HLP NRC EXAM
SCENARIO # 1

Facility:	Catawba NRC Exam 2013	Scenario No.: 1	Op Test No.: 2013301
Examiners:		Operators:	SRO
			RO
			BOP

Initial Conditions: IC#177; Unit 1 is at ~1% power, BOL. 1EMF-72 (S/G B Leakage) is out of service. 1A NI Pump is tagged out for preventive maintenance.

Turnover: The crew is to shift the operating charging pumps, **and then** increase power to 13-15% for placing the turbine on-line per OP/1/A/6100/001 Enclosure 4.1 step 3.195 and the reactivity management plan. All Mode 1 prerequisites have been completed. York County is under a severe thunderstorm watch for the next 4 hours. Pre-start checkout of the 1B NV Pump has been completed.

Event No.	Malf. No.	Event Type*	Event Description
1	---	N-BOP N-SRO	Shift operating charging pumps
2	---	R-RO N-SRO	Raise power to 13-15%. Withdraw control rods to raise reactor power.
3	XMT-SG095 XMT-SG096	I-RO I-SRO	1B S/G W/R signal fails low. Feed reg. bypass valve opens. AP/06
4	KC028	C-BOP C-SRO TS-SRO	1A2 KC pump trips. AP/21
5	FWP012C CA004A	C-RO C-SRO TS-SRO	1A CF (Main Feed) Pump trips, 1A CA (AFW Pump fails to start) AP/06
6	NC005F NC004F NC014B	M-ALL	PZR PORV fails open. Manual closure attempt is unsuccessful. Manual block valve will not close.
7	NI001B	C-BOP C-SRO	1B NI (Safety Injection) Pump fails to start in AUTO.
8	IRX015K14		Control rod K14 stuck on reactor trip.

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

Scenario 1 – Summary

Initial Condition IC 177
Unit 1 is at ~1% power, BOL. 1EMF-72, (1S/G B Leakage) is out of service. 1A NI pump is out of service for preventive maintenance.

Turnover:
Unit 1 is at ~1% power, BOL. 1EMF-72, (1S/G B Leakage) is out of service. 1A NI pump is out of service for preventive maintenance. The crew is to shift operating charging pumps **and then** increase power to 13-15% for placing the turbine on-line per OP/1/A/6100/001 Enclosure 4.1 step 3.195 and the reactivity management plan. All Mode 1 prerequisites have been completed. York County is under a severe thunderstorm watch for the next 4 hours. Pre-start checkout of the 1B NV Pump has been completed.

Event 1
Shift operating charging pumps per OP/1/A/6200/001 (Chemical and Volume Control System), Enclosure 4.13 (Shifting the Operating Charging Pump).

Event 2
Raise power to 13-15%.

Event 3
1B S/G Wide Range level signal fails LOW. Results in the associated Feed Reg. Bypass Valve opening. RO takes manual control of level control valves to stabilize and restore 1B 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
1A2 KC (Component Cooling Water) pump trips. BOP starts additional pump(s) as needed to restore cooling. AP/21 (Loss of Component Cooling) entry. TS evaluation required.

Event 5
1A Main Feedwater Pump trips, along with the failure of the 1A AFW pump to auto start. RO recognizes that the turbine driven AFW pump (CAPT) needs to be manually started. AP/06 Case I entry. A TS evaluation required due to failure of the 1A AFW pump to auto start.

Event 6
1NC-32B (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 7
1B NI (Safety Injection) Pump fails to auto start on the SI signal. BOP manually starts to establish intermediate head injection flow.

Event 8
Control rod K14 does not fully insert upon the reactor trip. RO opens the reactor trip breakers.

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

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

EXERCISE GUIDE WORKSHEET

1. INITIAL CONDITIONS:

1.1 Reset to IC 177

START TIME:_____

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		n/a	MAL-EMF2.72 (EMF72 S/G B N16 TUBE DETECTOR FAILURE)	LPWR				
		1	XMT-SG095 (XCF_5621 S/G B W/R LVL CH 1 TO DCS/ELSEWHERE (CFAA5621))	40		3 MIN		3
		1	XMT-SG096 (XCF_5622 S/G B W/R LVL CH 3 TO DCS/ELSEWHERE (CFAA5622))	40		3 MIN		3
		3	LOA-KC028 (RACK OUT KC PMP 1A2)	RACK OUT				4
		5	OVR-FWP012C (CFPT 1A TRIP & RESET TRIP PB)	ON				5
		n/a	MAL-CA004A (FAILURE OF CA PUMP A TO START)	BOTH				5
		7	VLV-NC005F (NC32B PZR PORV FAIL TO POSITION)	1				6
		n/a	VLV-NC004F (NC31B PZR PORV ISOL VLV FAIL POSITION)	1				7
		n/a	MAL-NI001B (NI PUMP B FAILURE)	AUTO				8
		n/a	MAL-IRX015K14 (STUCK ROD K14 ON RX TRIP)	92				9

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 operating charging pumps.

✓	BOOTH INSTRUCTOR ACTION
	IF asked, "The last time the 1B NV Pump was run was a week ago."

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to perform a pre-operational check out of the 1B NV Pump, **REPEAT** back the information and then, after a couple of minutes, **CALL** the control room and state that the 1B NV pump is ready to be started.

✓	BOOTH INSTRUCTOR ACTION
	AFTER the 1B NV pump is started, **CALL** the control room and state that the 1B NV pump looks good for continuous run.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator dispatched to acknowledge 1D-7, C/4 'NCP SEAL WATER LO FLOW', **ACKNOWLEDGE** 1AD-7, C/4.

3.3 **Scenario EVENT 2**, increase reactor power to 13-15%.

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

3.4 **Scenario EVENT 3**, 1B 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 1B S/G W/R level.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to investigate the problem with 1B 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** 1B S/G Level is reading 40%.

3.4 **Scenario EVENT 4,** 1A2 KC Pump trips.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 3 to trip the 1A2 KC pump.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to investigate the 1A2 KC Pump/ Breaker, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to investigate the problem with 1A2 KC Pump/Breaker, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to Check out the 1A1 KC Pump, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to Check out the 1A 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.

3.5 **Scenario EVENT 5**, 1A CFPT Trips, 1A CA Pump Fails to Start in Auto

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

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

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

✓	BOOTH INSTRUCTOR ACTION
	IF an Operator and/or Maintenance are dispatched to investigate the 1A CFPT, **REPEAT** back the information.

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

3.6 **Scenario EVENT 6,** 1NC-32B fails open.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 7** to cause the 1D NC Pump to trip

3.7 **Scenario EVENTS 6,7,AND 8** 1NC-32B fails open, 1NC-31B will not close, 1B NI Pump will not start on Safety Injection, Control Rod K14 sticks at 92 steps on the reactor trip..

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is contacted to investigate 1NC-32B and/or 1NC-31B, **REPEAT** back the order.

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

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is contacted to investigate Control Rod K14, **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.

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

✓	BOOTH INSTRUCTOR ACTION
	IF station management is notified to evaluate starting additional plant equipment to assist in recovery, **REPEAT** the order.

✓	BOOTH INSTRUCTOR ACTION
	IF station management is notified to monitor shutdown margin, **REPEAT** the order.

✓	BOOTH INSTRUCTOR ACTION
	IF periodic NC boron samples are requested by Primary Chemistry, **REPEAT** the order.

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Event Description: Shift operating charging pumps.

Time	Position	Applicant's Actions or Behavior
NOTE TO EVALUATOR: Crew begins by shifting the operating charging pump per OP/1/A/6200/001 (Chemical and Volume Control System, Enclosure 4.13 (Shifting Of the Operating Charging Pump). The initial conditions are complete.		
NOTE TO EVALUATOR: The crew may have a Focus Brief and then make a plant page announcing the start of the 1B NV Pump.		
	BOP	Start NV PUMP 1B
	BOP	Secure NV PUMP 1A
NOTE TO EVALUATOR: The following actions are from OP/1/A/6200/001 Enclosure 4.13 (Shifting the Operating Charging Pump).		
NOTE: This enclosure affects reactivity and is designated important to Reactivity Management per NSD 304 (Reactivity Management). (R.M.)		
	BOP	3.1 **IF** shifting from 1A NV Pump in service to 1B NV Pump in service, p2erform the following:
CAUTION: • **If an NV Pump has been idle for an extended period of time, a boron transient may be initiated when it is placed in service. The volume of 1B NV Pump and associated piping is 65 gallons; the magnitude of the transient will be minimal.** • **Shifting charging pumps at low NC System pressures (< 1000 psig) with NC Pump(s) in service will result in hydraulic transients being placed on the NC Pump seal packages. Operating experience shows that these transients will affect seal return flow. (PIP 09-2596)**		
NOTE: A loss of 1EPD with only the 1B NV Pump running will isolate normal letdown due to an indicated loss of both charging pumps; the loss of 1EPD also disables the LTOP function of 1NC-32B (PZR PORV) creating a challenge to LTOP. This challenge does NOT occur if either the 1A NV Pump is in service or ND Letdown is in service. (PIP C-12-1241)		
NOTE TO EVALUATOR: Step 3.1.1 was marked N/A during the pre job brief.		
	BOP	3.1.2 Ensure VCT pressure is between 18-40 psig as read on 1NVP5500 (VCT Vent Press) (1MC5).
NOTE: If in an emergency situation, the 30 second delay after starting the Aux Oil Pump is NOT required before starting the NV pump.		

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Event Description: Shift operating charging pumps.

Time	Position	Applicant's Actions or Behavior
	BOP	3.1.3 30 seconds prior to starting 1B NV pump, place "NV PUMP 1B AUX OIL PUMP" in the "ON" position.
NOTE TO EVALUATOR:		**The crew will make a plant page to notify personnel of the start of the 1B Charging Pump**
	BOP	3.1.4 Start "NV PUMP 1B". (R.M.)
	BOP	3.1.5 Place "NV PUMP 1B AUX OIL PUMP" in "AUTO".
NOTE TO EVALUATOR:		**1AD-7, C/4 'NCP SEAL WATER LO FLOW' may annunciate in the next step. Crew refers to the annunciator response, determines that this is due to securing the 1A NV Pump (Charging), and dispatches an operator to acknowledge the annunciator.**
	BOP	3.1.6 Stop "NV PUMP 1A".
	BOP	3.1.7 Verify proper charging flow rate.
		END OF EVENT 1

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Event Description: Power increase to 13% - 15%

Time	Position	Applicant's Actions or Behavior
		EVENT 2
		NOTE TO EVALUATOR: RO withdraws control rods to raise temperature which causes the steam dumps to open and raise reactor power.
		NOTE TO EVALUATOR: The crew may also perform a dilution to raise temperature.
		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": • 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.

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Event Description: Power increase to 13% - 15%

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 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	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: 3.11.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the "RHT" position. 3.11.2 Ensure VCT level is monitored continuously while diverting to the RHT. **NOTE:** Procedure may continue while performing the following step. 3.11.3 **WHEN** desired VCT level is reached return 1NV-172A (3-Way Divert To VCT-RHT) to auto as follows: 3.11.3.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "VCT" position. 3.11.3.2 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "AUTO" position.
	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.

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Event Description: Power increase to 13% - 15%

Time	Position	Applicant's Actions or Behavior
	BOP	3.13 **IF AT ANY TIME** while dilution is in progress it becomes necessary to stop the dilution, perform the following: 3.13.1 Place the "NC MAKEUP CONTROL" switch to the "STOP" position. 3.13.2 Ensure the following valves close: • 1NV-242A (RMWST To B/A Blender Ctrl) • 1NV-181A (B/A Blender Otlt To VCT) 3.13.3 **IF** in "AUTO", verify the reactor makeup water pump stops. 3.13.4 Record reactor makeup water volume added as indicated on the total makeup counter. _____ gallons 3.13.5 **WHEN** conditions allow resuming the dilution, perform the following: 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). _____ - _____ = _____ gallons (Step 3.6) (Step 3.13.4) 3.13.5.2 Adjust total makeup counter to the volume of reactor makeup water determined in Step 3.13.5.1. (R.M.) 3.13.5.3 Place the "NC MAKEUP CONTROL" switch in the "START" position. (R.M.) 3.13.5.4 Verify the following: • 1NV-242A (RMWST To B/A Blender Ctrl) modulates to establish desired flow • 1NV-181A (B/A Blender Otlt To VCT) opens 3.13.5.5 **IF** in "AUTO", verify the reactor makeup water pump starts.
	BOP	3.14 **WHILE** makeup is in progress, monitor the following for expected results: • Control rod motion • NC System Tavg • Reactor Power
	BOP	3.15 Place the "NC MAKEUP CONTROL" switch in the "START" position. (R.M.)

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Event Description: Power increase to 13% - 15%

Time	Position	Applicant's Actions or Behavior
	BOP	3.16 Verify the following: • 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.) • 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		
END OF EVENT 2		
Booth Operator will insert Trigger 1 for EVENT 3 at the discretion of the lead examiner.		

Op Test No.: 301	Scenario # 1	Event # 3	Page 16 of 38
Event Description: 1B S/G W/R Level Failure			

Time	Position	Applicant's Actions or Behavior
EVENT 3		
Indications:		1CF-39 (S/G 1B CF BYB CTRL) begins to open 1CAP5100 (CA FLOW TO S/G 1B) indication increases to top of scale. S/G 1B Level begins to increase. 1AD-4, E/5 'CFCV ISOL VLVS CLSD' 1AD-2, F-10 'DCS TROUBLE'
	RO	Recognizes 1CF-39 (S/G 1B CF BYP CTRL) opening.
	RO	Take manual control of 1CF-37 (S/G 1B CF CTRL) and 1CF-39 (S/G 1B CF BYP CTRL) and control 1B S/G level at normal level.
	SRO	Crew enters AP/1/A/5500/006, CASE III.
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. **IF AT ANY TIME S/G levels approaching:** • 83% N/R level (S/G HI-HI Level Turb Trip) **OR** • 11% N/R level (S/G LO-LO Level Rx Trip). **THEN**: a. Manually trip reactor. b. **GO TO** EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
	RO or BOP	2. **Verify the following:** • 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. **IF AT ANY TIME any CF main feed reg valve in manual, THEN ensure associated feed reg bypass valve in manual.**
	RO or BOP	4. **Verify CF pump speed controller for in service CF pump(s):** • IN AUTO • RESPONDING ADEQUATELY
	RO or BOP	5. **Verify all S/G CF control valves:** • IN AUTO • RESPONDING ADEQUATELY

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Event Description: 1B S/G W/R Level Failure

Time	Position	Applicant's Actions or Behavior
	RO or BOP	5. RNO **Perform the following for the affected S/G(s):** a. Ensure affected controller(s) – IN MANUAL. b. **IF AT ANY TIME** S/G level not on program, **THEN** adjust CF flow to obtain a slight trend in the appropriate direction. c. **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	6. **Verify the following:** • S/G level(s) - STABLE • S/G level(s) - APPROXIMATELY AT PROGRAM • Malfunction - CORRECTED
	CREW	6. RNO **Perform the following:** a. Continue to control CF/SM D/P and S/G CF Flow rates to stabilize level in affected S/G(s) approximately at program level. b. **WHEN** all the following conditions met: • S/G level(s) - STABLE • S/G level(s) - APPROXIMATELY AT PROGRAM • Malfunction - CORRECTED. **THEN GO TO** Step 7. c. Do not continue in this procedure until all conditions met.
NOTE TO EVALUATOR:		**The SRO may address Tech Spec 3.3.3, but it does not apply. Tech Spec 3.3.4 does not apply because Aux Feedwater Flow instrumentation is available**
NOTE TO EVALUATOR:		**The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.**
END OF EVENT 3		
Booth Operator will insert Trigger 3 for EVENT 4 at the discretion of the lead examiner.		

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Event Description: 1A2 KC 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/2 'NV PMP A OIL COOLER LO FLOW' 1AD-7, F/3 'LETDN HX OUTLET HI TEMP' 1AD-11, A/1 '4 KV ESS PWR TRAIN A TROUBLE' 1AD-13, F/1 'FUEL POOL COOL HX A 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 1A2 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:** • At least one KC pump - ON. **AND** • Flow to KC loads presently in service.
	BOP	2. RNO **Perform the following:** a. Start additional KC pump(s) as necessary.
NOTE TO EVALUATOR: Step 2 RNO b. will not apply		
	SRO	3. **IF AT ANY TIME all KC pumps are lost, THEN RETURN TO STEP 2.**

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Event Description: 1A2 KC 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:** • 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - DARK **AND** • At least one KC pump - ON.
	SRO	5. **IF AT ANY TIME 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" LIT, THEN perform Step 4 RNO.**
	BOP	6. **Verify both KC surge tank levels - 50% - 90% AND STABLE.**
	BOP	7. **Start additional KC pump(s) as necessary to supply any KC loads presently in service.**
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:** • 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:** a. Verify the following Train A KC non-essential header isolation valves - OPEN: • 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: • 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:** a. Verify both KC surge tank levels - 50% - 90% AND STABLE.
	SRO	10. b. **GO TO** Step 14.

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Event Description: 1A2 KC 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:** • 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 5 for EVENT 4 at the discretion of the lead examiner.		
	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).
NOTE TO EVALUATOR:		**Step 18 will not apply.**
	BOP	19. **Verify KC surge tanks level as follows:** • Greater than 50% • Stable or increasing

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Event Description: 1A2 KC Pump Trips

Time	Position	Applicant's Actions or Behavior
	BOP	20. **WHEN plant conditions permit, THEN perform the following:** • 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	21. **Verify the following:** • 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - DARK • 1AD-7, H/3 "VCT HI TEMP" - DARK • Normal letdown - IN SERVICE.
	BOP	22. **Ensure VCT and letdown path aligned as follows:** a. **IF** desired to align NV pump suction to VCT, then perform the following: 1) OPEN the following valves: • 1NV-188A (VCT Otlt Isol) • 1NV-189B (VCT Otlt Isol). 2) CLOSE the following valves: • 1NV-252A (NV Pumps Suct From FWST) • 1NV-253B (NV Pumps Suct From FWST). 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". 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".
	SRO	23. **Determine long term plant status. RETURN TO procedure in affect.**
NOTE TO EVALUATOR: The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.		
END OF EVENT 4		

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Event Description: 1A CFPT trips and 1A CA Pump fails to start.			

Time	Position	Applicant's Actions or Behavior
EVENT 5		
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, A/1 'CFPT A TRIPPED' 1AD/5, A/4 'CFPT A COMMON TROUBLE'		
	RO	Recognize 1A CFPT Trip and subsequent loss of feedwater.
	RO	Recognize failure of 1A CA Pump to start and attempts to start it.
	RO	Determines the need to start CAPT #1 and starts 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.**

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Event Description: 1A CFPT trips and 1A CA Pump fails to start.

Time	Position	Applicant's Actions or Behavior
	SRO	7. **Ensure compliance with appropriate Tech Specs and SLCs:** • 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 5 at the discretion of the lead examiner.		
	SRO	8. **Determine required notifications:** • **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		

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Event Description: 1NC-32B (PZR PORV) fails open, 1NC-31B (PZR PORV ISOL) will not close

Time	Position	Applicant's Actions or Behavior
EVENTS 6 AND 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-32B open
	BOP	Attempt to close 1NC-32B
	BOP	Attempt to close 1NC-31B
	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).**
	RO	1. **Verify all Pzr PORVs - CLOSED.**
	RO	1. RNO **Perform the following:** a. Manually 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). b) Trip reactor.
	RO	c) **WHEN** reactor tripped **OR** S/I setpoint reached, **THEN** ensure S/I initiated.
EVENT 8		
	CREW	d) **GO TO** EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
TRANSITION TO E-0 (Reactor Trip or Safety Injection)		

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Event Description: 1NC-32B (PZR PORV) fails open. 1NC-31B (PZR PORV ISOL) will not close. 1B NI pump fails to auto start on SI signal. Control rod K14 sticks at 92 steps on reactor trip.

Time	Position	Applicant's Actions or Behavior
NOTE TO EVALUATOR: The following steps are from E-0 Reactor Trip or Safety Injection		
	RO and BOP	1. **Monitor Enclosure 1 (Foldout Page).**
	RO	2. **Verify Reactor Trip: Perform the following:** • All rod bottom lights - LIT • All reactor trip and bypass breakers - OPEN • I/R power - DECREASING.
	RO	2. RNO **Perform the following:** a. Trip reactor.
NOTE TO EVALUATOR: RNO 2.b. will not apply		
END OF EVENT 8		
	RO	3. **Verify Turbine Trip: Perform the following:** • All turbine stop valves - CLOSED
	BOP	4. **Verify 1ETA and 1ETB - ENERGIZED.**
	RO	5. **Verify S/I is actuated:** 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:** • **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:** a. Phase A "RESET" lights - DARK. b. Monitor Light Panel Group 5 St lights on energized train(s) - LIT.

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Event Description: 1NC-32B (PZR PORV) fails open. 1NC-31B (PZR PORV ISOL) will not close. 1B NI pump fails to auto start on SI signal.

Time	Position	Applicant's Actions or Behavior
	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 and BOP	11.a. RNO a. Perform the following for affected train(s): 1) Reset ECCS. – 'A' ECCS 2) Reset D/G load sequencer(s). – 'A' D/G Seq. 3) Start affected pump(s). – 1A CA Pump 4) **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.
	RO	11. b. 3 S/G N/R levels - GREATER THAN 11%.
	BOP	12. **Verify all of the following S/I pumps - ON: Perform the following for affected train(s):** • NV pumps • ND pumps • NI pumps.
CRITICAL TASK	BOP	12. RNO **Perform the following for affected train(s):** a. Reset ECCS. – 'B' ECCS b. Reset D/G load sequencer(s). – 'B' D/G Seq. c. Start affected pump(s). – 1B NI Pump
END OF EVENT 7		
	RO or BOP	d. **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.

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Event Description: 1NC-32B (PZR PORV) fails open, 1NC-31B (PZR PORV ISOL) will not close

Time	Position	Applicant's Actions or Behavior
	BOP	13. **Verify all KC pumps - ON.**
NOTE TO EVALUATOR:		**The crew may decide not to transition to the RNO based on actions taken in event 3.**
	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). d. **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.
NOTE TO EVALUATOR:		**Step 13 RNO e. will not apply.**
	BOP	14. **Verify all Unit 1 and Unit 2 RN pumps**
	BOP	15. **Verify proper ventilation systems operation as follows:** • **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:** 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: 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.
NOTE		**Spent Fuel Pool parameters should be monitored within 2 hours of event.**
	RO or BOP	18. **WHEN time and manpower permit, 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).**

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Event Description: 1NC-32B (PZR PORV) fails open, 1NC-31B (PZR PORV ISOL) will not close

Time	Position	Applicant's Actions or Behavior
	RO	19. **Control S/G levels as follows:** a. Verify total CA flow - GREATER THAN 450 GPM.
NOTE TO EVALUATOR:		**Although the crew will transition to the RNO for step 19.a., the steps do not apply.**
	RO	b. **WHEN** at least one S/G N/R level is greater than 11% (29% ACC), **THEN** THROTTLE feed flow to maintain all S/G N/R levels between 11% (29% ACC) and 50%.
	RO	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.** – 1A2 KC Pump, 1A NI Pump
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).**

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Event Description: 1NC-32B (PZR PORV) fails open, 1NC-31B (PZR PORV ISOL) will not close

Time	Position	Applicant's Actions or Behavior
	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. 3) **IF** 1NC-32B **OR** 1NC-34A cannot be closed **OR** isolated, **THEN** perform the following: a) Align N2 to PORVs by opening the following valves: • 1NI-438A (Emer N2 From CLA A to 1NC-34A) • 1NI-439B (Emer N2 From CLA B to 1NC-32B). b) CLOSE affected PZR PORV. 4) **IF** any Pzr PORV cannot be closed **OR** isolated, **THEN** perform the following: a) Energize H_2 igniters. b) Dispatch operator to perform the following: (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). c) **IF** both the following conditions exist, • Containment pressure – HAS REMAINED LESS THAN 3 PSIG • Containment pressure - BETWEEN 1 PSIG **AND** 3 PSIG **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).

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Event Description: 1NC-32B (PZR PORV) fails open, 1NC-31B (PZR PORV ISOL) will not close

Time	Position	Applicant's Actions or Behavior
	CREW	d) Concurrently: • Implement F-0 (Critical Safety Function Status Trees • **GO TO** to 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.		

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Event Description: 1NC-32B (PZR PORV) fails open, 1NC-31B (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 0ºF 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.

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Event Description: 1NC-32B (PZR PORV) fails open, 1NC-31B (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: • Notify Chemistry to sample all S/Gs for activity. OR • Notify RP to frisk all cation columns for activity.
	BOP	d. 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	e. Verify all S/Gs - INTACT • 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:** a. Power to all Pzr PORV isolation valves - AVAILABLE. b. All Pzr PORVs – CLOSED.

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Event Description: 1NC-32B (PZR PORV) fails open, 1NC-31B (PZR PORV ISOL) will not close

Time	Position	Applicant's Actions or Behavior
	BOP	8.b. RNO b. **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. 3) **IF** any Pzr PORV cannot be closed **OR** isolated, **THEN** perform the following: a) Align N_2 to all Pzr PORVs by opening: • 1NI-438A (Emer N2 From CLA A To 1NC-34A) • 1NI-439B (Emer N2 From CLA B To 1NC-32B). b) CLOSE affected Pzr PORV.
	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. b. Secondary heat sink:. • Any intact S/G N/R level – GREATER THAN 11% (29% ACC) OR • Total feed flow to intact S/Gs - GREATER THAN 450 GPM. c. NC pressure - STABLE OR INCREASING. d. Pzr level - GREATER THAN 11% (30% ACC).
	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)		

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Event Description: 1NC-32B (PZR PORV) fails open, 1NC-31B (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).

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Event Description: 1NC-32B (PZR PORV) fails open, 1NC-31B (PZR PORV ISOL) will not close

Time	Position	Applicant's Actions or Behavior
	BOP	8. **Establish charging as follows:** a. Verify all of the following valves - OPEN: • 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). b. THROTTLE 1NV-294 (NV Pmps A&B Disch Flow Ctrl) for 32 GPM charging line flow. c. CLOSE 1NV-309 (Seal Water Injection Flow). d. OPEN the following valves: • 1NV-312A (Chrg Line Cont Isol) • 1NV-314B (Chrg Line Cont Isol). e. Verify 1NV-309 - ABLE TO BE OPERATED FROM CONTROL ROOM. f. Place 1NV-309 - IN AUTO. g. Perform the following: • Maintain charging flow less than 180 GPM. • Maintain 32 GPM seal water flow.
	BOP	9. **Control charging as follows:** a. Control charging flow to maintain Pzr level stable. b. Verify Pzr level - STABLE OR INCREASING.
	BOP	10. **Determine if NI pumps should be stopped:** a. Verify the following: • NC pressure - STABLE OR INCREASING • NC pressure - GREATER THAN 1620 PSIG.
	CREW	10.a. RNO a. Perform the following: 1) **IF** any S/G faulted, **THEN** do not continue until faulted S/G depressurization stops **OR** criteria for stopping NI pumps are met. 2) **IF** no S/G faulted **OR** conditions for stopping NI pumps cannot be satisfied after faulted S/G depressurization stops, **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 1

ATTACHMENT 1 -	Crew Critical Task Summary
ATTACHMENT 2 -	Shift Turnover Information
ATTACHMENT 3 –	OP/1/A/6150/009 Enclosure 5 (Manual Operation of the Makeup Controls), Rev. 077
ATTACHMENT 4 –	AP/1/A/5500/021 Enclosure 1 (Foldout Page), Rev. 042
ATTACHMENT 5 –	AP/1/A/5500/006 Case II (Loss of Normal CA Supply), Rev. 041
ATTACHMENT 6 –	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page), Rev. 041
ATTACHMENT 7 –	EP/1/A/5000/E-0 Enclosure 2 (Ventilation System Verification), Rev. 041
ATTACHMENT 8 –	EP/1/A/5000/E-0 Enclosure 4 (NC Temperature Control), Rev. 041
ATTACHMENT 9 –	EP/1/A/5000/G-1 Enclosure 18 (VX and Containment Ventilation Control), Rev. 006
ATTACHMENT 10 –	EP/1/A/5000/E-1 Enclosure 1 (Foldout Page), Rev. 028
ATTACHMENT 11 –	EP/1/A/5000/E-1 Enclosure 2 (S/I Termination Criteria), Rev. 028
ATTACHMENT 12 –	EP/1/A/5000/ES-1.1 Enclosure 1 (Foldout Page), Rev. 032

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
1%	BOL	1793 PPM	per OAC

Controlling Procedure

- OP/1/A/6100/001 (Controlling Procedure for Unit Startup), Enclosure 4.1 (Unit Startup) is in progress up to step 3.195. All Mode 1 prerequisites have been completed.

Other Information Needed to Assume the Shift

- 1EMF-72 (S/G B Leakage) is out of service. 1A NI Pump is tagged out for preventive maintenance.
- Direction for the crew is to shift the operating charging pumps, **and then** increase power to 13-15% for placing the turbine on-line per the reactivity management plan. York County is under a severe thunderstorm watch for the next 4 hours. Pre-start checkout of the 1B NV Pump has been completed.

NEOs Available

Six NEOs are available as listed on the status board

METEOROLOGICAL CONDITIONS

- 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.

HLP NRC EXAM
SCENARIO # 2

Facility:	Catawba NRC Exam 2013	Scenario No.: 2	Op Test No.: 2013301
Examiners:		Operators:	SRO
			RO
			BOP

Initial Conditions: IC#178; Unit 1 is at 50% power, MOL. Unit 2 is at 100%. 1A NI Pump is tagged out. 1B CBP is tagged out. 1B LH pump is tagged out.

Turnover: Unit 1 is at 50% power, MOL. Unit 2 is at 100%. 1A NI Pump and the 1B CBP pump are tagged out for preventive maintenance. 1B LH pump is tagged out and is expected to be returned in 3 hours. The crew is to begin increasing power to 100% per the reactivity management plan.

Event No.	Malf. No.	Event Type*	Event Description
1	---	N-BOP R-RO N-SRO	Begin increasing reactor power to 100%.
2	NC013	TS-SRO	Pressurizer Level channel 2 fails Hi.
3	NV012F	C-BOP C-SRO	1NV-15B (Letdown Isolation Valve) fails closed. AP/12
4	KC045	I-BOP I-SRO TS-SRO	KC surge tank level transmitter fails low. AP/21
5	EHC007A	C-RO C-SRO	Operating LH pump (1A) trips. Requires manual turbine trip. AP/02
6	NCP001D	C-RO C-SRO	1D NC Pump trips (electrical).
7	NC013D	M-ALL	LBLOCA
8	ISE002A/B	I-BOP I-SRO	Both trains Safety Injection fail to auto actuate.
9	VLV-SM002A	C-RO C-SRO	1SM-3 MSIV fails to auto close.

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

Scenario 2 – Summary

Initial Condition
Unit 1 is at 50% power, MOL. Unit 2 is at 100%. 1A NI Pump is tagged out. 1B CBP is tagged out. 1B LH pump is tagged out.

Turnover:
Unit 1 is at 50% power, MOL. Unit 2 is at 100%. 1A NI Pump is tagged out. 1B CBP is tagged out for preventive maintenance. 1B LH Pump is tagged out and is expected to be returned to service in 3 hours. OP/1/A/6100/003 (Controlling Procedure for Unit Startup), Enclosure 4.1 (Power Increase) has been completed up to step 3.52. The crew is to begin increasing power to 100% per the reactivity management plan.

Event 1
A power increase to 100% is begun. The BOP performs the dilution, the RO sets up and monitors the turbine for the power increase.

Event 2
Pressurizer Level channel 2 fails Hi. TS evaluation required.

Event 3
1NV-15B (Letdown Isolation Valve) fails closed. Requires manual action by the BOP to restore letdown. AP/12 (Loss of Charging or Letdown) entry.

Event 4
The level transmitter for the KC Surge Tank (Component Cooling) fails LOW. Requires BOP manual action to restore KC cooling (system realignment). AP/21 (Loss of Component Cooling) entry. The first KC pump start attempt FAILS. TS evaluation required.

Event 5
The operating LH pump (EHC) trips. The automatic turbine trip setpoint (1100 psig) will be reached, but the turbine will NOT automatically trip. Requires manual action by the RO to trip the turbine. AP/02 (Turbine Trip) entry, since only the turbine is tripped. The reactor remains at power.

Event 6
1D NCP (RCP) trips due to an electrical problem. Crew determines that a reactor trip is required.

Event 7
A LBLOCA initiates on the reactor trip.

Event 8
BOTH trains of SI fail to auto actuate. BOP manually actuates both trains of SI.

Event 9
One MSIV fails to auto close. RO manually closes the MSIV.

***Critical task 1** – Manually initiate at least one train of SI before transition out of E-0 to enter any E-1 series, E-2 series, or E-3 series procedure or to any FRG.*

EXERCISE GUIDE WORKSHEET

1. INITIAL CONDITIONS:

1.1 Reset to IC 178

START TIME:_____

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		n/a	LOA-NI003 (RACKOUT NI PMP 1A)	RACK OUT				
		n/a	LOA-CM040 (RACKOUT CBP 1B)	RACK OUT				
		n/a	OVR-MT016A (HYDR FLUID PMP 1B OFF LT)	OFF				
		n/a	OVR-MT016B (HYDR FLUID PMP 1B ON LT)	OFF				
		n/a	MAL-EHC007B (EHC HYDRAULIC FLUID PUMP B TRIP)					
		1	XMT-NC013 (LNC_5150 PZR LVL CH II TO MTR 1NCP5153 + DCS NCAA5154/NCAA5155)	100				2
		3	VLV-NV012F (NV15B L/D ISOL OUTSIDE CNMT VLV FAIL TO POSITION)	0			5 SEC	3
		5	XMT-KC046 (LKC_5641 KC SURGE TANK KCLS5640 TO VALVES)	0				4
		n/a	MAL-KC001B (KC PUMP 1A2 FAILURE)	BOTH				4
		16	MAL-KC001B (KC PUMP 1A2 FAILURE)	BOTH			1 SEC	4
		n/a	MAL-KC001A (KC PUMP 1A1 FAILURE)	BOTH				4
		18	MAL-KC001A (KC PUMP 1A1 FAILURE)	BOTH			1SEC	4
		7	MAL-EHC007A (EHC HYDRAULIC FLUID PUMP A TRIP)					5
		n/a	MAL-EHC002 (TURBINE TRIP FAILURE)	AUTO				5
		9	MAL-NCP001D (NCP D TRIP)					6
		10	MAL-NC013D (NC COLD LEG D LEAK)	27.5				7
		n/a	MAL-ISE002A (AUTO SI TRN A FAILS TO ACTUATE)					8

		n/a	**MAL-ISE002B (AUTO SI TRN B FAILS TO ACTUATE)**					**8**
		n/a	**VLV-SM002A (SM3 MSIV C FAIL AUTO ACTIONS)**					**9**
			Ensure TRIGGER 10 = x01o063g l x01o066g					
			Ensure TRIGGER 16 = x11i119n					
			Ensure TRIGGER 18 = x11i122n					

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**, Pressurizer Level channel 2 fails Hi

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 1** to cause the Pressurizer Level Channel 2 to fail hi

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to write a w/r for Pressurizer level channel 2, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to issue model w/o #00874531 to have IAE trip the bistable, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF IAE is called to trip the bistable, **REPEAT** back the information.

3.4 **Scenario EVENT 3,** 1NV-15B closes

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR** Trigger 3 to cause 1NV-15B to close.

✓	BOOTH INSTRUCTOR ACTION
	WHEN CREW determines that 1NV-15B is closed, **THEN CALL THE CONTROL ROOM AND STATE** "This is Bobby Raines from OTG. We inadvertently put our test equipment on the wrong jumper in the cabinet that affects the letdown valves. The test equipment has been removed so everything affecting letdown should work correctly."

✓	BOOTH INSTRUCTOR ACTION
	IF Operator dispatched to acknowledge 1AD-7, C/4 "NCP SEAL WATER LO FLOW", **ACKNOWLEDGE** 1AD-7, C/4.

3.5 **Scenario EVENT 4**, KC Surge Tank level transmitter failure.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR** Trigger 5 to cause the B train KC Surge Tank level transmitter to fail.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to investigate the problem with the KC Surge Tank level transmitter **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator dispatched to the KC Surge Tanks to look for leaks, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator and/or Maintenance are dispatched to investigate the KC pump and/or breaker, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Unit 2 Operator is contacted for Unit 2 RN miniflow status, **RESPOND** "Unit 2 RN is in normal miniflow alignment."

3.6 **Scenario EVENT 5**, 1A LH Pump trips requiring manual Turbine trip.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR** Trigger 7 to trip the 1A LH pump and initiate leak on EHC header.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator and/or Maintenance is dispatched to investigate the 1A LH Pump and/or breaker, **REPEAT** back the order.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to investigate the problem with the 1A LH Pump and/or breaker, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF an Operator is dispatched close 1SP-3, **REPEAT** back the order.

3.7 **Scenario EVENT 6** 1D NC Pump Trip

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 9** to cause the 1D NC Pump to trip

3.8 **Scenario EVENT 7**, LBLOCA

✓	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 Secondary 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.

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Event Description: Power increase to 100% power.

Time	Position	Applicant's Actions or Behavior
		NOTE TO EVALUATOR: Crew begins with a power increase. BOP performs a dilution per OP/1/6150/009, Enclosure 4.3. Amount of dilution will be determined by the power increase plan. The RO will input turbine target data. These two evolutions may be performed concurrently. Initial conditions are complete. A reactivity management brief will be performed during turnover. Step 3.1 is complete.
	BOP	Perform a dilution.
	RO	Input targets into the main turbine control panel.
		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": • 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.

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Event Description: Power increase to 100% power.

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 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	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: 3.11.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the "RHT" position. 3.11.2 Ensure VCT level is monitored continuously while diverting to the RHT. **NOTE:** Procedure may continue while performing the following step. 3.11.3 **WHEN** desired VCT level is reached return 1NV-172A (3-Way Divert To VCT-RHT) to auto as follows: 3.11.3.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "VCT" position. 3.11.3.2 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "AUTO" position.
	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.

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Event Description: Power increase to 100% power.

Time	Position	Applicant's Actions or Behavior
	BOP	3.13 **IF AT ANY TIME** while dilution is in progress it becomes necessary to stop the dilution, perform the following: 3.13.1 Place the "NC MAKEUP CONTROL" switch to the "STOP" position. 3.13.2 Ensure the following valves close: • 1NV-242A (RMWST To B/A Blender Ctrl) • 1NV-181A (B/A Blender Otlt To VCT) 3.13.3 **IF** in "AUTO", verify the reactor makeup water pump stops. 3.13.4 Record reactor makeup water volume added as indicated on the total makeup counter. _____ gallons 3.13.5 **WHEN** conditions allow resuming the dilution, perform the following: 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). _____ - _____ = _____ gallons (Step 3.6) (Step 3.13.4) 3.13.5.2 Adjust total makeup counter to the volume of reactor makeup water determined in Step 3.13.5.1. (R.M.) 3.13.5.3 Place the "NC MAKEUP CONTROL" switch in the "START" position. (R.M.) 3.13.5.4 Verify the following: • 1NV-242A (RMWST To B/A Blender Ctrl) modulates to establish desired flow • 1NV-181A (B/A Blender Otlt To VCT) opens 3.13.5.5 **IF** in "AUTO", verify the reactor makeup water pump starts.
	BOP	3.14 **WHILE** makeup is in progress, monitor the following for expected results: • Control rod motion • NC System Tavg • Reactor Power
	BOP	3.15 Place the "NC MAKEUP CONTROL" switch in the "START" position. (R.M.)

Op Test No.: 301 Scenario # 2 Event # 1 Page 12 of 41

Event Description: Power increase to 100% power.

Time	Position	Applicant's Actions or Behavior
	BOP	3.16 Verify the following: • 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.) • 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 # 2	Event # 1	Page 13 of 41
Event Description: Power increase to 100% 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 3.1.2.		
	RO	3.1.2 Increase turbine generator load by performing the following: 3.1.2.1 Select "LOAD RATE" and verify it illuminates. 3.1.2.2 Input the desired load rate. 3.1.2.3 Select "ENTER" or "OK" and verify "LOAD RATE" goes dark. 3.1.2.4 Select "TARGET" and verify it illuminates. 3.1.2.5 Input the desired load target. 3.1.2.6 Select "ENTER" and verify "TARGET" light goes dark. 3.1.2.7 Verify new load target appears on Target Display. 3.1.2.8 Select "GO" and verify it illuminates to start load increase. 3.1.2.9 Coordinate with Secondary Chemistry to adjust S/G blowdown flowrates to obtain maximum blowdown for the appropriate load.
END OF PREPARATION FOR POWER INCREASE 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: Pressurizer Level Channel 2 Fails Hi.			

Time	Position	Applicant's Actions or Behavior
EVENT 2		
Indications:		1AD-6, A/9 'PZR HI LEVEL ALERT' 1AD-2, F/10 'DCS TROUBLE' OAC pt. C1A0867 'PZR LEVEL CH 2' – HI-HI
	BOP	Recognize Pressurizer Level Channel 2 Fails Hi
	SRO	Enters Tech Spec 3.3.1 Condition L
NOTE TO EVALUATOR:		**The following steps are from the annunciator response for 1AD-6, A/9 'PZR HI LEVEL ALERT'**
	SRO	**IF** a channel malfunction has occurred, perform the following: 1. Refer to TS Table 3.3.1-1 for required number of channels.
NOTE TO EVALUATOR:		**T.S. 3.3.1 (Reactor Trip System Instrumentation) Condition L (Place channel in trip within 72 hours) should be entered.**
	CREW	2. Issue Model W/O #00874531 to have IAE trip the bistable.
	CREW	3. Initiate a work request to have the channel repaired.
NOTE TO EVALUATOR:		**The SRO will conduct a "Crew Update" to inform the crew of any Tech Spec conditions that have been entered.**
END OF EVENT 2		
Booth Operator will insert Trigger 3 for EVENT 3 at the discretion of the lead examiner.		

Op Test No.: 301	Scenario # 2	Event # 3	Page 15 of 41
Event Description: 1NV-15B closes. (Loss of Letdown)			

Time	Position	Applicant's Actions or Behavior
EVENT 3		
INDICATIONS: OAC pt. C1A0452 'NV LETDOWN FLOW' – LO-LO		
	BOP	BOP recognize closure of 1NV-15B
	SRO	Crew enters AP/1/A/5500/012, CASE II
NOTE TO EVALUATOR:		**Once the crew determines that 1NV-15B is closed, the booth will notify the control room that the closure of 1NV-15B was inadvertent and should operate correctly. The recipient of the call will perform a "Crew Update" to share the information with the crew.**
NOTE TO EVALUATOR:		**The crew will make a plant page announcing the entry into AP/1/A/5500/012, Loss of Charging or Letdown.**
NOTE TO EVALUATOR:		**The following actions 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:** • 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%.**
NOTE TO EVALUATOR:		**The BOP will control charging using 1NV-294 (NV PUMPS A & B DISCH FLOW CTRL) in the following step.**
	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:** 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.**
NOTE TO EVALUATOR:		**Based on the call from the field about the cause of 1NV-15B closing, the crew may decide to open 1NV-15B at this point.**

Op Test No.: 301 Scenario # 2 Event # 3 Page 16 of 41

Event Description: 1NV-15B closes. (Loss of Letdown)

Time	Position	Applicant's Actions or Behavior
	CREW	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).**
	SRO	10. **Ensure compliance with appropriate Tech Specs:** • 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: All LCOs are met.		
	BOP	11. **Verify at least one of the following valves - CLOSED:** • 1NV-1A (NC Letdn To Regen Hx Isol) OR • 1NV-2A (NC Letdn To Regen Hx Isol).
	SRO	11. RNO **GO TO Step 16.**
	CREW	16. **Establish letdown as follows:** a. Verify ability to establish normal letdown - RESTORED.
	BOP	16. b. Ensure 1NV-849 (Letdn Flow Var Orif Ctrl) valve demand position - 0%.
	BOP	16. c. Verify the following valves - OPEN: • 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)		
	BOP	16. d. OPEN the following valves: • 1NV-15B (Letdn Cont Isol) • 1NV-10A (Letdn Orif 1B Otlt Cont Isol).

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Event Description: 1NV-15B closes. (Loss of Letdown)

Time	Position	Applicant's Actions or Behavior
	BOP	16. e. Adjust 1NV-294 (NV Pmps A&B Disch Flow Ctrl) as necessary to maintain letdown subcooled in following steps.
	BOP	16. f. THROTTLE 1NV-148 (Letdn Press Control) to 45% demand.
	BOP	16. g. THROTTLE open 1NV-849 (Letdn Flow Var Orif Ctrl) in 1% to 5% increments until one of the following conditions met: • Letdown flow and letdown pressure increases OR • Valve demand position is 60% open.
	CREW	16. h. Do not continue until one of the above conditions met.
	BOP	16. i. Verify letdown flow and letdown pressure - HAS INCREASED.
Booth Operator will insert Trigger 5 for EVENT 4 at the discretion of the lead examiner.		
	BOP	16. 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	16. k. **WHEN** 5 minutes have elapsed, **THEN** perform the following: 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: a) Adjust 1NV-148 (Letdn Press Control) to maintain letdown pressure at 350 PSIG. b) Ensure 1NV-148 (Letdn Press Control) - IN AUTO. 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).
	BOP	16. l. **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.

Op Test No.: 301 Scenario # 2 Event # 3 Page 18 of 41

Event Description: 1NV-15B closes. (Loss of Letdown)

Time	Position	Applicant's Actions or Behavior
	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.**
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 # 2	Event # 4	Page 19 of 41
Event Description: B Train KC Surge Tank level transmitter fails low.			

Time	Position	Applicant's Actions or Behavior
EVENT 4		
Indications:		OAC pt. C1D2214 'KC TRAIN B LOW-LOW LEVEL SURGE TANK ISOL - ACTUATED 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, F/3 'LETDN HX OUTLET HI TEMP' 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	Recognize the following valves close: • 1KC-228B (RX BLDG NON-ESS HDR ISOL) • 1KC-1B (RX BLDG NON-ESS RET HDR ISOL) • 1KC-53B (AUX BLDG NON-ESS HDR ISOL) • 1KC-2B (AUX BLDG NON-ESS RET HDR ISOL)
	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 or 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: Perform the following:** • At least one KC pump - ON. **AND** • Flow to KC loads presently in service.
	BOP	2. RNO **Perform the following:** a. Start additional KC pump(s) as necessary.
NOTE TO EVALUATOR:		**The first pump start attempt will fail.**

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Event Description: B Train KC Surge Tank level transmitter fails low.

Time	Position	Applicant's Actions or Behavior
NOTE TO EVALUATOR: Step 2 RNO b. will not apply		
	SRO	3. **IF AT ANY TIME all KC pumps are lost, THEN RETURN TO STEP 2.**
NOTE Uncooled letdown may result in loss of NV pumps within a matter of minutes.		
	BOP	4. **Verify the following:** • 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - DARK **AND** • At least one KC pump - ON.
	SRO	5. **IF AT ANY TIME 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" LIT, THEN perform Step 4 RNO.**
	BOP	6. **Verify both KC surge tank levels - 50% - 90% AND STABLE.**
	BOP	7. **Start additional KC pump(s) as necessary to supply any KC loads presently in service.**
CAUTION A loss of KC cooling to the NC pumps results in a gradual approach to an overheated condition in ~ 10 minutes which will result in shaft seizure.		
	BOP	8. **Verify KC flow to NC pumps as follows:** • 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" -3 DARK.
	BOP	9. **Verify KC available as follows:** a. Verify the following Train A KC non-essential header isolation valves - OPEN: • 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: • 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).

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Event Description: B Train KC Surge Tank level transmitter fails low.

Time	Position	Applicant's Actions or Behavior
NOTE		**The KC non-essential header valves can be reopened when the appropriate train's level switch is reset. This should occur between 40% and 48% KC surge tank level.**
	BOP	9.b. RNO b. **WHEN** OAC alarm C1D2214 (KC Train B Low-Low Level Surge Tank Isol) is "NOT ACTUATED" **AND** cause of valve closure known, **THEN** ensure the affected valve(s) are open.
	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:** a. Verify both KC surge tank levels - 50% - 90% AND STABLE.
	SRO	10. b. **GO TO** 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:** • 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.**

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Event Description: B Train KC Surge Tank level transmitter fails low.

Time	Position	Applicant's Actions or Behavior
Booth Operator will insert Trigger 7 for EVENT 5 at the discretion of the lead examiner.		
	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).
NOTE TO EVALUATOR: Step 18 will not apply.		
	BOP	19. **Verify KC surge tanks level as follows:** • Greater than 50% • Stable or increasing
	BOP	20. **WHEN plant conditions permit, THEN perform the following:** • 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	21. **Verify the following:** • 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - DARK • 1AD-7, H/3 "VCT HI TEMP" - DARK • Normal letdown - IN SERVICE.
	BOP	22. **Ensure VCT and letdown path aligned as follows:** a. **IF** desired to align NV pump suction to VCT, then perform the following: 1) OPEN the following valves: • 1NV-188A (VCT Otlt Isol) • 1NV-189B (VCT Otlt Isol). 2) CLOSE the following valves: • 1NV-252A (NV Pumps Suct From FWST) • 1NV-253B (NV Pumps Suct From FWST). 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". 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".

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Event Description: B Train KC Surge Tank level transmitter fails low.			

Time	Position	Applicant's Actions or Behavior
	SRO	23. **Determine long term plant status. <u>RETURN</u> <u>TO</u> procedure in affect.**
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 # 2	Event # 5	Page 24 of 41
Event Description: 1A LH Pump trips, Main Turbine requires a manual trip.			

Time	Position	Applicant's Actions or Behavior
EVENT 5		
Indications:		OAC pt C1A1121 LH PRESS - LO 1AD-1, C/10 'HYD FLUID LO PRESS TURB TRIP'
	RO	Recognize failure of AUTO Turbine trip.
	RO	Manually Trip the Turbine
NOTE TO EVALUATOR:		**The crew will 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:** • All turbine stop valves - CLOSED
NOTE TO EVALUATOR:		**The crew may have tripped the turbine by this time and may not proceed to the RNO.**
	RO	2. RNO **Perform the following:** a. Trip turbine.
NOTE TO EVALUATOR:		**Step 2. RNO b. will not apply**
	RO	3. **Verify reactor response:** • Control rods - IN "AUTO" AND STEPPING IN • P/R neutron flux - DECREASING
	BOP	4. **Ensure C heater drain pumps - OFF.**
	BOP	5. **Monitor Enclosure 4 (Rod Insertion Limit Boration).**
	RO	6. **WHEN reactor power is less than 20%, THEN:** a. Place "CRD BANK SELECT" switch – IN MANUAL. b. Verify reactor power - GREATER THAN 5%. c. Maintain control rods above insertion limits. d. Operate control rods to stabilize reactor power between 6%-10%. e. **IF AT ANY TIME** reactor power is less than or equal to 5%, **THEN** insert control rods to shutdown reactor to Mode 3. **REFER TO** the following procedures: • OP/1/A/6150/008 (Rod Control) • OP/1/A/6100/002 (Controlling Procedure For Unit Shutdown

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Event Description: 1A LH Pump trips, Main Turbine requires a manual trip.

Time	Position	Applicant's Actions or Behavior
	RO	7. **Verify proper steam dump operation as follows:** a. "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) – LIT b. Steam dump valves - MODULATING. c. T-Avg - DECREASING TO T-REF.
	RO	8. **Ensure generator is tripped as follows:** a. Verify turbine generator megawatt output - LESS THAN **OR** EQUAL TO ZERO MW. b. Ensure the following breakers and MODs - OPEN: • MOD 1BG and 1BT • MOD 1AG and 1AT • Generator Breaker 1A and 1B. c. Ensure main generator "EXCITATION" - OFF d. Verify "MAN/AUTO REG" select switch "MAN" mode light - LIT.
	BOP	9. **Verify Pzr PORV and Pzr spray valve status as follows:** a. All Pzr PORVs - CLOSED. b. Normal Pzr spray valves - CLOSED.
	BOP	10. **Verify Pzr level - TRENDING TO PROGRAM.**
NOTE TO EVALUATOR:		**If the Pressurizer Level Master is still in 'Manual', the crew may proceed to the RNO and control charging and letdown to maintain program level.**
	RO	11. **Verify S/G N/R levels - TRENDING TO OR STABLE AT 39%.**
	RO	12. **Verify reactor power - GREATER THAN 5%.**
NOTE TO EVALUATOR:		**DNB requirements do not apply during transients.**
NOTE TO EVALUATOR:		**S.R. 3.3.1.2, for a Power Mismatch of > 2%, is only required to be performed when THERMAL POWER is ≥ 15% RTP**
NOTE TO EVALUATOR:		**Due to Control Rod M4 in Control Bank D at Half Accuracy, an RPI URGENT FAILURE alarm may occur on Rod Insertion, but will clear when Control Bank D is inserted again.**
	RO	13. **Stabilize reactor power as follows:** a. Maintain control rods above insertion limits. b. Operate control rods in manual to stabilize reactor power between 6%-10%. c. Verify all atmospheric steam dump valves - CLOSED. d. Verify condenser steam dump valves - MODULATING

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Event Description: 1A LH Pump trips, Main Turbine requires a manual trip.

Time	Position	Applicant's Actions or Behavior
Booth Operator will insert Trigger 9 for EVENT 6 at the discretion of the lead examiner.		
	BOP	14. **Align AS supply to CF pumps as follows:** a. Adjust 1AS-2 (Main Stm To Aux Steam) to maintain 165 psig. b. Ensure 1AS-12 (AS To CFPT Isol) - OPEN. c. Dispatch operator to CLOSE 1SP-3 (SC To CFPT 1A & 1B) (TB1-640, 1G-24).
	RO	15. **Verify feed flow - ALIGNED TO CA NOZZLES.**
NOTE TO EVALUATOR:		**It is not intended to perform step 15 RNO in this scenario.**
	CREW	15. RNO **Transfer feed flow to CA nozzles. NOZZLES. REFER TO Enclosure 1 (Transferring Feed Flow From CF to CA Nozzles).**
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		

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Event Description: 1D NC pump trips (electrical)

Time	Position	Applicant's Actions or Behavior
EVENT 6		
INDICATIONS: 1AD-6, D/5 'UF NCP BUS ALERT' 1AD-6 F/5 'UV NCP BUS ALERT' 1AD-6, B/4 'NCP D TRIP' 1AD-6, A/4 'LOOP D LO FLOW ALERT'		
	RO	Recognize trip of the 1D NC pump and perform the Immediate Actions of AP/1/A/5500/004, Loss of Reactor Cooling Pump
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/5500/004, Loss of Reactor Coolant Pump.**
NOTE TO EVALUATOR:		**The following steps are from AP/1/A/5500/004, Loss of Reactor Coolant Pump. The actions will be taken, however the procedure will not be read by the CRS, since these are Immediate Actions.**
	RO	1. **Verify all control banks - INSERTED.**
	RO	1. RNO **Perform the following:** a. Ensure reactor - TRIPPED.
	CREW	1 RNO b. **GO TO** 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		

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Event Description: LBLOCA, both trains of Safety Injection fail to auto actuate, 1SM-3 (S/G 1C SM ISOL) fails to close

Time	Position	Applicant's Actions or Behavior
EVENTS 7, 8 and 9		
	RO	Verifies the 1SM-3 (S/G 1C SM ISOL) fails to close and manually closes it.
	BOP	Verifies failure of both trains of S/I to actuate and manually initiate S/I on both trains.
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:** • All rod bottom lights - LIT • All reactor trip and bypass breakers - OPEN • I/R power - DECREASING.
	RO	3. **Verify Turbine Trip: Perform the following:** • All turbine stop valves - CLOSED
	BOP	4. **Verify 1ETA and 1ETB - ENERGIZED.**
	BOP	5. **Verify S/I is actuated:** a. "SAFETY INJECTION ACTUATED" status light (1SI-13) - LIT.
	BOP	5. RNO a. Perform the following: 1) Verify conditions requiring S/I: • Pzr pressure - LESS THAN 1845 PSIG OR • Containment pressure - GREATER THAN 1.2 PSIG.
CRITICAL TASK	BOP	5. RNO a.2) **IF** S/I is required, **THEN** initiate S/I.
NOTE TO EVALUATOR:		**Step 5 RNO a. 2) may have been done by the BOP as part of the Immediate Actions.**
END OF EVENT 8		
NOTE TO EVALUATOR:		**Step 5 RNO a. 3) will not apply.**
	BOP	b. Both E/S load sequencer actuated status lights (1SI-14) - LIT.

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Event Description: LBLOCA, 1SM-3 (S/G 1C SM ISOL) fails to close

Time	Position	Applicant's Actions or Behavior
NOTE TO EVALUATOR:		**After the Immediate Actions are complete, the crew trips the NC (Reactor Coolant) pumps due to a loss of subcooling.**
	RO	6. **Announce "Unit 1 Safety Injection".**
	SRO	7. **Determine required notifications:** • **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:** a. Phase A "RESET" lights - DARK. 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
	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:		**If the RO noticed 1SM-3 (S/G 1C SM ISOL) was open and manually closed it, then step 10. RNO d) will not apply**
	RO or BOP	d) **IF** monitor light panel not in correct alignment, **THEN** ensure correct alignment.
END OF EVENT 9		
	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.

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Event Description: LBLOCA

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. **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).
	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%.
	BOP	12. **Verify all of the following S/I pumps - ON:** • 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:** • **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:** 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. e. ND pumps - INDICATING FLOW TO C-LEGS.
NOTE Spent Fuel Pool parameters should be monitored within 2 hours of event.		

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Event Description: LBLOCA

Time	Position	Applicant's Actions or Behavior
	RO or BOP	18. **WHEN time and manpower permit, 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** at least one S/G N/R level is greater than 11% (29% ACC), **THEN** THROTTLE feed flow to maintain all S/G N/R levels between 11% (29% ACC) and 50%.
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.

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Event Description: LBLOCA

Time	Position	Applicant's Actions or Behavior

	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.

	BOP	27. **Verify NC System is intact as follows:**
		• 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:
		  • 1EMF-53A (Containment Trn A)
		  • 1EMF-53B (Containment Trn B).
		• Containment EMF trip 1 lights - DARK:
		  • 1EMF-38 (Containment Particulate)
		  • 1EMF-39 (L) (Containment Gas (Lo Range)).
		• Containment sump level - STABLE.

	BOP	27. RNO **Perform the following:** a. Energize H_2 igniters.
	RO or BOP	27. RNO b. Dispatch operator to perform the following: 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).
NOTE TO EVALUATOR: Step 27. RNO c. will not apply		
	CREW	d. Concurrently: • 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).

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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 **IF ND flow to C-Legs is greater than 675 GPM, THEN RETURN TO 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 **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%.

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Event Description: LBLOCA

Time	Position	Applicant's Actions or Behavior
	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.
NOTE TO EVALUATOR:		**The BOP will open 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: • Notify Chemistry to sample all S/Gs for activity. OR • Notify RP to frisk all cation columns for activity.

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Event Description: LBLOCA

Time	Position	Applicant's Actions or Behavior
	BOP	d. 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	e. Verify all S/Gs - INTACT • 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:** 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:** 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:** a. NC pressure - GREATER THAN 285 PSIG.
	SRO	10.a. RNO a. **GO TO** Step 12.

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Event Description: LBLOCA

Time	Position	Applicant's Actions or Behavior
	BOP	12. **Verify D/Gs should be stopped:** a. Any D/G - ON. b. Verify 1ETA is energized by offsite power as follows: • "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: • "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	13. **Obtain containment H_2 concentration as follows:** 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 H_2 analyzers - IN SERVICE
	CREW	13.b. RNO b. Perform the following: 1) Dispatch operator to place containment H_2 analyzers in service. **REFER TO** OP/1/A/6450/010 (Containment Hydrogen Control Systems). 2) **WHEN** H_2 analyzers are in service, **THEN** perform Steps 13.c through 13.e. 3) **GO TO** Step 14.

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Event Description: LBLOCA

Time	Position	Applicant's Actions or Behavior
	BOP	14. **Initiate evaluation of plant status as follows:** a. Verify Cold Leg Recirc capability from at least one train: • A Train: • 1A ND pump - AVAILABLE • 1NI-185A (ND Pump 1A Cont Sump Suct) – POWER AVAILABLE OR • B Train: • 1B ND pump - AVAILABLE • 1NI-184B (ND Pump 1B Cont Sump Suct) – POWER AVAILABLE b. Determine if leak is in auxiliary building: 1) Verify auxiliary building radiation: • All area monitor EMF trip 1 lights - DARK. • EMF-41 (Aux Bldg Ventilation) trip 1 light – DARK **NOTE** The following step is checking for a significant NC leak into the ND System. 2) Verify NC to ND pressure boundary intact as follows: • ND Pressure - NORMAL • ND Temperature - NORMAL • ND Flow – NORMAL c. Determine if NC is leaking into KC system: • 1EMF-46A (COMPONENT COOLING TRAIN A) trip 1 light - DARK . • 1EMF-46B (COMPONENT COOLING TRAIN B) trip 1 light - DARK . d. Ensure KC NC NI NM St signals - RESET e. **WHEN** TSC is staffed, **THEN** notify TSC to perform Enclosure 7 (TSC Actions).
	RO or BOP	15. **Determine if NC System cooldown and depressurization is required:** a. NC pressure - GREATER THAN 285 PSIG
	RO	15. RNO a. **IF** ND flow to C-Legs is greater than 675 GPM, **THEN GO TO** Step 16.

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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. **IF** starting of any VX fan has previously been attempted, **THEN GO TO** 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. **RETURN TO** Step 14.
END OF EVENT 7		
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 5 (Manual Operation of the Makeup Controls), Rev. 077
ATTACHMENT 4 –	AP/1/A/5500/012 Enclosure 3 (Control Room Ventilation System Verification), Rev. 033
ATTACHMENT 5 –	AP/1/A/5500/021 Enclosure 1 (Foldout Page), Rev. 042
ATTACHMENT 6	AP/1/A/5500/021 Enclosure 2 (Alternate Cooling to NV Pump 1A)
ATTACHMENT 7	AP/1/A/5500/002 Enclosure 1 (Transferring Feed Feed Flow from CF to CA Nozzles
ATTACHMENT 8 –	AP/1/A/5500/002 Enclosure 4 (Rod Insertion Limit Boration), Rev. 032
ATTACHMENT 9 –	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page), Rev. 041
ATTACHMENT 10 –	EP/1/A/5000/E-0 Enclosure 2 (Ventilation System Verification), Rev, 041
ATTACHMENT 11 –	EP/1/A/5000/E-0 Enclosure 4 (NC Temperature Control), Rev. 041
ATTACHMENT 12 –	EP/1/A/5000/E-0 Enclosure 5 (VX System Operation), Rev. 041
ATTACHMENT 13 –	EP/1/A/5000/E-1 Enclosure 1 (Foldout Page), Rev. 028
ATTACHMENT 14 –	EP/1/A/5000/E-1 Enclosure 2 (S/I Termination Criteria), Rev. 028
ATTACHMENT 15 –	EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 18 (VX and Containment Ventilation Control), Rev. 006

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	**UNSAT**	**CT #**	**CRITICAL TASK**
		C-1	Manually initiate at least one train of SI before transition out of E-0 to enter any E-1 series, E-2 series, or E-3 series procedure or to any FRG.

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION			
Unit 1 Status			
Power Level	**Power History**	**NCS Boron**	**Xenon**
50%	MOL	1027 PPM	per OAC
Controlling Procedure			
• OP/1/A/6100/003 (Controlling Procedure for Unit Operation), Enclosure 4.1 (Power Increase). The steps up to step 3.52 are complete.			
Other Information Needed to Assume the Shift			
• Unit 1 is at 50% power, MOL. Unit 2 is at 100%. 1A NI Pump and the 1B CBP pump are tagged out for preventive maintenance. 1B LH pump is tagged out and is expected to be returned in 3 hours. Direction to crew is to begin increasing power to 100% per the reactivity management plan.			
NEOs Available			
Six NEOs are available as listed on the status board			
METEOROLOGICAL CONDITIONS			
• 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.			

HLP NRC EXAM
SCENARIO # 3

Facility:	Catawba NRC Exam 2013	Scenario No.: 3	Op Test No.: 2013301
Examiners:		Operators:	SRO
			RO
			BOP

Initial Conditions: IC#179; Unit 1 is at 85% power, MOL. 1B CBP pump is tagged out of service. 1B LH pump is tagged out.

Turnover: Unit 1 is at 85% power, MOL. 1B CBP pump is tagged out for preventive maintenance and is expected to be returned to service in 2 hours. 1B LH Pump is tagged out and is expected to return to service in 3 hours. Increase power to 100% per the reactivity management plan. York County is under a severe thunderstorm watch for the next 4 hours.

Event No.	Malf. No.	Event Type*	Event Description
1	---	N-BOP R-RO N-SRO	Power increase to 100%
2	IPE-003C	C-BOP C-SRO TS-SRO	1NC-29 (PZR spray) fails open. AP/11
3	NC005	TS-SRO	NC Loop B Flow channel 2 fails low.
4	FWP015C	C-RO C-SRO	1B CFPT Trips with failed auto runback. AP/03
5	RN003	C-BOP C-SRO TS-SRO	1B RN pump trips. AP/20
6	CF006F	C-RO C-SRO	1CF-33 (1A CF CONT ISOL) closes requiring reactor trip. AP/06
7	SM008C	M-ALL	1A S/G Steamline break outside containment.
8	ISE006A ISE006B	I-RO I-SRO	Main Steam Isolation fails to auto initiate.
9	VLV-NI001A	C-BOP C-SRO	1NI-9A fails to open in AUTO.

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

Scenario 3 – Summary

Initial Condition IC 179
Unit 1 is at 85% power, MOL. 1B CBP is out of service. 1B LH Pump is tagged out.

Turnover:
Unit 1 is at 85% power, MOL. 1B CBP is tagged out for preventive maintenance and is expected to be returned to service in 2 hours. 1B LH Pump is tagged out and expected to return to service in 3 hours. Increase power per the reactivity management plan and increase turbine load to 100%. York County is under a severe thunderstorm watch for the next 4 hours.

Event 1
Increase power to 100%.

Event 2
1NC-29 (PZR Spray Valve) fails open. BOP manually closes the spray valve (will be successful). AP/11 (Pressurizer Pressure Anomalies) entry. TS evaluation required.

Event 3
NC Loop B Flow channel 2 fails LOW. TS evaluation required.

Event 4
1B Main Feedwater Pump trips and the Main Turbine will NOT run back in auto. RO recognizes that the Main Turbine needs to be run back to ~ 65% turbine load manually. AP/03 (Load Rejection) Case I entry.

Event 5
(Nuclear Service Water) 1B 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 6
1CF-33 (S/G 1A CF CONT ISOL) fails closed causing a loss of all feed flow to the 1A S/G requiring the RO to trip the reactor per AP/06 (Loss of S/G Feedwater).

Event 7
A steamline break outside containment occurs on the 1A S/G when the reactor trips.

Event 8
Main Steam Isolation fails to auto actuate. RO manually actuates Main Steam Isolation.

Event 9
1NI-9A (NV Cold Leg Injection Valve) fails to auto open on the SI. BOP takes manual action to open the valve for full injection.

***Critical Task 1* – Isolate the faulted S/G before transition out of E-2.**

***Critical Task 2* – Manually actuate main steamline isolation to prevent a severe (orange-path) challenge to either the subcriticality or the integrity CSF.**

***Critical Task 3* – Manually close Pzr spray valve prior to ESF actuation or Rx trip.**

EXERCISE GUIDE WORKSHEET

1. INITIAL CONDITIONS:

1.1 Reset to IC 179

START TIME:_____

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		n/a	LOA-CM040 (RACKOUT CBP 1B)					
		n/a	MAL-RN003B (RN PMP 1B FAILURE TO STRT)	AUTO				
		n/a	MAL-RN003D (PMP 2B FAILURE TO STRT)	AUTO				
		1	MAL-IPE003C (PZR SPRAY VLV NC-29 FAIL, MAN CTRL)	100				2
		3	XMT-NC005 (FNC_5040 NC LOOP B FLOW MTR (FI-425))	0				3
		n/a	MAL-EHC003F (ALL TURBINE AUTO RUNBACK FAILURE)	BLOCK				4
		5	OVR-FWP015C (CFPT 1B TRIP_RESET TRIP PB)	ON				4
		7	LOA-RN003 (RACKOUT RN PUMP 1B)	RACK OUT				5
		8	LOA-VC039 (MNL RST OF LATCH FOR CHILLER B HI COND PRESS TRIP DUE TO LOSS OF RN)	RESET	20 SEC			5
		11	VLV-CF006F (CF CONT ISOL VLV CF033 FAIL TO POSITION)	0		4 SEC		6
		12	MAL-SM008A (STM LINE BRK OUTSIDE CONTAINMENT LOOP A)	8.25e+5				7
		n/a	MAL-ISE006A (AUTO SM ISOL SIGNAL TRN A)	BLOCK				8
		n/a	MAL-ISE006B (AUTO SM ISOL SIGNAL TRN B)	BLOCK				8
		n/a	VLV-NI001A (NI9A B.I.T. DISCHARGE ISOL VLV FAIL AUTO ACTIONS)					9
			Ensure TRIGGER 8 = x14o013r l x14o014r l x11o038r					
			Ensure TRIGGER 12 = x01o063g l x01o066g					

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**, 1NC-29 fails open.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 1** to cause 1NC-29 to fail open.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to investigate the problem with 1NC-29, **REPEAT** the information.

3.4 **Scenario EVENT 3,** NC Loop B Flow Channel 2 fails low.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 3** to cause NC Loop B Channel 2 to fail low

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is contacted to issue model w/o #00874531, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is contacted to write a w/r on NC Loop B Channel 2, **REPEAT** back the information.

3.5 **Scenario EVENT 4**, 1B CFPT Trips with a failed auto Main Turbine runback.

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

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is contacted to write a w/r on the 1B CFPT, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator and/or Maintenance is dispatched to investigate the 1B CFPT, **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.

3.6 **Scenario EVENT 5,** 1B RN Pump trips.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 7** to cause the 1B RN Pump to trip.

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

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

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

3.7 **Scenario EVENT 6**, 1CF-51 goes closed.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 11** to cause the 1CF-51 to close.

3.8 **Scenario EVENTS 7, 8 and 9** Steamline break inside containment on the 1C S/G.

✓	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 Secondary 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 RP is requested to monitor the area of the steam fault for radiation, **REPEAT** the order.

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Event Description: Power increase to 100% power.

Time	Position	Applicant's Actions or Behavior
NOTE TO EVALUATOR:		**Crew begins with a power increase. BOP performs a dilution per OP/1/6150/009, Enclosure 4.3. Amount of dilution is 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:		**The following actions are 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": • 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.
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 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.**

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Event Description: Power increase to 100% power.

Time	Position	Applicant's Actions or Behavior
	BOP	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: 3.11.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the "RHT" position. 3.11.2 Ensure VCT level is monitored continuously while diverting to the RHT. **NOTE:** Procedure may continue while performing the following step. 3.11.3 **WHEN** desired VCT level is reached return 1NV-172A (3-Way Divert To VCT-RHT) to auto as follows: 3.11.3.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "VCT" position. 3.11.3.2 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "AUTO" position.
	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.

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Event Description: Power increase to 100% power.

Time	Position	Applicant's Actions or Behavior
	BOP	3.13 **IF AT ANY TIME** while dilution is in progress it becomes necessary to stop the dilution, perform the following: 3.13.1 Place the "NC MAKEUP CONTROL" switch to the "STOP" position. 3.13.2 Ensure the following valves close: • 1NV-242A (RMWST To B/A Blender Ctrl) • 1NV-181A (B/A Blender Otlt To VCT) 3.13.3 **IF** in "AUTO", verify the reactor makeup water pump stops. 3.13.4 Record reactor makeup water volume added as indicated on the total makeup counter. _____ gallons 3.13.5 **WHEN** conditions allow resuming the dilution, perform the following: 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). _____ - _____ = _____ gallons (Step 3.6) (Step 3.13.4) 3.13.5.2 Adjust total makeup counter to the volume of reactor makeup water determined in Step 3.13.5.1. (R.M.) 3.13.5.3 Place the "NC MAKEUP CONTROL" switch in the "START" position. (R.M.) 3.13.5.4 Verify the following: • 1NV-242A (RMWST To B/A Blender Ctrl) modulates to establish desired flow • 1NV-181A (B/A Blender Otlt To VCT) opens 3.13.5.5 **IF** in "AUTO", verify the reactor makeup water pump starts.
	BOP	3.14 **WHILE** makeup is in progress, monitor the following for expected results: • Control rod motion • NC System Tavg • Reactor Power
	BOP	3.15 Place the "NC MAKEUP CONTROL" switch in the "START" position. (R.M.)

Op Test No.: 301 Scenario # 3 Event # 1 Page 11 of 35

Event Description: Power increase to 100% power.

Time	Position	Applicant's Actions or Behavior
	BOP	3.16 Verify the following: • 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.) • 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 # 3 Event # 1 Page 12 of 35

Event Description: Power increase to 100% 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 3.1.2.**
	RO	3.1.2 Increase turbine generator load by performing the following: 3.1.2.1 Select "LOAD RATE" and verify it illuminates. 3.1.2.2 Input the desired load rate. 3.1.2.3 Select "ENTER" or "OK" and verify "LOAD RATE" goes dark. 3.1.2.4 Select "TARGET" and verify it illuminates. 3.1.2.5 Input the desired load target. 3.1.2.6 Select "ENTER" and verify "TARGET" light goes dark. 3.1.2.7 Verify new load target appears on Target Display. 3.1.2.8 Select "GO" and verify it illuminates to start load increase. 3.1.2.9 Coordinate with Secondary Chemistry to adjust S/G blowdown flowrates to obtain maximum blowdown for the appropriate load.
END OF PREPARATION FOR POWER INCREASE 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 # 3	Event # 2	Page 13 of 35
Event Description: 1NC-29 (Pzr Spray Valve) fails open			

Time	Position	Applicant's Actions or Behavior
EVENT 2		
Indications:		OAC point C1L4455 'NORMAL SPRAY FLOW ACTIVATED' 1AD-6, F/8 'PZR LO PRESS CONTROL'
	RO	Recognizes 1NC-29 (PZR SPRAY CTRL FRM LOOP A) is open
	RO	Verifies Pressurizer pressure is normal
	RO	Places controller for 1NC-29 in Manual and closes 1NC-29.
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	2. **Verify Pzr spray valve(s) – CLOSED.**
CRITICAL TASK	BOP	2.a. RNO **Perform the following:** a. Manually close affected spray valve(s).
NOTE TO EVALUATOR:		**Step 2 RNO b. may apply.**
	BOP	b. **IF** affected spray valve(s) will not close, **THEN** perform the following: 1) **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). 2) 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". 3) **IF** NC pressure is stable **OR** increasing, **THEN GO TO** Step 3.
	BOP	3. **Verify all Pzr heaters – ENERGIZED.**
	BOP	4. **Ensure 1NV-37A (NV Supply To Pzr Aux Spray) – CLOSED.**

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Event Description: 1NC-29 (Pzr Spray Valve) fails open

Time	Position	Applicant's Actions or Behavior
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:**
		• Stabilize unit at appropriate power level.
		• Adjust the following as required to maintain T-Avg within 1°F of T-Ref:
		  • Turbine load
		  • Control rods
		  • Boron concentration.

NOTE TO EVALUATOR: Step 7 does not apply.		
	BOP	8. **Ensure compliance with appropriate Tech Specs:** • 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 Condition A (2 hours) should be entered. This condition is likely to be cleared by the time Tech Specs are reviewed per the AP.		
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. RETURN TO 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 3 for Event 3 at the discretion of the lead examiner.		
END OF EVENT 2		

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Event Description: NC Loop B Flow Channel 2 fails low.

Time	Position	Applicant's Actions or Behavior
EVENT 3		
Indications: 1AD-6, A/2 'LOOP B LO FLOW ALERT' 1AD-2, F/10 'DCS TROUBLE'		
	BOP	Recognize NC Loop B Flow Channel 2 Fails low
	SRO	Enters Tech Spec 3.3.1
NOTE TO EVALUATOR:		**The following steps are from the annunciator response for 1AD-6, A/2 'LOOP B LO FLOW ALERT'**
	SRO	**IF** a channel malfunction has occurred, perform the following: 1. Refer to TS Table 3.3.1-1 for required number of channels.
NOTE TO EVALUATOR:		**T.S. 3.3.1 (Reactor Trip System Instrumentation) Condition M (Place channel in trip within 6 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.**
	CREW	2. Issue Model W/O #00874531 to have IAE trip the bistable.
	CREW	3. Initiate a work request to have the channel repaired.
END OF EVENT 3		
Booth Operator will insert Trigger 5 for EVENT 4 at the discretion of the lead examiner.		

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Event Description:	1B CFPT trips and the Main Turbine fails to runback in automatic requiring the RO to runback the Main Turbine in manual.		

Time	Position	Applicant's Actions or Behavior
EVENT 4		
Indications:		1AD-5, C/1 'CFPT B TRIPPED' 1AD-5, C/4 'CFPT COMMON TROUBLE' 1AD-4, C/1,2,3,4 'S/G A,B,C,D FLOW MISMATCH LO CF FLOW'
	RO	Recognize 1B CFPT tripped
	RO	Recognize auto Main Turbine Runback failure
	RO	Manually runback the Main Turbine as required.
	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.**
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	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:** • Control rods - IN "AUTO" AND STEPPING IN • P/R neutron flux - DECREASING.
	RO	3. **Verify proper steam dump operation as follows:** a. Verify T-Ref instrumentation - AVAILABLE. b. "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT. c. Verify the following: • "C-7A LOSS OF LOAD INTLK COND DUMP" status light (1SI 18) - LIT. • Steam dump valves - MODULATING. d. T-Avg - DECREASING TO T-REF.
	BOP	4. **Verify Pzr PORV and Pzr spray valve status as follows:** a. All Pzr PORVs - CLOSED. b. Normal Pzr spray valves - CLOSED.

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Event Description: 1B CFPT trips and the Main Turbine fails to runback in automatic requiring the RO to runback the Main Turbine in manual.

Time	Position	Applicant's Actions or Behavior
	BOP	5. **Verify proper CM System operation as follows**: 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.
	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:** • 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:** • 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.**
	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%.**
NOTE TO EVALUATOR:		**The crew will determine that the RNO step 13.a. does not apply.**

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Event Description: 1B CFPT trips and the Main Turbine fails to runback in automatic requiring the RO to runback the Main Turbine in manual.

Time	Position	Applicant's Actions or Behavior
	RO and BOP	13. RNO **Perform the following:** b. **WHEN** the appropriate runback target load is reached, **THEN**: 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: • Turbine load • Control rods • Boron concentration. c. **GO TO** Step 15.
	BOP	15. **Verify the following PCBs - CLOSED:** • 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.**
	RO and BOP	17. **WHEN the appropriate runback target load is reached, THEN**: • 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: • 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:** a. Restore CM and CF as follows: 1) Verify C-htr drain pumps - ON.

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Event Description: 1B CFPT trips and the Main Turbine fails to runback in automatic requiring the RO to runback the Main Turbine in manual.

Time	Position	Applicant's Actions or Behavior
	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	20.a. 2) Verify both CF Pumps - IN SERVICE.
	SRO	20.a.2) RNO 2) **GO TO** Step 20.b.
	BOP	20. b. RC pump(s) and cooling tower fans. **REFER TO** OP/1/B/6400/001A (Condenser Circulating Water System).
	RO	21. **Reset steam dump valves as follows:** a. Verify reactor power - STABLE. b. Verify steam dump valves - IN "T-AVG" MODE. c. Verify steam dump valves - CLOSED. d. Reset steam dump valves. e. Verify the following status lights (1SI-18) - DARK: • "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 OR EQUAL TO 15% IN A 1 HOUR PERIOD.**
	RO or BOP	25. **Notify the following sections to take appropriate samples:** • 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).

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Event Description: 1B CFPT trips and the Main Turbine fails to runback in automatic requiring the RO to runback the Main Turbine in manual.

Time	Position	Applicant's Actions or Behavior
	SRO	26. **Ensure compliance with appropriate Tech Specs:** • 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:		**No Tech Spec actions need to be entered.**
	BOP	27. **Notify Reactor Group Engineer of occurrence.**
	SRO	28. **Determine long term plant status. <u>RETURN</u> <u>TO</u> OP/1/A/6100/003 (Controlling Procedure For Unit Operation).**
NOTE TO EVALUATOR:		**The SRO will conduct a "Crew Brief" or a "Focus Brief" to summarize the event.**
END OF EVENT 4		
Booth Operator will insert Trigger 7 for EVENT 5 at the discretion of the lead examiner.		

Op Test No.: 301	Scenario # 3	Event # 5	Page 21 of 35
Event Description: Loss of 1B RN Pump.			

Time	Position	Applicant's Actions or Behavior
EVENT 5		
Indications:		1AD-11, D/1 '4KV ESS PWR TRAIN B TROUBLE' 1AD-12, A/2 'RN ESSENTIAL HDR A PRESSURE LO' 1AD-12, A/5 'RN ESSENTIAL HDR B PRESSURE LO'
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 DUAL SUPPLY HEADER ALIGNMENT.**
	BOP	4. **Verify each operating RN pump discharge flow - GREATER THAN 8,600 GPM.**
	BOP	5. **Verify each operating RN pump discharge flow - LESS THAN 23,000 GPM.**
	BOP	6. **Ensure RN pumps - IN OPERATION AS NEEDED.**
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).**
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.**

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Event Description: Loss of 1B RN Pump.

Time	Position	Applicant's Actions or Behavior
	SRO	12. **Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual:** • 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 11 for EVENT 6 at the discretion of the lead examiner.		
	SRO	13. **Determine required notifications:** • **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. 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 5		

Op Test No.: 301	Scenario # 3	Event # 6	Page 23 of 35
Event Description: 1CF-33 (S/G 1A CF CONT ISOL) closes.			

Time	Position	Applicant's Actions or Behavior
EVENT 6		
Indications:		1AD-4, A-1 'S/G A FLOW MISMATCH LO CF FLOW' 1AD-4, A/1,2,4 'S/G A,B,D FLOW MISMATCH CF>STM' 1AD-4, B/1 'S/G A LEVEL DEVIATION'
	RO	Recognizes loss of all feed flow to the 1A S/G at greater than 5% reactor power.
	RO	Manually trips the reactor per the immediate actions of AP/1/A/5500/006 (Loss of S/G Feedwater), Case I (Loss of CF Supply To S/Gs).
	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/5500/006, Loss of S/G Feedwater.**
NOTE TO EVALUATOR:		**The following steps are from AP/1/A/5500/0006, Loss of S/G Feedwater, Case I (loss of CF Supply To S/Gs).**
	RO	1. **Verify reactor power - LESS THAN 5%.**
	RO	1. RNO **IF AT ANY TIME all CF supply to S/G(s) lost, THEN perform the following:** a. Manually trip reactor.
	CREW	b. **GO TO** EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
END OF EVENT 6		

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Event Description: Steamline break outside containment on the 1A S/G. Main Steam Isolation (both trains) fails to actuate requiring manual initiation. 1NI-9A (NV PUMP C/L INJ ISOL) fails to open on the Safety Injection.

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:** • All rod bottom lights - LIT • All reactor trip and bypass breakers - OPEN • I/R power - DECREASING.
	RO	3. **Verify Turbine Trip: Perform the following:** • All turbine stop valves - CLOSED
	BOP	4. **Verify 1ETA and 1ETB - ENERGIZED.**
	BOP	5. **Verify S/I is actuated:** 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:** • **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:** a. Phase A "RESET" lights - DARK. 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
	CREW	b. **IF AT ANY TIME** containment pressure exceeds 3 PSIG while in this procedure, **THEN** perform Step 10.a.

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Event Description: Steamline break outside containment on the 1A S/G. Main Steam Isolation (both trains) fails to actuate requiring manual initiation. 1NI-9A (NV PUMP C/L INJ ISOL) fails to open on the Safety Injection.

Time	Position	Applicant's Actions or Behavior
	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%.
NOTE TO EVALUATOR:		**If the RO takes longer to recognize the failed Main Steam Isolation, S/G N/R levels may be below 11% and the crew would transition to the RNO and may start CA PMP #1.**
	BOP	12. **Verify all of the following S/I pumps - ON:** • 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.**
NOTE TO EVALUATOR:		**The crew may determine that the 1B RN Pump will not start due to the failure and proceed to step 15.**
NOTE TO EVALUATOR:		**Step 14 RNO a. will not apply.**
	BOP	14. RNO b. **IF** any Unit 1 RN pump is off, **THEN** 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	14. RNO b. 4) **IF AT ANY TIME** B/O occurs, **THEN** restart S/I equipment previously on.
	BOP	15. **Verify proper ventilation systems operation as follows:** • **REFER TO** 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	16. RNO **Perform the following:** a. Verify Main Steam Isolation as follows: • All MSIVs - CLOSED • All MSIV bypass valves - CLOSED • All S/G PORVs - CLOSED.

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Event Description: Steamline break outside containment on the 1A S/G. Main Steam Isolation (both trains) fails to actuate requiring manual initiation. 1NI-9A (NV PUMP C/L INJ ISOL) fails to open on the Safety Injection.

Time	Position	Applicant's Actions or Behavior
NOTE TO EVALUATOR:		**The actions of step 16 RNO b.1) may have already been performed by the RO due to the failed automatic Main Steam Isolation.**
CRITICAL TASK	RO	b. **IF** any valve open, **THEN** perform the following: 1) Initiate Main Steam Isolation. 2) **IF** any valve is still open, **THEN** CLOSE valve.
		END OF EVENT 8
	RO	17. **Verify proper S/I flow as follows:** a. "NV S/I FLOW" - INDICATING FLOW.
	RO	b. NC pressure - LESS THAN 1620 PSIG.
	RO	c. NI pumps - INDICATING FLOW.
	RO	d. NC pressure - LESS THAN 285 PSIG.
	RO or BOP	17.d.RNO Perform the following: 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) Observe note prior to Step 18 and **GO TO** Step 18.
NOTE		**Spent Fuel Pool parameters should be monitored within 2 hours of event.**
	RO or BOP	18. **WHEN time and manpower permit, 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.
	RO	b. **WHEN** at least one S/G N/R level is greater than 11% (29% ACC), **THEN** THROTTLE feed flow to maintain all S/G N/R levels between 11% (29% ACC) and 50%.
	RO	20. **Verify all CA isolation valves - OPEN.**

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Event Description: Steamline break outside containment on the 1A S/G. Main Steam Isolation (both trains) fails to actuate requiring manual initiation. 1NI-9A (NV PUMP C/L INJ ISOL) fails to open on the Safety Injection.

Time	Position	Applicant's Actions or Behavior
	BOP	21. **Verify S/I equipment status based on monitor light panel - IN PROPER ALIGNMENT.**
NOTE TO EVALUATOR:		**If the BOP has not identified and corrected 1NI-9A (NV PUMP C/L INJ ISOL) failure to open until this step, they will transition to the RNO and open 1NI-9A.**
		END OF EVENT 9

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Event Description: Steamline break outside containment on the 1A S/G.

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. 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	25. **Verify main steamlines intact:** • 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.**

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Event Description: Steamline break outside containment on the 1A S/G.

Time	Position	Applicant's Actions or Behavior
EP/1/A/5000/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:** • All MSIVs • All MSIV bypass valves.
	RO or BOP	4. **Verify any S/G pressure - STABLE OR INCREASING.**
	RO or BOP	5. **Identify faulted S/G(s) as follows:** • Verify any S/G pressure - DECREASING IN AN UNCONTROLLED MANNER OR • Verify any S/G - DEPRESSURIZED.
	RO or BOP	6. **Maintain at least one intact S/G available for NC System cooldown in subsequent steps.**
	RO or BOP	7. **Verify faulted S/G(s) PORV - CLOSED.**
	RO or BOP	8. **Ensure CA System valve control - RESET.**
NOTE TO EVALUATOR:		**The actions of step 9.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	9. **Isolate all faulted S/G(s) as follows:** • S/G 1A: a. Verify S/G 1A Feedwater Isolation status light (1SI-5) - LIT. b. CLOSE the following valves: 1) 1SM-77A (S/G 1A Otlt 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: 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).

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Event Description: Steamline break outside containment on the 1A S/G.

Time	Position	Applicant's Actions or Behavior
	RO	10. **WHEN NC T-Hots start to increase, THEN dump steam from intact S/G PORVs to stabilize NC T-Hots.**
	BOP	11. **Verify secondary radiation normal as follows:** a. Ensure the following signals - RESET: 1) Phase A Containment Isolations. 2) CA System valve control 3) KC NC NI NM St signals.
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.**
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: • Notify Chemistry to sample all S/Gs for activity. OR • Notify RP to frisk all cation columns for activity.
	BOP	d. 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).
	BOP	e. Verify S/G(s) fault - INSIDE CONTAINMENT.

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Event Description: Steamline break outside containment on the 1A S/G.

Time	Position	Applicant's Actions or Behavior
	RO or BOP	11.e.RNO e. Request RP to perform the following: 1) Monitor the area of the steam fault for radiation. 2) Notify Control Room of any abnormal radiation conditions
	RO or BOP	f. **WHEN** activity results are reported, **THEN** verify all S/Gs indicate no activity.
	RO	12. **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: • Any intact S/G N/R level – GREATER THAN 11% (29% ACC) OR • 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).
	CREW	e. **GO TO** 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 # 3 Event # 7 Page 32 of 35

Event Description: Steamline break outside containment on the 1A S/G.

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:** • 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: • 1NV-252A (NV Pumps Suct From FWST) • 1NV-253B (NV Pumps Suct From FWST).
	BOP	b. Verify the following valves - OPEN: • 1NV-203A (NV Pumps A&B Recirc Isol) • 1NV-202B (NV Pumps A&B Recirc Isol)
	BOP	c. CLOSE the following valves: • 1NI-9A (NV Pmp C/L Inj Isol) • 1NI-10B (NV Pmp C/L Inj Isol)
END OF EVENT 7		
END OF SCENARIO		

Attachment List

Scenario 3

ATTACHMENT 1 -	Crew Critical Task Summary
ATTACHMENT 2 -	Shift Turnover Information
ATTACHMENT 3 –	AP/1/A/5500/003 Enclosure 3 (Rod Insertion Limit Boration), Rev. 041
ATTACHMENT 4 –	AP/0/A/5500/020 Enclosure 1 (Foldout Page), Rev. 042
ATTACHMENT 5 –	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page), Rev. 041
ATTACHMENT 6 –	EP/1/A/5000/E-0 Enclosure 2 (Ventilation System Verification), Rev. 041
ATTACHMENT 7 –	EP/1/A/5000/E-0 Enclosure 4 (NC Temperature Control), Rev. 041
ATTACHMENT 8 –	EP/1/A/5000/E-2 Enclosure 1 (Foldout Page), Rev. 014
ATTACHMENT 9 –	EP/1/A/5000/ES-1.1 Enclosure 1 (Foldout Page), Rev. 032

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	**UNSAT**	**CT #**	**CRITICAL TASK**
		C-1	Isolate the faulted S/G before transition out of E-2.
		C-2	Manually actuate main steamline isolation to prevent a severe (orange-path) challenge to either the subcriticality or the integrity CSF.
		C-3	Manually close Pzr spray valve prior to ESF actuation or Rx trip.

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION

Unit 1 Status

Power Level	Power History	NCS Boron	Xenon
85%	MOL	874 PPM	per OAC

Controlling Procedure

- 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 3.2.

Other Information Needed to Assume the Shift

- 1B CBP pump is tagged out for preventative maintenance and is expected to be returned to service in 2 hours. York County is under a severe thunderstorm watch for the next 4 hours.
- 1B LH Pump is tagged out and expected to return to service in 3 hours.
- Direction for the crew is to increase reactor power to 100%.

NEOs Available

Six NEOs are available as listed on the status board

METEOROLOGICAL CONDITIONS

- 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.

HLP NRC EXAM
SCENARIO # 4

Facility:	Catawba NRC Exam 2013	Scenario No.: 4	Op Test No.: 2013301
Examiners:		Operators:	SRO
			RO
			BOP

Initial Conditions: IC# 180; Unit 1 is at 100% power, EOL. 1B LH Pump is out of service.

Turnover: Unit 1 is at 100% power, EOL. 1B LH Pump is out of service. Letdown flow has been increased to 100 gpm for NC System cleanup in preparation for the upcoming outage. Direction for the crew is to decrease power per the reactivity management plan to ~95% in preparation for Main Steam Safety Valve testing.

Event No.	Malf. No.	Event Type*	Event Description
1	---	N-BOP R-RO N-SRO	Decrease power to 95%.
2	KF004	C-BOP C-SRO	1A KF (Spent Fuel Pool Cooling) pump trips. AP/41
3	ENB013B	TS-SRO	N42 fails low. AP/16
4	SGL005D	C-RO C-SRO	1CF-55 (1D S/G Feed Reg Vlv) fails closed (ramps in). AP/06
5	NV001	I-BOP I-SRO	1NV-172A (divert valve) diverts to Recycle Holdup Tank.
6	NC009F	C-RO TS-SRO	1NC-36B (PZR PORV) fails open, manual closure successful. AP/11.
7	SG001D	C-ALL	1D S/G tube leak. (25-350 gpm ramp) AP/10
8	SG001D	M-ALL	1D S/G tube rupture.
9	EHC002	C-RO C-SRO	Turbine trip failure on reactor trip.
10	ISE003B		Train B Phase A Isolation Signal failure.

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

Scenario 4 – Summary

Initial Condition IC 180
Unit 1 is at 100% power, EOL. 1B LH pump is out of service.

Turnover:
Unit 1 is at 100% power, EOL. 1B LH Pump is out of service. Letdown flow has been increased to 100 gpm for NC System cleanup in preparation for the upcoming outage. Direction for the crew is to decrease power per the reactivity management plan to ~95% in preparation for Main Steam Safety Valve testing.

Event 1
Decrease power to 95%.

Event 2
1A KF (Spent Fuel Pool Cooling) pump trips. AP/41 (Loss of Spent Fuel Cooling or Level) entry. BOP manually starts the 1B KF pump.

Event 3
Power Range NI N42 fails LOW. AP/16 (Malfunction of Nuclear Instrumentation) entry. TS evaluation required.

Event 4
1CF-55 (1D S/G Feed Reg Vlv) fails closed (ramps closed). RO takes manual control of the feed reg valve to maintain 1D S/G level. AP/06 (Loss of SG Feedwater) will be entered.

Event 5
1NV-172A (VCT LEVL CTRL) controller fails HI, causing 1NV-172A to divert to the RHT (Recycle Holdup Tank). BOP places the control switch for 1NV-172A to the VCT (Volume Control Tank) position.

Event 6
1NC-36B (PZR PORV) fails open. Manual closure will be successful. AP/11 (Pressurizer Pressure Anomalies) entry. TS evaluation required.

Event 7
A tube leak on 1D S/G ramps from 25 - 350 gpm. AP/10 (Reactor Coolant Leak) entry. Tube leak increases to a tube rupture and requires a reactor trip.

Event 8
Tube leak increases to a tube rupture and requires a reactor trip.

Event 9
Main Turbine fails to trip on the reactor trip. RO manually trips the turbine.

Event 10
Train B Phase A Isolation fails to actuate on the safety injection. BOP manually initiates.

***Critical Task 1** – Isolate feed/steam to/from ruptured S/G before a transition to ECA-3.1.*

***Critical Task 2** – Terminate S/I before water release occurs from the ruptured S/G PORV or safety.*

***Critical Task 3** – 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.*

***Critical Task 4** – Manually close Pzr PORV or isolation valve prior to ESF actuation or Rx trip.*

***Critical Task 5** – Manually control feedwater to prevent reaching an S/G Hi Hi level Turbine trip or Lo Lo level Rx trip.*

EXERCISE GUIDE WORKSHEET

1. INITIAL CONDITIONS:

1.1 Reset to IC #180
START TIME:_____

✓	✓	Trigger	Instructor Action	Final	Delay	Ramp	Delete In	Event
		n/a	OVR-MT016A (HYDR FLUID PMP 1B OFF LT)	OFF				
		1	LOA-KF004 (RACKOUT KF PMP A)	RACKOUT				2
		3	MAL-ENB013B (P/R 42 BLOWN FUSE)	INST				3
		5	MAL-SGL005D (S/G/D/HI PWR LVL CONTROLLER FAILURE)	200		2 MIN		4
		7	MAL-NV001 (VCT LVL CTRL FAILURE)	100				5
		9	XMT-VQ001 (PVQ_5040 CNT PRESS MTR)	.125				6
		10	VLV-NC009F (NC36B PZR PORV FAIL TO POSITION)	1				6
		12	VLV-NC009F (NC36B PZR PORV FAIL TO POSITION)	1			1 SEC	6
		15	MAL – SG001D (S/G D TUBE LEAK)	350		2 MIN		7,8
		n/a	MAL-EHC002 (TURBINE TRIP FAILURE)	AUTO				9
		n/a	MAL-ISE003B (AUTO PHASE A ISOL SIGNAL TRN B)	BLOCK				10
			Ensure TRIGGER 10 = x5ri017a					
			Ensure TRIGGER 12 = x10i277c					

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 95%.

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

3.3 **Scenario EVENT 2**, 1A KF Pump trips.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, THEN INSERT SIMULATOR Trigger 1 to trip the 1A KF Pump.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator and/or Maintenance is dispatched to investigate the 1A KF Pump and/or Breaker, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to investigate the problem with 1A KF Pump and or Breaker, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to write a w/r for the 1A KF Pump and/or Breaker, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF RP is notified of the loss of Spent Fuel Pool cooling, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to check out 1B KF Pump, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to ensure 1KC-155 OPEN, **REPEAT** back the information. After 3 minutes contact the Control Room and state that 1KC-155 is open. **Give a call back number!**

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to throttle 1KF-22, **REPEAT** back the information. After 3 minutes had elapsed, contact the Control Room and state that 1KF-22 has been throttled 3 turns open.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to adjust 1KF-22, **REPEAT** back the information. After 1 minute has elapsed, contact the Control Room and state that 1KF-22 has been adjusted as required.

3.4 **Scenario EVENT 3,** N-42 blown instrument fuse.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 3** to cause the instrument fuse for N-42 to blow.

✓	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 N42, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF the Reactor Group is notified of N42 failure, **REPEAT** back the information.

3.5 **Scenario EVENT 4**, 1CF-55 (S/G D Feed Reg Vlv) fails closed.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 5** to fail 1CF-55 (S/G D Feed Reg Vlv) closed.

✓	BOOTH INSTRUCTOR ACTION
	IF SWM is called to investigate the problem with 1CF-55, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF Operator is dispatched to locally investigate 1CF-55, **REPEAT** back the information.

3.6 **Scenario EVENT 5,** 1NV-172A Controller Fails Hi

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 7** to cause the controller for 1NV-172A to fail Hi

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to investigate the problem with 1NV-172A controller, **REPEAT** back the information.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to write a w/r for the 1NV-172A controller, **REPEAT** back the information.

3.7 **Scenario EVENT 6**, 1NC-36B (PZR PORV) fails open.

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner**, THEN INSERT SIMULATOR Trigger 9** to cause 1AD-13, F/5 (HVAC PANEL TROUBLE) to alarm.

✓	BOOTH INSTRUCTOR ACTION
	IF the SWM is contacted to write a w/r for the 1NC-36B, **REPEAT** back the information.

3.8 **Scenario EVENT 7,** S/G 1D Tube Leak

✓	BOOTH INSTRUCTOR ACTION
	WHEN directed by the lead examiner, **THEN INSERT SIMULATOR Trigger 15** to cause a tube leak on the 1D 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 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.

✓	BOOTH INSTRUCTOR ACTION
	IF Secondary Chemistry is notified to determine affected S/G by sampling **REPEAT** the order

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Event Description: Power decrease to 95% power.

Time	Position	Applicant's Actions or Behavior
		NOTE TO EVALUATOR: Crew begins with a power decrease. BOP performs a boration per OP/1/6150/009, 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/1/6150/009, Boron Concentration Control, Enclosure 4.2 (Boration).
	BOP	3.2 Ensure the following valve control switches in "AUTO": • 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 # 4 Event # 1 Page 11 of 44

Event Description: Power decrease to 95% 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	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: 3.11.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) to the "RHT" position. 3.11.2 Ensure VCT level is monitored continuously while diverting to the RHT. **NOTE:** Procedure may continue while performing the following step. 3.11.3 **WHEN** desired VCT level is reached return 1NV-172A (3-Way Divert To VCT-RHT) to auto as follows: 3.11.3.1 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "VCT" position. 3.11.3.2 Place the control switch for 1NV-172A (3-Way Divert To VCT-RHT) in the "AUTO" position.
	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.

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Event Description: Power decrease to 95% power

Time	Position	Applicant's Actions or Behavior
	BOP	3.13 **IF AT ANY TIME** while boration is in progress it becomes necessary to stop the boration, perform the following: 3.13.1 Place the "NC MAKEUP CONTROL" switch to the "STOP" position. 3.13.2 Ensure the following valves close: (R.M.) • 1NV-238A (B/A To Blender Ctrl Vlv) • 1NV-186A (B/A Blender Otlt To VCT Otlt) 3.13.3 Record boric acid volume added as indicated on the Boric Acid counter. _____ gallons 3.13.4 **WHEN** conditions allow resuming the boration, perform the following: 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). _____ - _____ = _____ gallons (Step 3.5) (Step 3.13.3) 3.13.4.2 Adjust boric acid counter to the volume of boric acid determined in Step 3.13.4.1. (R.M.) 3.13.4.3 Place the "NC MAKEUP CONTROL" switch in the "START" position. (R.M.) 3.13.4.4 Verify the following: • 1NV-238A (B/A To Blender Ctrl Vlv) modulates to establish desired flow • 1NV-186A (B/A Blender Otlt To VCT Otlt) opens 3.13.4.5 **IF** in "AUTO", verify the boric acid pump starts.
	BOP	3.14 **WHILE** makeup is in progress, monitor the following for expected results: • Control rod motion • NC System Tavg • Reactor Power
	BOP	3.15 Place the "NC MAKEUP CONTROL" switch to the "START" position. (R.M.)

Op Test No.: 301 Scenario # 4 Event # 1 Page 13 of 44

Event Description: Power decrease to 95% power

Time	Position	Applicant's Actions or Behavior
	BOP	3.16 Verify the following: • 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.) • 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.: 301	Scenario # 4	Event # 1	Page 14 of 44
Event Description: Power decrease to 95% 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	3.2.2 Decrease turbine generator load by performing the following: 3.2.2.1 Select "LOAD RATE" and verify it illuminates. 3.2.2.2 Input the desired load rate. 3.2.2.3 Select "ENTER" and verify "LOAD RATE" goes dark 3.2.2.4 Select "TARGET" and verify it illuminates. 3.2.2.5 Input the desired load target. 3.2.2.6 Select "ENTER" and verify "TARGET" goes dark. 3.2.2.7 Verify new load target appears on Target Display. 3.2.2.8 Select "GO" and verify it illuminates to start load decrease. 3.2.2.9 Coordinate with Secondary Chemistry to adjust S/G blowdown flowrates to obtain maximum blowdown for the appropriate load
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 # 4	Event # 2	Page 15 of 44
Event Description: 1A KF Pump trips.			

Time	Position	Applicant's Actions or Behavior
EVENT 2		
Indications: 1AD-11, A/1 '4KV ESS PWR TRAIN A TROUBLE' OAC pt C1X1060 NEW TRAIN A 1.47 ALARM		
	BOP	Recognize 1A KF (Spent Fuel Pool Cooling) Pump tripped
	CREW	Enter AP/1A/5500/041 (Loss of Spent Fuel Cooling or Level)
	BOP	Start the 1B KF Pump.
NOTE TO EVALUATOR:		**The crew will make a plant page announcing the entry into AP/1/A/5500/041, Loss of Spent Fuel Cooling or Level.**
NOTE TO EVALUATOR:		**The following steps are from AP/1/A/5500/041, Loss of Spent Fuel Cooling or Level, Case I (Loss of Spent Fuel Pool Cooling).**
NOTE • **Spent Fuel Pool temperature can be verified locally with an infrared thermometer.** • **Spent Fuel Pool level can be determined locally when instrument indications are unavailable. The bottom of spent fuel pool skimmer trough elevation is 38 feet 10 inches.**		
	BOP	1. **Verify Spent Fuel Pool conditions as follows:** a. Verify the following: • Spent Fuel Pool level - GREATER THAN 39 FT. • Spent Fuel Pool level - STABLE.
	CREW	b. **IF AT ANY TIME** Spent Fuel Pool level decreases to less than 39 Ft, **THEN** perform the following: 1) Stop KF pump(s). 2) **GO TO** Case II (Loss of Spent Fuel Pool Level).
	BOP	2. **Verify fuel movement - IN PROGRESS.**
	SRO	2. RNO **GO TO Step 4.**
	RO	4. **IF AT ANY TIME conditions in the Spent Fuel Bldg. warrant, THEN evacuate non-essential personnel from Spent Fuel Bldg.**
	RO or BOP	5. **Notify RP of loss of spent fuel cooling.**
	BOP	6. **Ensure KC pumps - IN SERVICE AS REQUIRED.**

Op Test No.: 301 Scenario # 4 Event # 2 Page 16 of 44

Event Description: 1A KF Pump trips.

Time	Position	Applicant's Actions or Behavior
NOTE TO EVALUATOR: The CRS should determine that Unit 1 S/I has not actuated.		
	CREW	7. **Verify LOCA occurred as follows:** • Unit 1 S/I - ACTUATED OR • Unit 2 S/I - ACTUATED
	CREW	7. RNO **Perform the following:** a. **IF AT ANY TIME** either unit S/I actuates, **THEN RETURN TO** Step 7. b. **GO TO** Step 10.
	BOP	10. **Verify at least one train of KC - ALIGNED TO AUX BLDG NON ESSENTIAL HEADER.** • A Train: • 1KC-1A (Aux Bldg Non-Ess Ret Hdr Isol) - OPEN • 1KC-50A (Aux Bldg Non-Ess Hdr Isol) - OPEN. OR • B Train: • 1KC-2B (Aux Bldg Non-Ess Ret Hdr Isol) - OPEN • 1KC-53B (Aux Bldg Non-Ess Hdr Isol) - OPEN.
	BOP	11. **Verify KF pumps - OFF.**
NOTE TO EVALUATOR: The crew determines that step 12 does not apply.		
	BOP	13. **Place KF in service as follows:**
NOTE TO EVALUATOR: The crew determines that steps 13.a. and 13.b do not apply.		
	CREW	c. Determine the allowable KF pump flowrate. **REFER TO** Enclosure 2 (Allowable KF Flowrates).
NOTE TO EVALUATOR: The crew determines that the allowable flowrate is 2,840 gpm.		
	BOP	d. Verify Spent Fuel Pool level sufficient to allow starting KF pump as follows: • Spent Fuel Pool Level – GREATER THAN OR EQUAL TO 39 FT. • Allowable KF pump flowrate - GREATER THAN OR EQUAL TO 750 GPM.

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Event Description: 1A KF Pump trips.

Time	Position	Applicant's Actions or Behavior
	SRO	e. Record the allowable KF pump flowrate on Enclosure 3 Placing KF In Service).
	BOP	f. Verify Spent Fuel Pool temperature - LESS THAN OR EQUAL TO 200°F.
NOTE If available the previously running pump is preferable to start.		
	CREW	g. Place available KF pump in service using the allowable KF pump flowrate. **REFER TO** Enclosure 3 (Placing KF In Service).
NOTE TO EVALUATOR:		**The CRS may decide to read Enclosure 3 or hand it off to the BOP.**
NOTE TO EVALUATOR:		**The following steps are from Enclosure 3 (Placing KF In Service).**
	SRO	1. **Record allowable KF flowrate _____. REFER TO Enclosure 2 (Allowable KF Flowrates).**
NOTE TO EVALUATOR:		**Step 2 will not apply.**
	BOP	3. **Ensure sufficient KC pumps in service to allow an increase of 2000 GPM KC flow.**
NOTE TO EVALUATOR:		**The crew may decide to start an additional KC (Component Cooling) Pump.**
NOTE TO EVALUATOR:		**Step 4 will not apply.**
NOTE TO EVALUATOR:		**The BOP will dispatch an operator to perform steps 5.a, 5.d, and 5.f.**
	BOP	5. **IF placing KF Cooling Loop 1B in operation, THEN perform the following:** a. Ensure 1KC-155 (1B KF Hx Inlet) (AB-585, PP-52/53, Rm 418) - OPEN.
	BOP	b. Close 1KC-149 (KF Hx 1A Cool Wtr Otlt).
	BOP	c. Adjust 1KC-156 (KF Hx 1B Cool Wtr Otlt) to 2000 gpm.
	BOP	d. Throttle 1KF-22 (1B KF Loop Flow Control) (AB-587, PP-52, Rm 418) three turns open.
NOTE TO EVALUATOR:		**The crew will make a plant page to notify personnel of the start of the 1B KF (Fuel Pool Cooling) Pump**
	BOP	e. Start KF Pump 1B.

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Event Description: 1A KF Pump trips.

Time	Position	Applicant's Actions or Behavior
Booth Operator will insert Trigger 3 for EVENT 3 at the discretion of the lead examiner.		
	BOP	f. Adjust 1KF-22 (1B KF Loop Flow Control) (AB-587, PP-52, Rm 418) to achieve to the allowable flowrate recorded in Step 1.
	BOP	g. Adjust 1KC-156 (KF Hx 1B Cool Wtr Otlt) as required to achieve desired Spent Fuel Pool temperature.
	BOP	6. **WHEN time and personnel permit, THEN perform applicable steps of OP/1/A/6200/005 (Spent Fuel Cooling System).**
NOTE TO EVALUATOR: The following steps are from AP/1/A/5500/041 (Loss of Spent Fuel Cooling or Level), Case I (Loss of Spent Fuel Pool Cooling).		
NOTE It may take several hours for Spent Fuel Pool temperature to stabilize after cooling is reestablished.		
	BOP	14. **Verify Spent Fuel Pool temperature - STABLE OR DECREASING.**
	BOP	15. **Verify Spent Fuel Pool temperature less than 125°F.**
	BOP	16. **Ensure VF in filter mode. REFER TO Enclosure 4 (VF Filter Mode Verification).**
	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 proper VC/YC system operation. REFER TO Enclosure 5 (Control Room Ventilation System Verification).**
	SRO	19. **Ensure compliance with appropriate Tech Specs and Selected Licensee Commitments Manual:** • 3.7.14 (Spent Fuel Pool Water Level) • 3.7.15 (Spent Fuel Pool Boron Concentration) • 3.7.16 (Spent Fuel Assembly Storage) • 3.9.6 (Refueling Cavity Water Level) • 4.3 (Fuel Storage) • SLC 16.7-9 (Standby Shutdown System) • SLC 16.9-21 (Refueling Operations - Storage Pool Water Level).
NOTE TO EVALUATOR: No Tech Specs conditions will be entered.		

Op Test No.: 301	Scenario # 4	Event # 2	Page 19 of 44
Event Description: 1A KF Pump trips.			

Time	Position	Applicant's Actions or Behavior
	BOP	20. **Verify the following:** • Spent Fuel Pool temperature – LESS THAN 125°F. • KF pump(s) - ON.
	BOP	21. **IF purification of the Spent Fuel Pool is desired, THEN REFER TO OP/1/A/6200/005 (Spent Fuel Cooling System).**
	CREW	22. **Determine long term plant status. RETURN TO procedure in affect.**
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 20 of 44
Event Description: N-42 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 OR • **N-42 (failed low)** 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. REFER TO Model W/O #00874531:** • OT DELTA T • OP DELTA T.

Op Test No.: 301 Scenario # 4 Event # 3 Page 21 of 44

Event Description: N-42 blown instrument fuse.

Time	Position	Applicant's Actions or Behavior
	BOP	6. **Perform the following actions at the Miscellaneous Control And Indication Panel:** 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:** 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:** 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	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.**

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Event Description: N-42 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:** • 3.2.4 (Quadrant Power Tilt Ratio (QPTR)) • 3.3.1 (Reactor Trip System (RTS) Instrumentation).
NOTE TO EVALUATOR: The SRO should determine that the following Tech Spec 3.3.1 conditions for associated functions should be entered: **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)** **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)** **6. <u>Overtemperature ΔT</u>** **Condition E (72 hours to place the channel in trip)** **7. <u>Overpower ΔT</u>** **Condition E (72 hours to place the channel in trip)** **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)** **c. Power Range Neutron Flux, P-8, - Condition S (1 hour to verify interlock is in required state for existing conditions)** **d. Power Range Neutron Flux, P-9, - Condition S (1 hour to verify interlock is in required state for existing conditions)** **e. Power Range Neutron Flux, P-10, - Condition R (1 hour to verify interlock is in required state for existing conditions)**		
NOTE TO EVALUATOR: The SRO will conduct a "Crew Update" to inform the crew of any Tech Spec conditions that have been entered.		
	SRO	16. **Determine required notifications:** • **<u>REFER TO</u>** RP/0/A/5000/001 (Classification Of Emergency) • **<u>REFER TO</u>** RP/0/B/5000/013 (NRC Notification Requirements).

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Event Description: N-42 blown instrument fuse.

Time	Position	Applicant's Actions or Behavior
	BOP	17. **Notify Reactor Group Engineer of occurrence.**
	SRO	18. **<u>WHEN</u> the affected P/R channel is repaired, <u>THEN</u> ensure IAE returns the channel to service.**
	SRO	19. **Determine long term plant status. <u>RETURN</u> <u>TO</u> 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		

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Event Description: 1CF-55 (1D S/G Feed Reg Vlv) fails closed.

Time	Position	Applicant's Actions or Behavior
EVENT 4		
Indications:		1AD-4, B/4 'S/G D LEVEL DEVIATION' 1AD-4, C/4 'S/G D FLOW MISMATCH LO CF FLOW'
	RO	Place 1CF-55 (S/G D Feed Reg Vlv) in 'Manual' and throttle as necessary to control 1D 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. **IF AT ANY TIME S/G levels approaching:** • 83% N/R level (S/G HI-HI Level Turb Trip) **OR** • 11% N/R level (S/G LO-LO Level Rx Trip). **THEN**: a. Manually trip reactor. b. **GO TO** EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
	RO or BOP	2. **Verify the following:** • 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. **IF AT ANY TIME any CF main feed reg valve in manual, THEN ensure associated feed reg bypass valve in manual.**
Booth Operator will insert Trigger 7 for EVENT 5 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):** • IN AUTO • RESPONDING ADEQUATELY
	RO or BOP	5. **Verify all S/G CF control valves:** • IN AUTO • RESPONDING ADEQUATELY

Op Test No.: 301 Scenario # 4 Event # 4 Page 25 of 44

Event Description: 1CF-55 (1D S/G Feed Reg Vlv) fails closed.

Time	Position	Applicant's Actions or Behavior
CRITICAL TASK	RO or BOP	5. RNO **Perform the following for the affected S/G(s):** a. Ensure affected controller(s) – IN MANUAL. b. **IF AT ANY TIME** S/G level not on program, **THEN** adjust CF flow to obtain a slight trend in the appropriate direction. c. **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	6. **Verify the following:** • S/G level(s) - STABLE • S/G level(s) - APPROXIMATELY AT PROGRAM • Malfunction - CORRECTED.
	CREW	6. RNO **Perform the following:** a. Continue to control CF/SM D/P and S/G CF Flow rates to stabilize level in affected S/G(s) approximately at program level. b. **WHEN** all the following conditions met: • S/G level(s) - STABLE • S/G level(s) - APPROXIMATELY AT PROGRAM • Malfunction - CORRECTED. **THEN GO TO** Step 7. c. 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 4		

Op Test No.: 301	Scenario # 4	Event # 5	Page 26 of 44
Event Description: Controller for 1NV-172A (VCT LEVEL CTRL) fails Hi.			

Time	Position	Applicant's Actions or Behavior
EVENT 5		
Indications:		OAC pt C1Q0348 'VLV NV172A NC FILTER OTLT 3-WAY CTRL' - INTERMEDIATE
	BOP	Recognizes that 1NV-172A (3-WAY DIVERT TO VCT–RHT) has diverted to the RHT
	BOP	Places the control switch for 1NV-172A (3-WAY DIVERT TO VCT-RHT) to the VCT position.
NOTE TO EVALUATOR: The following steps are from the OAC alarm response for pt. C1Q0348 'VLV NV172A NC FILTER OTLT 3-WAY CTRL'		
	BOP	1. Check VCT Level
	BOP	2. **IF** VCT Level is high, **THEN** monitor NV-172A position.
	BOP	3. **WHEN** VCT Level returns to normal, **THEN** ensure NV-172A returns to the VCT position.
	BOP	4. Verify NV-172A control switch is in AUTO or position required by plant operation.
Booth Operator will insert Trigger 9 for EVENT 6 at the discretion of the lead examiner.		
END OF EVENT 5		

Op Test No.: 301 Scenario # 4 Event # 6 Page 27 of 44

Event Description: 1NC-36B (PZR PORV) fails open

Time	Position	Applicant's Actions or Behavior
EVENT 6		
NOTE TO EVALUATOR:		**1AD-13, F/5 'HVAC PANEL TROUBLE' alarms. BOP goes to the rear of the control boards to acknowledge the alarm. When the BOP depresses the acknowledge button, 1NC-36B (PZR PORV) will fail open.**
Indications:		1AD-6, E/10 'PZR PORV DISCH HI TEMP' 1AD-6, F/8 'PZR LO PRESS CONTROL' OAC pt C1Q0756 'VLV NC36B PZR POWER OPERATED RELIEF' - OPEN
	RO	Close 1NC-36B (PZR PORV)
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).**
	RO	1. **Verify all Pzr PORVs - CLOSED.**
CRITICAL TASK	RO	**1.** RNO **Perform the following:** a. Manually close Pzr PORV(s).
NOTE TO EVALUATOR:		**Step 1.b. of RNO does 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.**
NOTE TO EVALUATOR:		**Depending on how fast the RO responded to the PORV failure, the Pzr heaters may not be energized, however, the crew will determine that the step 3 RNO will not apply.**
	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.**

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Event Description: 1NC-36B (PZR PORV) fails open

Time	Position	Applicant's Actions or Behavior

	CREW	6. **WHEN NC pressure is stable, THEN:**
		• Stabilize unit at appropriate power level.
		• Adjust the following as required to maintain T-Avg within 1°F of T-Ref:
		  • Turbine load
		  • Control rods
		  • Boron concentration.

NOTE TO EVALUATOR:		**Step 7 does not apply.**
	SRO	8. **Ensure compliance with appropriate Tech Specs:** • 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 • 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 to within limits in 2 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.**
	SRO	9. **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 6		
Booth Operator will insert Trigger 15 for EVENT 7 at the discretion of the lead examiner.		

Op Test No.: 301	Scenario # 4	Event # 7	Page 29 of 44
Event Description: A tube leak develops on 1D S/G tube leak (25-350 gpm)			

Time	Position	Applicant's Actions or Behavior
EVENT 7		
Indications:		1RAD-1, B/1 '1EMF33 CSAE EXHAUST HI RAD' 1RAD-1, B/4 '1EMF-71 S/G A LEAKAGE HI RAD' 1RAD-1, E/7 '1EMF-74 S/G D LEAKAGE HI RAD' 1RAD-3, E/5 '1EMF 26,27,28,29 S/G A,B,C,D, STEAM LINE – 1EMF 29
	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. **IF** Pzr level stable OR increasing, **THEN GO TO** Step 3.

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Event Description: A tube leak develops on 1D S/G tube leak (25-350 gpm)

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	d. **IF** Pzr level continues to decrease, **THEN** perform the following: 1) Reduce letdown flow to 45 GPM as follows: a) **IF** 1NV-10A (Letdn Orif 1B Otlt Cont Isol) open, **THEN** perform the following: (1) Control 1NV-148 (Letdn Press Control) to establish letdown pressure between 375 - 400 PSIG. (2) THROTTLE 1NV-849 (Letdn Flow Var Orif Ctrl) for 45 GPM letdown flow. (3) **WHEN** 45 GPM letdown flow established, **THEN** adjust 1NV-148 (Letdn Press Control) to maintain letdown pressure at 350 PSIG. (4) **WHEN** letdown pressure is stable at 350 PSIG, **THEN** place 1NV-148 (Letdn Press Control) in auto.
	BOP	2) **IF** Pzr level continues to decrease, **THEN** ensure the following valves closed: • 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	4) **IF** Pzr level continues to decrease **OR** Pzr level cannot be maintained greater than 4%, **THEN** perform the following: a) Trip reactor. b) **WHEN** reactor tripped verified, **THEN** initiate S/I. c) **GO TO** EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
END EVENT 7		
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 # 8, 9 and 10	Page 31 of 44
Event Description:	1D S/G tube rupture, Main Turbine fails to trip on reactor trip, Train B of Phase A Isolation Signal fails to actuate.		

Time	Position	Applicant's Actions or Behavior
EVENTS 8, 9, AND 10		
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:** • All rod bottom lights - LIT • All reactor trip and bypass breakers - OPEN • I/R power - DECREASING.
	RO	3. **Verify Turbine Trip:** • All turbine stop valves - CLOSED
CRITICAL TASK	RO	3. RNO **Perform the following:** a. Trip turbine.
NOTE TO EVALUATOR: Step 3. RNO b. will not apply.		
END OF EVENT 9		
	BOP	4. **Verify 1ETA and 1ETB - ENERGIZED.**
	RO	5. **Verify S/I is actuated:** 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:** • **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:** a. Phase A "RESET" lights - DARK.
	BOP	9. a. RNO a. Initiate Phase A Isolation.
END OF EVENT 10		

Op Test No.: 301 Scenario # 4 Event # 8 Page 32 of 44

Event Description: 1D S/G tube rupture

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. **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%.
	BOP	12. **Verify all of the following S/I pumps - ON:** • 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:** • **REFER TO** 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.
	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) **GO TO** Step 18.
NOTE Spent Fuel Pool parameters should be monitored within 2 hours of event.		

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Event Description: 1D S/G tube rupture

Time	Position	Applicant's Actions or Behavior
	RO or BOP	18. **WHEN time and manpower permit, 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. b. **WHEN** at least one S/G N/R level is greater than 11% (29% ACC), **THEN** THROTTLE feed flow to maintain all S/G N/R levels between 11% (29% ACC) and 50%.
	RO	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.
	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:** • 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.

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Event Description: 1D S/G tube rupture

Time	Position	Applicant's Actions or Behavior
	CREW	26. RNO **IF any EMF trip 1 light is lit OR any S/G level is increasing in an uncontrolled manner, THEN concurrently:** • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). • **GO TO** 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)		

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Event Description: 1D S/G tube rupture

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:** • 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: • 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.**
CRITICAL TASK	RO	**4. Isolate steam flow from ruptured S/G(s) as follows:** a. Verify all ruptured S/G(s) PORV - CLOSED. b. Verify S/G(s) 1B and 1C - INTACT. c. Isolate blowdown and steam drain on all ruptured S/G(s) as follows: • S/G 1D 1) Close 1SM-74B (S/G 1D Otlt Hdr Bldwn C/V). 2) Verify the following blowdown isolation valves - CLOSED: a) 1BB-8A (S/G 1D Bldwn Cont Isol Insd). b) 1BB-147B (S/G 1D Bldwn Cont Isol Byp). c) 1BB-10B (S/G 1D Bldwn Cont Isol Otsd).
CRITICAL TASK	RO	**5. Close the following valves on all ruptured S/G(s):** • MSIV • MSIV bypass valve.

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Event Description: 1D S/G tube rupture

Time	Position	Applicant's Actions or Behavior
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 1D: 1) CLOSE 1CA-42B (CA Pmp B Disch To S/G 1D Isol). 2) CLOSE 1CA-38A (CA Pmp 1 Disch To S/G 1D Isol). c. **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.**
	BOP	**8. Verify any NC pump - ON.**
	BOP	**9. Verify Pzr pressure - GREATER THAN 1955 PSIG.**
NOTE • **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:** a. 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 16.**
	RO	b. Ensure ruptured S/G(s) isolated as follows: 1) Verify the following valves on all ruptured S/G(s) - CLOSED: • MSIV • MSIV bypass valves. 2) Verify S/G PORV on ruptured S/G(s) - CLOSED OR ISOLATED.
NOTE TO EVALUATOR: Step 10.b.3) will be N/A'd.		

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Event Description: 1D S/G tube rupture

Time	Position	Applicant's Actions or Behavior
	RO	c. Verify the condenser is available as follows: • "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT • MSIV on intact S/G(s) - OPEN. d. Verify steam dumps - IN PRESSURE MODE.
	RO	10.d. RNO Place steam dumps in pressure mode as follows: 1) Place "STM DUMP CTRL" M/A station in manual. 2) Adjust "STM DUMP CTRL" M/A station output to match "% STM DUMP DEMAND" (1SMP5211). 3) **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.
	RO	e. **WHEN** "P-12 LO-LO TAVG" status light (1SI-18) is lit, **THEN** place the steam dump interlock bypass switches in "BYP INTLK." f. Dump steam to condenser from intact S/G(s) at maximum rate while attempting to avoid a Main Steam Isolation.
	BOP	g. Verify main steam isolation blocked status lights (1SI-13) - LIT.
	BOP	10.g. RNO Perform the following: 1) Depressurize NC System to less than 1955 PSIG using one of the following: • Pzr spray OR • Pzr PORV. 2) **WHEN** "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) is lit, **THEN** perform the following: a) Depress ECCS steam pressure "BLOCK" pushbuttons. b) Verify main steam isolation blocked status lights (1SI-13) - LIT. 3) Maintain NC pressure less than 1955 PSIG.
	RO	h. **WHEN** core exit T/Cs are less than required temperature, **THEN** stabilize core exit T/Cs less than required temperature.

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Event Description: 1D S/G tube rupture

Time	Position	Applicant's Actions or Behavior
	RO	**11. Control intact S/G levels as follows:** a. Verify N/R level in all intact S/Gs - GREATER THAN 11% (29% ACC). b. Throttle feed flow to maintain all intact S/G N/R levels between 16% (29% ACC) and 50%.
	BOP	**12. Verify Pzr PORV and isolation valve status as follows:** a. Power to all Pzr PORV isolation valves - AVAILABLE. b. All Pzr PORVs - CLOSED. 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. (1D)**
	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.**

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Event Description: 1D S/G tube rupture

Time	Position	Applicant's Actions or Behavior
	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.
	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: • Spray valves not effective in reducing NC pressure OR • Ruptured S/G(s) NR level approaching 83% (75% ACC). d. Do not continue until at least one of the following conditions satisfied: • Both of the following: • NC pressure - LESS THAN RUPTURED S/G(s) PRESSURE • Pzr level - GREATER THAN 11% (30% ACC) OR • Both of the following: • NC pressure - WITHIN 300 PSIG OF RUPTURED S/G(s) PRESSURE • Pzr level - GREATER THAN 41% (50% ACC) OR • Pzr level - GREATER THAN 68% (50% ACC) OR • 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

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Event Description: 1D S/G tube rupture

Time	Position	Applicant's Actions or Behavior
	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.**
	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: • 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: • 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: • 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.

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Event Description: 1D S/G tube rupture			

Time	Position	Applicant's Actions or Behavior
CRITICAL TASK	BOP	25. **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. Ensure the following valves - OPEN: • 1NV-203A (NV Pumps A&B Recirc Isol) • 1NV-202B (NV Pmps A&B Recirc Isol). c. Close the following valves: • 1NI-9A (NV Pmp C/L Inj Isol) • 1NI-10B (NV Pmp C/L Inj Isol).
END OF EVENT 8		
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. 077
ATTACHMENT 4 –	OP/1B/6300/001 Enclosure 4.2 (Load Changing), Rev. 099
ATTACHMENT 5 –	AP/1/A/5500/041 Enclosure 2 (Allowable KF Flowrates), Rev. 007
ATTACHMENT 6	AP/1/A/5500/041 Enclosure 3 (Placing KF In Service) Rev. 007
ATTACHMENT 7 –	AP/1/A/5500/041 Enclosure 4 (VF Filter Mode Verification), Rev. 007
ATTACHMENT 8	AP/1/A/5500/041 Enclosure 5 (Control Room Ventilation System Verification, Rev. 007
ATTACHMENT 9 –	AP/1/A/5500/016 Enclosure 1 (P/R Bistables That Must Be Tripped), Rev. 027
ATTACHMENT 10 –	Annunciator Response for 1RAD-1, B/1 (1EMF-33 CSAE EXHAUST HI RAD), Rev. 064
ATTACHMENT 11 –	AP/1/A/5500/010 Enclosure 1 (Case I Steam Generator Tube Leak Foldout Page)
ATTACHMENT 12 –	EP/1/A/5000/E-0 Enclosure 1 (Foldout Page), Rev. 041
ATTACHMENT 13 –	EP/1/A/5000/E-0 Enclosure 2 (Ventilation System Verification), Rev. 041
ATTACHMENT 14 –	EP/1/A/5000/E-0 Enclosure 4 (NC Temperature Control), Rev. 041
ATTACHMENT 15 –	EP/1/A/5000/E-3 Enclosure 1 (Foldout Page), Rev. 043
ATTACHMENT 16 –	EP/1/A/5000/E-3 page 23 (Step 10 table)

ATTACHMENT 1

CREW CRITICAL TASK SUMMARY			
SAT	**UNSAT**	**CT #**	**CRITICAL TASK**
		C-1	Isolate feed/steam to/from ruptured S/G before a transition to ECA-3.1.
		C-2	Terminate S/I before water release occurs from the ruptured S/G PORV or safety.
		C-3	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.
		C-4	Manually close Pzr PORV or isolation valve prior to ESF actuation or Rx trip.
		C-5	Manually control feedwater to prevent reaching an S/G Hi Hi level Turbine trip or Lo Lo level Rx trip.

Comments:

ATTACHMENT 2

SHIFT TURNOVER INFORMATION

Unit 1 Status

Power Level	Power History	NCS Boron	Xenon
100%	EOL	90 PPM	per OAC

Controlling Procedure

- 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

- The 1B LH pump is out of service. Letdown flow has been increased to 100 gpm for NC System cleanup in preparation for the upcoming outage. Direction for the crew is to decrease power per the reactivity management plan to ~95% in preparation for Main Steam Safety Valve testing.

NEOs Available

Six NEOs are available as listed on the status board

METEOROLOGICAL CONDITIONS

- 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.