to perform Enclosure 3 (Opposite Unit Ventilation Verification). 							
NOTE TO EVALUATOR: SRO will state that they will hand Enclosure 3 to a Unit 2 operator and set Enclosure 3 off to the side									
	RO	16. Verify all S/G pressures - GREATER THAN 775 PSIG.							
	RO	17. Verify proper S/I flow as follows: <ol style="list-style-type: none"> "NV S/I FLOW" - INDICATING FLOW. NC pressure - LESS THAN 1620 PSIG. NI pumps - INDICATING FLOW. NC pressure - LESS THAN 285 PSIG. ND pumps - INDICATING FLOW TO C-LEGS. 							
	RO or BOP	18. WHEN time and manpower permit (within two hours of event), THEN monitor Spent Fuel Pool level and temperature. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring).							
	RO	19. Control S/G levels as follows: <ol style="list-style-type: none"> Verify total CA flow - GREATER THAN 450 GPM. WHEN each S/G N/R level greater than 11% (29% ACC), THEN control feed flow to maintain that S/G N/R level between 11% (29% ACC) and 50%. 							
NOTE TO EVALUATOR: The RO will address Event 8 by closing the CAPT TRIP T/V CTRL, or by closing the CA PUMP #1 FLOWS to the S/Gs (1CA-64, 1CA-52, 1CA-48, 1CA-36, or by closing the CA PUMP 1 DISCH TO S/Gs ISOL (1CA-66B, 1CA-54B, 1CA-50A, 1CA-38A).									
END OF EVENT 8									

Op Test No.:	<u>301</u>	Scenario #	<u>5</u>	Event #	<u>7</u>	Page	<u>28</u>	of	<u>38</u>
Event Description: LBLOCA									
Time	Position	Applicant's Actions or Behavior							

NOTE TO EVALUATOR: ACC values are used for the remainder of the scenario.

	RO	20. Verify all CA isolation valves - OPEN.
	BOP	21. Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.
NOTE Enclosure 4 (NC Temperature Control) shall remain in effect until subsequent procedures provide alternative NC temperature control guidance.		
	RO	22. Control NC temperature. REFER TO Enclosure 4 (NC Temperature Control).
	BOP	23. Verify Pzr PORV and Pzr Spray Valve status as follows: a. All Pzr PORVs - CLOSED. b. Normal Pzr spray valves - CLOSED. c. At least one Pzr PORV isolation valve - OPEN.
	RO or BOP	24. Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.
	RO or BOP	24. RNO IF any NV OR NI pump is on, THEN perform the following: a. Ensure all NC pumps - OFF. b. Maintain seal injection flow.
	RO or BOP	25. Verify main steamlines intact: • All S/G pressures - STABLE OR INCREASING • ALL S/Gs - PRESSURIZED.
NOTE TO EVALUATOR: The Crew may determine that the 1C S/G is faulted due to the failure of 1SA-5 (S/G 1C SM TO CAPT) and transition to E-2 to isolate the S/G. REFER to Attachment 11.		
	BOP	26. Verify S/G tubes are intact as follows: • Verify the following EMF trip 1 lights - DARK: • 1EMF-33 (Condenser Air Ejector Exhaust) • 1EMF-26 (Steamline 1A) • 1EMF-27 (Steamline 1B) • 1EMF-28 (Steamline 1C) • 1EMF-29 (Steamline 1D).
	RO or BOP	• All S/G levels - STABLE OR INCREASING IN A CONTROLLED MANNER.

Op Test No.:	301	Scenario #	5	Event #	7	Page	29	of	38
Event Description: LBLOCA									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>27. Verify NC System is intact as follows:</p> <ul style="list-style-type: none"> Containment pressure - LESS THAN 1 PSIG. IF normal off-site power is available, THEN verify containment pressure less than 0.3 PSIG. Containment high range EMFs - LESS THAN 3 R/HR: <ul style="list-style-type: none"> 1EMF-53A (Containment Trn A) 1EMF-53B (Containment Trn B). Containment EMF trip 1 lights - DARK: <ul style="list-style-type: none"> 1EMF-38 (Containment Particulate) 1EMF-39 (L) (Containment Gas (Lo Range)). Containment sump level - STABLE.
	BOP	<p>27. RNO Perform the following:</p> <p>a. Energize H₂ igniters.</p>
	RO or BOP	<p>27. RNO b. Dispatch operator to perform the following:</p> <ol style="list-style-type: none"> Secure all ice condenser air handling units. REFER TO EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 11 (Securing All Ice Condenser Units). Place containment H₂ analyzers in service. REFER TO OP/1/A/6450/010 (Containment Hydrogen Control Systems).
<p>NOTE TO EVALUATOR: Step 27. RNO c. will not apply</p>		
	CREW	<p>d. Concurrently:</p> <ul style="list-style-type: none"> Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). GO TO EP/1/A/5000/E-1 (Loss Of Reactor Or Secondary Coolant).

Op Test No.:	301	Scenario #	5	Event #	7	Page	30	of	38
Event Description: LBLOCA									
Time	Position	Applicant's Actions or Behavior							

NOTE TO EVALUATOR: The crew will address the challenge to the NC (Reactor Coolant) System Integrity per EP/1/A/5000/FR-P.1 (Response to Imminent Pressurized Thermal Shock Condition) if not done previously.		
NOTE TO EVALUATOR: The following steps are from EP/1/A/5000/FR-P.1 (Response to Imminent Pressurized Thermal Shock Condition)		
	RO or BOP	1. Verify NC pressure - GREATER THAN 285 PSIG.
	CREW	1. RNO <u>IF</u> ND flow to C-Legs is greater than 675 GPM, <u>THEN RETURN TO</u> procedure and step in effect.
NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.		
TRANSITION TO EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant)		
NOTE TO EVALUATOR: The following steps are from EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant)		
	RO and BOP	1. Monitor Enclosure 1 (Foldout Page).
	RO or BOP	2. Verify NC subcooling based on core exit T/Cs - GREATER THAN 0°F.
	RO or BOP	2. RNO <u>IF</u> any NV OR NI pump is on, <u>THEN</u> perform the following: a. Ensure all NC pumps - OFF. b. Maintain seal injection flow.
	BOP	3. Verify main steamlines intact: • All S/G pressures - STABLE OR INCREASING • All S/Gs - PRESSURIZED
	RO	4. Control intact S/G N/R 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 11% (29% ACC) and 50%.

Op Test No.: 301 Scenario # 5 Event # 7 Page 31 of 38

Event Description: LBLOCA

Time	Position	Applicant's Actions or Behavior
	BOP	5. Reset the following: <ol style="list-style-type: none"> ECCS. D/G load sequencers. Phase A Phase B.
	RO or BOP	<ol style="list-style-type: none"> IF AT ANY TIME B/O occurs, THEN restart S/I equipment previously on.
	BOP	6. Establish VI to Containment as follows: <ul style="list-style-type: none"> Ensure 1VI-77B (VI Cont Isol) - OPEN. Verify VI pressure - GREATER THAN 85 PSIG.
	RO	7. Verify secondary radiation - NORMAL: <ol style="list-style-type: none"> Ensure the following signals - RESET: <ol style="list-style-type: none"> CA System valve control
	BOP	<ol style="list-style-type: none"> KC NC NI NM St signals.
NOTE TO EVALUATOR: The BOP will open the following valves when aligning the S/Gs for chemistry sample in step b. below: <ul style="list-style-type: none"> 1NM-191B (S/G 1A SMPL HDR CONT ISOL) 1NM-201A (S/G 1B SMPL HDR CONT ISOL) 1NM-211B (S/G 1C SMPL HDR CONT ISOL) 1NM-221A (S/G 1D SMPL HDR CONT ISOL) 1NM-190A (S/G 1A BLDWN SMPL CONT ISOL) 1NM-200B (S/G 1B BLDWN SMPL CONT ISOL) 1NM-210A (S/G 1C BLDWN SMPL CONT ISOL) 1NM-220B (S/G 1D BLDWN SMPL CONT ISOL) 		
	BOP	<ol style="list-style-type: none"> Align all S/Gs for Chemistry sampling.
	RO or BOP	<ol style="list-style-type: none"> Perform at least one of the following: <ul style="list-style-type: none"> Notify Chemistry to sample all S/Gs for activity. OR <ul style="list-style-type: none"> Notify RP to frisk all cation columns for activity.

Op Test No.: 301 Scenario # 5 Event # 7 Page 32 of 38

Event Description: LBLOCA

Time	Position	Applicant's Actions or Behavior
	BOP	d. Verify the following EMF trip 1 lights - DARK: <ul style="list-style-type: none"> • 1EMF-33 (Condenser Air Ejector Exhaust) • 1EMF-26 (Steamline 1A) • 1EMF-27 (Steamline 1B) • 1EMF-28 (Steamline 1C) • 1EMF-29 (Steamline 1D).
	RO	e. Verify all S/Gs - INTACT <ul style="list-style-type: none"> • All S/G pressures - STABLE OR INCREASING • All S/Gs - PRESSURIZED
	RO or BOP	f. WHEN activity results are reported, THEN verify all S/Gs indicate no activity.
	BOP	8. Verify Pzr PORVs and Isolation Valves: <ul style="list-style-type: none"> a. Power to all Pzr PORV isolation valves - AVAILABLE. b. All Pzr PORVs – CLOSED c. Any Pzr PORV isolation valve - OPEN.
	RO or BOP	d. IF AT ANY TIME any Pzr PORV opens due to high pressure, THEN after Pzr pressure decreases to less than 2315 PSIG, ensure PORV closes or is isolated.
	RO	9. Verify S/I termination criteria: <ul style="list-style-type: none"> a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F.
	SRO	9.a. RNO a. GO TO Step 9.f.
Terminate the scenario at the discretion of the Lead Examiner.		
	RO or BOP	f. Monitor S/I termination criteria. REFER TO Enclosure 2 (S/I Termination Criteria).
	CREW	g. IF AT ANY TIME S/I termination criteria is met while in this procedure, THEN RETURN TO Step 9.
	RO or BOP	10. Determine if ND pumps should be stopped: <ul style="list-style-type: none"> a. NC pressure - GREATER THAN 285 PSIG.
	SRO	10.a. RNO a. GO TO Step 12.

Op Test No.: 301 Scenario # 5 Event # 7 Page 33 of 38

Event Description: LBLOCA

Time	Position	Applicant's Actions or Behavior
	BOP	<p>12. Verify D/Gs should be stopped:</p> <ul style="list-style-type: none"> a. Any D/G - ON. b. Verify 1ETA is energized by offsite power as follows: <ul style="list-style-type: none"> • "D/G 1A BKR TO ETA" - OPEN • 1ETA - ENERGIZED. c. Dispatch operator to stop 1A D/G and place in standby readiness. REFER TO OP/1/A/6350/002 (Diesel Generator Operation). d. Verify 1ETB is energized by offsite power as follows: <ul style="list-style-type: none"> • "D/G 1B BKR TO ETB" - OPEN • 1ETB - ENERGIZED. e. Dispatch operator to stop 1B D/G and place in standby readiness. REFER TO OP/1/A/6350/002 (Diesel Generator Operation).
	BOP	<p>13. Obtain containment H₂ concentration as follows:</p> <ul style="list-style-type: none"> a. Ensure operator dispatched to secure all ice condenser air handling units. REFER TO Enclosure 3 (Securing All Ice Condenser Air Handling Units). b. Verify containment H₂ analyzers - IN SERVICE
	CREW	<p>13.b. RNO b. Perform the following:</p> <ul style="list-style-type: none"> 1) Dispatch operator to place containment H₂ analyzers in service. REFER TO OP/1/A/6450/010 (Containment Hydrogen Control Systems). 2) WHEN H₂ analyzers are in service, THEN perform Steps 13.c through 13.e. 3) GO TO Step 14.

Op Test No.:	301	Scenario #	5	Event #	7	Page	34	of	38
Event Description: LBLOCA									
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>14. Initiate evaluation of plant status as follows:</p> <p>a. Verify Cold Leg Recirc capability from at least one train:</p> <ul style="list-style-type: none"> • A Train: <ul style="list-style-type: none"> • 1A ND pump - AVAILABLE • 1NI-185A (ND Pump 1A Cont Sump Suct) – POWER AVAILABLE OR • B Train: <ul style="list-style-type: none"> • 1B ND pump - AVAILABLE • 1NI-184B (ND Pump 1B Cont Sump Suct) – POWER AVAILABLE <p>b. Determine if leak is in auxiliary building:</p> <p>1) Verify auxiliary building radiation:</p> <ul style="list-style-type: none"> • All area monitor EMF trip 1 lights - DARK. • EMF-41 (Aux Bldg Ventilation) trip 1 light – DARK <p>NOTE The following step is checking for a significant NC leak into the ND System.</p> <p>2) Verify NC to ND pressure boundary intact as follows:</p> <ul style="list-style-type: none"> • ND Pressure - NORMAL • ND Temperature - NORMAL • ND Flow – NORMAL <p>c. Determine if NC is leaking into KC system:</p> <ul style="list-style-type: none"> • 1EMF-46A (COMPONENT COOLING TRAIN A) trip 1 light - DARK . • 1EMF-46B (COMPONENT COOLING TRAIN B) trip 1 light - DARK . <p>d. Ensure KC NC NI NM St signals - RESET</p> <p>e. WHEN TSC is staffed, THEN notify TSC to perform Enclosure 7 (TSC Actions).</p>
	RO or BOP	<p>15. Determine if NC System cooldown and depressurization is required:</p> <p>a. NC pressure - GREATER THAN 285 PSIG</p>
	RO	<p>15. RNO a. IF ND flow to C-Legs is greater than 675 GPM, THEN <u>GO TO</u> Step 16.</p>

Op Test No.:	301	Scenario #	5	Event #	7	Page	35	of	38
Event Description: LBLOCA									
Time	Position	Applicant's Actions or Behavior							

	BOP	16. Verify Containment pressure - GREATER THAN 3 PSIG.
	CRS	16. RNO Perform the following: a. <u>IF</u> starting of any VX fan has previously been attempted, <u>THEN GO TO</u> Step 17.
	BOP	17. Determine if transfer to Cold Leg Recirc is required: a. FWST level - LESS THAN 20% (1AD-9, D/8 "FWST 2/4 LO LEVEL").
	CREW	17. RNO a. <u>RETURN TO</u> Step 14.
END OF EVENT 7		
END OF SCENARIO		

Attachment List

Scenario 4

ATTACHMENT 1 -	Crew Critical Task Summary
ATTACHMENT 2 -	Shift Turnover Information
ATTACHMENT 3 –	OP/1/A/6150/009 Enclosure 4.5 (Manual Operation of the Makeup Controls), rev. 079
ATTACHMENT 4 –	AP/1/A/5500/028 Enclosure 1 (Foldout Page), rev. 007
ATTACHMENT 5 –	AP/1/A/5500/008 Enclosure 1 (Foldout Page), rev. 018
ATTACHMENT 6	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page), rev. 042
ATTACHMENT 7 –	EP/1/A/5000/E-0 Enclosure 2 (Ventilation System Verification), rev. 042
ATTACHMENT 8	EP/1/A/5000/E-0 Enclosure 4 (NC Temperature Control), rev. 042
ATTACHMENT 9 –	EP/1/A/5000/E-0 Enclosure 5 (VX System Operation), rev. 042
ATTACHMENT 10 –	EP/1/A/5000-G-1 Enclosure 1 (Unit 1 Spent Fuel Pool Monitoring), rev.007
ATTACHMENT 11 –	EP/1/A/5000/E-2 (Faulted Steam Generator Isolation), rev. 015
ATTACHMENT 12 –	EP/1/A/5000/E-1 Enclosure 1 (Foldout Page), rev. 028

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	UNSAT	CT #	CRITICAL TASK
		C-1	Manually trip reactor on RCP seal failure prior to initiation of LOCA.
		C-2	Close or isolate atmospheric dump prior to exiting AP/28.

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION			
Unit 1 Status			
Power Level	Power History	NCS Boron	Xenon
75%	BOL	1298 PPM	per OAC
Controlling Procedure			
<ul style="list-style-type: none"> OP/1/A/6100/003 (Controlling Procedure for Unit Operation), Enclosure 4.1 (Power Increase) is in progress up to step 3.62. 			
Other Information Needed to Assume the Shift			
<ul style="list-style-type: none"> Unit 2 is at 100%. The 1A KF (Fuel Pool Cooling) Pump is tagged out for preventative maintenance. The 1A2 CFPT MOP is tagged out for motor replacement. Increase power to 100% per the reactivity management plan. 			
NEOs Available			
Six NEOs are available as listed on the status board			
METEOROLOGICAL CONDITIONS			
<ul style="list-style-type: none"> Upper wind direction = 315 degrees, speed = 10 mph Lower wind direction = 315 degrees, speed = 10.5 mph Forecast calls for Severe Thunderstorm Watch for the next 4 hours. 			