Final Submittal

CATAWBA EXAM 2003-301

50-413 & 50-414

March 31 - April 4 &
April 10, 2003

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

Simulation Facility: Catawba **Scenario No.:** NRC-1 **Op-Test No:**

Examiners: _____ Operators: _____

_____ _____

_____ _____

Objectives: To evaluate the applicants' ability to decrease power using the Rapid Downpower procedure (AP/09) while maintaining Tave matched to Tref, and to use AOPs to respond to a pressurizer spray valve failing open, reactor coolant (NC) Loop "C" T-cold indication fails high resulting in rod motion, a loss of the component cooling water to the non-essential headers due to a failed surge tank level transmitter and a loss of condenser vacuum. The applicants will be evaluated using EOPs to respond to a loss of all feedwater to the steam generators resulting in a loss of secondary heat sink, with a success path via emergency procedure FR-H.1 where the turbine driven auxiliary feedwater pump will be returned to service.

Initial Conditions: 100% power, BOL, Equilibrium Xe.
NCS Boron Concentration **841** ppm.

Turnover: CA pump 1A is out of service for routine maintenance. It is due to be returned to service in 24 hours.

NS pump 1A is out of service for motor replacement. It is due to be returned to service in **24** hours.

Valve 1NC-31B was just closed due to leakage by PORV 1NC-32B. An R&R is being developed.

The Operations Duty manager has instructed you to reduce load within 2 hours to 65% at 20% per hour in accordance with AP/1/A/5500/09 due to chemistry concerns for a leak in 1B feedwater pump turbine condenser tube.

Event No.	Malf. No.	Event Type*	Event Description
1		R-BOP	Borate for power decrease
2		N-RO	Decrease power from 100% using AP/09
3	MAL-IPE003C = 100	C-BOP	Pressurizer Spray Valve NC-29 fails open with manual control available.
4	XMT-NC065 = 630	I-RO	NC Loop 1C Narrow range Cold Leg Temperature fails high.

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

Event No.	Malf. No.	Event Type*	Event Description
5	XMT-KC046 = 0 XMT-KC008 = 0	C-BOP	KC Surge Tank Level Transmitter fails low resulting in the loss of the **Auxiliary** Building and Reactor Building non-essential headers.
6	MAL-MT003 = 15	C-RO	Loss **of** condenser vacuum
7		M-ALL	Reactor trip due to loss of vacuum
8	MAL-CA004B = BOTH	C-RO	**CA** pump 1B fails to start (50G relay)
9	MAL-CA005 = 0	C-BOP	CAPT trips on mechanical overspeed resulting in loss of heat sink
10	OVR-NV022C =OFF	C-BOP	1NV-37A fails to position during NC system depressurization.

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

Event Description: Boration for power decrease

Time	Position	Applicant's Actions or Behavior
	SRO/ BOP	Per AP/1/A/5500/09 (Rapid Downpower) Step 12.d. directs BOP to borate the NC System as required referring to ROD book, Section 4.8.
AP/09 Step 12.d.		**NOTE** • The boric acid added to the NC System should be added in several increments. • The boric acid added to the NC System should be added only during the first hour of the downpower event. Borate the NC System as required. REFER TO R.O.D. book Section **4.8.**
	SRO	Directs BOP to determine amount of boron to add to begin the load change and provides guidance that the boration should be done in several batches (–455 gallons over the first hour).
	BOP	Determines amount of boron to add (–455 gallons over first hour).
	BOP	Refer to OP/1/A/6150/009 (Boron Concentration Control)
Step 2.2 Step 2.3	BOP	Ensure the following valve control switches in "AUTO': • 1NV-238A (B/A Xfer Pmp To Blender Ctrl) • 1NV-186A (B/A Blender Otlt To VCT Otlt)
Step 2.3 Step 2.4	BOP	Adjust the boric acid batch counter to the desired volume of boric acid to be added.
Step 2.4	BOP	Place the "NC MAKEUP MODE SELECT" switch in "BORATE.
Step 2.5	BOP	Adjust the controller for 1NV-238A (B/A Xfer Pmp to Blender Ctrl) controller to the desired flow.
Step 2.6	BOP	Ensure 1NV-238A (B/A Xfer Pmp to Blender Ctrl) controller in "AUTO'.
Step 2.7	BOP	**NOTE:** If necessary, boration can be manually secured at any time by placing the "NC MAKEUP CONTROL" switch to the "STOP position. Ensure at least one boric acid transfer pump in "AUTO or "ON".
Step 2.8	BOP	Place the "NC MAKEUP CONTROL" switch in "START" position.

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

Event Description: Boration for power decrease

Time	Position	Amlicant's Actions or Behavior
Step 2.9	BOP	Verify the following valves open: • 1NV-238A (B/A Xfer Pmp To Blender Ctrl Vlv) • 1NV-186A (B/A Blender Otlt To VCT Otlt)
Step 2.10	BOP	If in "AUTO, verify the boric acid transfer pump starts.
Step 2.11	BOP	Verify proper flow by observing the boric acid flow totalizer.
Step 2.12	BOP	When the desired volume of boric acid is reached on the boric acid batch counter, ensure the following valves close: • 1NV-238A (B/A Xfer Pmp To Blender Ctrl Vlv) • 1NV-186A (B/A Blender Otlt To VCT Otlt)

Step 2.13	BOP	IF desired, flush the makeup line as follows:
		• Open the following valves:
		  • 1NV-242A (RMWST To B/A Blender Ctrl)
		  • 1NV-186A (B/A Blender Otlt To VCT Otlt)
		• Ensure one reactor makeup water pump is in "ON.
		• **WHEN** ~20 gallons of makeup water have been flushed through the makeup line, close the following valves:
		  • 1NV-242A (RMWST To B/A Blender Ctrl)
		  • 1NV-186A (B/A Blender Otlt To VCT Otlt)
		• Place the following valve control switches in "AUTO:
		  • 1NV-242A (RMWST To B/A Blender Ctrl)
		  • 1NV-186A (B/A Blender Otlt To VCT Otlt)
		• **IF NOT** required for current plant operation, place the reactor makeup water pump started in earlier step in "AUTO.

Step 2.14	BOP	IF automatic makeup is desired, refer to Enclosure 4.1 (Automatic Makeup).

Op-Test No.: NRC Scenario No.: 1 Event No.: 2

Event Description: Turbine load reduction for power decrease using AP/09.

Time	Position	Applicant's Actions or Behavior
Step 1	ALL	Monitor Enclosure 1 (Foldout Page).
Step 2	SRO	Determine required notifications: • REFER TO RP/0/A/5000/001 (Classification Of Emergency) • REFER TO RP/0/A/5000/013 (NRC Notification Requirements).
Step 3	ALL	IF AT ANY TIME prompt separation from the grid is required, THEN GO TO Step **24.**
Step 4	SRO	IF load reduction is due to grid instability, THEN perform the following: **...** Determines that the load reduction **is** not due to grid instability and that the step does not apply. SRO continues to Step 5.
Step 5	SRO	Verify the following load reduction criteria - KNOWN: • Time required to reduce load • Target load power level Determines from turnover that the time required to reduce load is 2 hours and the target is 65% (Approximately 780 MW).
Step ***6***	SRO	Verify time required to reduce load - GREATER THAN **OR** EQUAL TO 15 MINUTES. Determines that time required to reduce load is 2 hours.
Step 7	SRO	Determine the required power reduction rate (MW/min) from the table below: Determines from the table that the requires rate is approximately 3.5 MW/min.
Step 8	SRO	Determine the target load from the table below: Determines the target load to be approximately 780 MW.

Op-Test No.: NRC Scenario No.: 1 Event No.: 2

Event Description: Turbine load reduction for power decrease using AP/09.

Time	Position	Applicant's Actions or Behavior
Step 9	RO	Initiate turbine load reduction as follows: **NOTE** o Any load reduction rate of greater than 25 MW/Min must be performed in the "MANUAL" mode. o Unloading rates greater than 60 MW/Min (5%/minute) will meet C-7A interlock and may result *in* steam dump actuation. a. Verify automatic turbine load reduction – DESIRED. b. Enter the desired "LOAD RATE on the turbine control panel. c. Enter the desired "TARGET" on the turbine control panel. d. Depress the "GO pushbutton on the turbine control panel. e. Verify turbine load – DECREASING AS REQUIRED. f. IF AT ANY TIME the turbine controls fail respond properly, THEN perform Step 9.e.
Step 10	RO	IF AT ANY TIME the turbine load reduction rate OR the target load must be changed, THEN RETURN TO Step *5.*
Step 11	RO	Adjust power factor as necessary. REFER TO Unit 1 Revised Data Book Figure 43.
Step 12	RO	Attempt to control T-Avg as follows: a. Verify T-Ref instrumentation – AVAILABLE. b. Verify control rods - IN AUTO AND STEPPING IN. c. Maintain T-Avg greater than or equal to 551°F.
Step 12 d	BOP	**NOTE** • The boric acid added to the NC System should be added in several increments. • The boric acid added to the NC System should be added only during the first hour of the downpower event. d. Borate the NC System as required. REFER TO R.O.D. book Section **4.8.**
Step 12.e.	ALL	Ensure operator monitors Enclosure 2 (Rod Insertion Limit Boration).

Op-Test No.: NRC Scenario No.: **1** Event No.: **2**

Event Description: Turbine load reduction for power decrease using AP/09.

Time	Position	Applicant's Actions or Behavior
Step 13	BOP	Verify Pzr PORV and Pzr spray valve status as follows: a. All Pzr PORVs - CLOSED. **b.** Normal Pzr spray valves - CLOSED.
Step 14	BOP	Operate RC pumps and fans as necessary to maintain RC temperature greater than 60°F. REFER TO OP/1/B/6400/001A (Condenser Circulating Water System).
Step 15	RO	Verify reactor power - LESS THAN 85%. Determines that reactor power is greater than 85% and informs SRO.
	SRO	Transitions to Step 15 RNO and directs actions.
Step 15 RNO	ALL	IF the target load is less than 85%, THEN: 1) WHEN time and personnel permit, THEN perform applicable steps of OP/1/A/6100/003 (Controlling Procedure For Unit Operation). 2) Do not continue in this procedure until reactor power is less than 85%. 3) WHEN reactor power is less than 85%, THEN GO TO Step 16. **EXAMINER NOTE: The crew may not reduce power past 85%. If power is less than 85% at this point, the crew will proceed to Step 16.**
Step 16	BOP	Dispatch operator to secure both C-Htr drain pumps. REFER TO OP/1/B/6250/004 (Feedwater Heater Vents, Drains and Bleed System). Dispatches operator to secure "C" heater drain pumps.
Step 17	BOP	Align AS supply to the CF pumps as follows: a. Adjust 1AS-2 (Main Stm To Aux Steam) as necessary to maintain AS header pressure 165 PSIG. **b.** Ensure 1AS-12 (AS To CFPT Isol) - OPEN. c. Dispatch operator to close 1SP-3 (SC To CFPT 1A & 1B) (TB-640, 1G-24). **EXAMINER NOTE: The crew should not have sufficient time to reduce power to this point.**

Op-Test No.: NRC Scenario No.: 1 Event No.: 3

Event Description: Pressurizer spray valve 1NC-29 fails open with manual control available.

Time	Position	Applicant's Actions or Behavior
	BOP	Recognize 1NC-29 is open and inform SRO.
	SRO	Enter AP/1/A/5500/11 (Pressurizer Pressure Anomalies) Case I (Pressurizer Pressure Decreasing) and direct actions.
		EXAMINER NOTE: Steps 1 and 2 are Immediate Action steps and are required to be performed from memory.
Step 1 Step 1	BOP	Verify all Pzr pressure channels – INDICATING THE SAME. BOP informs SRO that all channels indicate the same.
Step 2 Step 2	BOP	Verify all Pzr PORVs - CLOSED. BOP informs SRO that all Pzr PORVs are closed.
Step 3	BOP	Verify Pzr spray valve(s) - CLOSED. BOP informs SRO that 1NC-29 is open.
	SRO	Transitions to Step 3 RNO and directs actions.
Step 3.a RNO	BOP	Perform the following: a. Manually close affected spray valve(s). BOP closes 1NC-29 manually and informs SRO.
Step 3.b.	SRO	**b. IF** affected spray valve(s) will not close, **THEN** perform the following: Determines that this step does not apply and transitions to Step **4** A/ER.
Step **4**	BOP	Verify all Pzr heaters – ENERGIZED. Informs SRO that all heaters are energized.
Step 5	BOP	Ensure 1NV-37A (NV Supply To Pzr Aux Spray) - CLOSED. Checks that 1NV-37A is closed and informs SRO.
Step ***6***	RO/BOP	Verify NC pressure - STABLE OR INCREASING. Informs **SRO** that pressure is increasing.
Step 7	SRO/BOP	• IF a Pzr pressure channel is failed high, THEN **...** Determines that step does not apply and continues to Step ***8.***

Op-Test No.: NRC Scenario No.: 1 Event No.: 3

Event Description: Pressurizer spray valve 1NC-29 fails open with manual control available.

Time	Position	Applicant's Actions or Behavior
Step 8	SRO	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). Determines that none apply for the spray valve failure.
Step 9	BOP	Ensure "PZR PRESS REC SELECT" is selected to an operable channel. BOP informs SRO that an operable channel is selected.
Step 10	SRO	Determine long term plant status. RETURN TO procedure in effect. Crew may contact Shift Work Manager and/or SPOC for assistance.

Op-Test No.: NRC Scenario No.: 1 Event **No.: 4**

Event Description: Channel NC Loop 1°C' narrow range cold leg temperature instrument fails high.

Time	Position	Amlicant's Actions or Behavior
		EXAMINER NOTE: Ensure control rods are in "AUTO" prior to initiating this event.
		EXAMINER NOTE: The following Annunciator Response Procedures may be referred to during this event. Copies are attached at the end of the scenario. 1AD-2 A/4; 1AD-6 N6; B/6 and C/6.
	RO	Recognize failure of Loop 1C narrow range cold leg temperature instrument and inform SRO.
		EXAMINER NOTE: The crew may respond to this event by taking control rods to manual and by utilizing guidance contained in the Annunciator Response procedures. This is an acceptable alternative. The following steps outline the actions the crew will perform if they implement AP/1/A/5500/015 (Rod Control Malfunction) Case II.
		EXAMINER NOTE: Steps 1 and 2 are Immediate Action steps and are required to be performed from memory.
	SRO	Enter AP/1/A/5500/015 (Rod Control Malfunction) Case 2 (Continuous Rod Movement) and direct actions.
Step 1	RO	Ensure "CRD **BANK** SELECT" switch – IN MANUAL. **Places** Rod Control selector switch to manual.
Step 2 Step 2	RO	Verify all rod motion - STOPS. Observes control rod bank demand counters and DRPI to determine rod motion has stopped and informs SRO.
Step 3	RO	Manually adjust control rods as necessary to maintain T-Avg within 1°F of T-Ref. Adjusts control rod position as required.
Step 4	ALL	Determine and correct cause of continuous rod movement. Crew may contact Shift Work Manager and/or SPOC for assistance.

Op-Test No.: NRC Scenario No.: 1 Event No.: **4**

Event Description: Channel NC Loop 1" C narrow range cold leg temperature instrument fails high.

Time	Position	Applicant's Actions or Behavior
Step 5	SRO	Ensure compliance with appropriate Tech Specs: • 3.1.1 (Shutdown Margin (SDM)) • 3.1.4 (Rod Group Alignment Limits) • 3.1.5 (Shutdown Bank Insertion Limits) • 3.1.6 (Control Bank Insertion Limits) • 3.3.2 (ESFAS Instrumentation). Determines that 3.3.1 and 3.3.2 apply.
Step 6	SRO	Determine required notifications: • REFER TO RP/0/A/5000/001 (Classification Of Emergency) • REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
Step 7	SRO	Determine long term plant status. RETURN TO procedure in effect.

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

Event Description: KC Surge Tank Level Transmitter fails low resulting in the isolation of the Auxiliary Building and Reactor Building Non-essential headers.

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes loss of 1B KC surge tank level indication and isolation of the Auxiliary Building and Reactor Building Non-essential headers and informs SRO.
	SRO	SRO refers to AP/1/A/5500/21 and directs actions.
	ALL	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.
Step 1 Step 1	ALL	Monitor Enclosure 1 (Foldout Page).
Step 2	BOP	Verify at least one KC pump – ON
Step 3	ALL	IF AT ANY TIME all KC pumps are lost, THEN RETURN TO STEP 2.
Step 4	BOP	Verify both KC surge tank levels – 50% to 90% and STABLE. **EXAMINER NOTE: The crew may go to Step 4 RNO due to the fact that the B KC surge tank was previously indicating low. The booth operator will have cleared the failure of the surge tank level transmitter by this time and surge tank level indication will have returned to normal.**
Step 5	BOP	Start additional KC pump(s) as necessary to supply any KC loads presently in service.
	ALL	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.
Step 6	BOP	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. Determines that annunciators are LIT and informs SRO.
	SRO	Transitions to Step 6 RNO and directs actions.

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

Event Description: KC Surge Tank Level Transmitter fails low resulting in the isolation of the Auxiliary Building and Reactor Building Non-essential headers.

Time	Position	Applicant's Actions or Behavior
Step ***6*** RNO	BOP	Perform the following: a. Ensure the following valves - OPEN: • 1KC-425A (NC Pumps Ret Hdr Cont Isol) • 1KC-338B (NC Pumps Sup Hdr Cont Isol) • 1KC-424B (NC Pumps Ret Hdr Cont Isol). Determines that valves are open and informs **SRO.**
Step 6 RNO	ALL	b. IF AT ANY TIME any of the following conditions are met: • Time since loss of KC – GREATER THAN 10 MINUTES OR • Any NC pump trip criteria from Enclosure 1 (Foldout Page) is met. • THEN... Determines that none of the conditions exist.
	SRO	Transitions to Step 7 A/ER and directs actions.
Step 7.a	BOP	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).
Step 7.b.	BOP	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). Determines that all 4 valves are closed and informs SRO.
	SRO	Transitions to Step **7.b.** RNO and directs actions.

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

Event Description: KC Surge Tank Level Transmitter fails low resulting in the isolation of the

Time	Position	Applicant's Actions or Behavior
Step 7.b. RNO	BOP	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. a. WHEN OAC alarm C1D2214 (KC Train B Low-Low Surge Tank Isol) is "NOT ACTUATED, THEN ensure the affected valves are open. Tank Isol) *is* "NOT ACTUATED and informs SRO.
	SRO	Directs BOP to open the following valves: • 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	Opens the following valves: • 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). Informs SRO when all valves are open.
	SRO	Transitions to Step 7.c. A/ER and directs actions.
Step 7.c.	BOP	c. Start additional KC pump(s) as necessary to supply any KC loads presently in service. Determines additional KC pumps are not needed and informs SRO.
Step 8.a	BOP	Verify KC surge tank levels normal as follows: a. Verify both KC surge tank levels - 50% - 90% AND STABLE.
Step 8.b	SRO	**b.** GO TO Step12. SRO transitions to Step 12 A/ER and directs actions.
Step 12	BOP	Ensure KC heat exchanger outlet mode switches - PROPERLY ALIGNED.
Step 13	ALL	Determine and correct cause of loss of KC. Crew may contact Shift Work Manager and/or SPOC for assistance.

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

Event Description: KC Surge Tank Level Transmitter fails low resulting in the isolation of the Auxiliary Building and Reactor Building Non-essential headers.

Time	Position	Applicant's Actions or Behavior
Step 14	SRO	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). Determines that none apply.
Step 15	SRO	Determine required notifications: • REFER TO RP/0/A/5000/001 (Classification Of Emergency) • REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
Step 16	ALL	IF KC Hx leak to RN is suspected, THEN... Determines no KC heat exchanger leak to RN is suspected.
Step 17	BOP	Verify KC surge tanks level as follows: • Greater than 50% • Stable or increasing.
Step 18	BOP	WHEN plant conditions permit, THEN return KC pumps to normal operation. REFER TO OP/1/A/6400/005 (Component Cooling System). No additional action. KC alignment is normal at this point.
Step 19	RO	Verify 1AD-7, F/3 "LETDN HX OUTLET HI TEMP" - DARK. **EXAMINER NOTE: 1AD-7, F/3 may be LIT at this point. If so, the SRO will transition to the Step 19 RNO and direct actions.**
Step 20	RO	IF desired to restore letdown flow through the NV demineralizers, THEN momentarily place 1NV-153A (Letdn Hx Otlt 3-Way Vlv) to the "DEMIN" position and return to "**AUTO**".
Step 21	SRO	Determine long term plant status. RETURN TO procedure in affect.

Op-Test No.: NRC Scenario No.: 1 Event No.: 6

Event Description: Loss of condenser vacuum.

Time	Position	Applicant's Actions or Behavior
		EXAMINER NOTE: The following Annunciator Response Procedures may be referred to during this event. Copies are attached at the end of the scenario. 1AD-2 A/9 and B/9
	BOP	Recognize symptoms of condenser vacuum decreasing and inform SRO.
	SRO	Enter AP/1/A/5500/23 (Loss of Condenser Vacuum) and direct actions.
Step 1	ALL	Monitor Enclosure 1 (Foldout Page).
Step 2	RO	Manually decrease turbine load to preserve vacuum as follows: NOTE: In "MANUAL" mode, the control valves are capable of full travel within 3 minutes. a. Select "MANUAL" on turbine control panel. b. Depress "CONTROL VALVES LOWER" pushbutton and reduce turbine load as required. c. Refer To AP/1/A/5500/09 (Rapid Downpower) as time and manpower permit.
		EXAMINER NOTE: The vacuum leak will initially be set at 15% of the malfunction range and then will be increased to 100% of the malfunction range when step 1 of the AP is read. It is not expected that the crew will reach the end of this procedure before reactor trip/turbine trip is required.
Step 3	BOP	Verify proper RC System operation as follows: a. Verify average condenser inlet temperature OAC point C1P1493 1 C1 & C2 Average RC Inlet Temp) - LESS THAN 90°F b. Verify 1AD-8, B/4 "COOLING TOWER BASIN HI/LO LEVEL" - DARK.
Step 4	BOP	Ensure proper operation of ZP System. REFER TO OP/0/B/6250/011 (Vacuum Priming System).
Step 5	BOP	Verify steam pressure to CSAE – GREATER THAN 110 PSIG.
Step 6	RO	Dispatch operator to place idle set of CSAE jet(s) in operation. REFER TO OP/1/B/6300/006 (Main Vacuum).
Step 7	RO	Verify steam seal header pressure - BETWEEN 3 PSIG - 5 PSIG.

Time	Position	Applicant's Actions or Behavior
Step *8*	BOP	Dispatch operator(s) to verify proper seal trough flows. REFER TO Enclosure *2* (Verification Of Seal Flows).
Step *9*	BOP	Dispatch operator to ensure CFPT seal system and water boxes operating properly. REFER TO Enclosure 3 (CFPT Stm Seal And Waterbox Vent Verification).
Step 10	RO	Verify condenser vacuum status as follows: a. Condenser vacuum - STABLE OR INCREASING. Determines condenser vacuum is decreasing and informs SRO.
	SRO	Transitions to Steo 10.a. RNO.
Step 10.a.I) RNO	BOP	a. Perform the following: 1) Dispatch operator to place main vacuum pump(s) in service. REFER TO Enclosure 4 (Placing Main Vacuum Pumps in Service).
Step 10.a.2) **RNO**	SRO	*2)* GO TO Step 11. Transitions to Step 11 A/ER and directs actions.
Step 11	ALL	Determine and correct cause of loss of vacuum. Crew may contact Shift Work Manager and/or SPOC for assistance.
Step 12	SRO	Determine required notifications: • REFER TO RP/0/A/5000/001 (Classification Of Emergency) • REFER TO RP/0/B/5000/013 (NRC Notification Requirements). Determines none are required at this time. **EXAMINER NOTE: This assumes that the reactor and turbine have not yet tripped.**
Step 13	SRO	Determine long term plant status. RETURN TO procedure in affect.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9

Event Description: Reactor trip/turbine trip due to loss of condenser vacuum. CA pump 1B fails to start. Turbine driven CA pump trips on mechanical overspeed. Loss of all auxiliary feedwater results in loss of secondary heat sink. Auxiliary Pzr spray will not be available resulting in NCS depressurization using Pzr PORV.

Time	Position	Applicant's Actions or Behavior
		EXAMINER NOTE: Reactor trip is going to be required due to the loss of condenser vacuum and >69% power in Event 6. **NOTE: The crew will be informed that the CAPT Trip and Throttle Valve is reset 5 minutes after an operator is dispatched but not prior to entry into FR-H.l.**
	SRO	Directs RO to trip the reactor.
	RO	Trips Reactor.
	RO/BOP	Perform Immediate Actions of E-0 from memory (steps 2-5).
	SRO	Enter EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) and direct actions of operators.
Step 1	RO/BOP	Monitor Enclosure 1 (Foldout Page)
Step 2	RO	Verify Reactor Trip: • All rod bottom lights – LIT • All reactor trip and bypass breakers – OPEN • I/R amps – DECREASING
Step 3	RO	Verify Turbine Trip: • All turbine stop valves – CLOSED
Step 4	BOP	Verify 1ETA and 1ETB – ENERGIZED.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9

Event Description: Reactor trip/turbine trip due to loss of condenser vacuum. CA pump 1B fails to start. Turbine driven CA pump trips on mechanical overspeed. Loss of all auxiliary feedwater results in loss of secondary heat sink. Auxiliary Pzr spray will not be available resulting in NCS depressurization using Pzr PORV.

Time	Position	Applicant's Actions or Behavior
Step 5.a	BOP	Verify S/I is actuated: a. "SAFETY INJECTION ACTUATED status light (1SI-13) – LIT Observes status liaht is DARK and informs SRO.
	SRO	Transitions to Step 5.a RNO and directs BOP
Step 5.a.1) RNO	BOP	a. Perform the following: 1) Verify conditions requiring S/I: • Pzr pressure-LESS THAN 1845 PSIG . OR • Containment pressure-GREATER THAN 1.2 PSIG Determines safety injection is not required and informs SRO.
Step 5.a.2) RNO	SRO	2) IF S/I is required, THEN manually initiate S/I. SRO determines this step to be N/A.
Step 5.a.3) RNO	SRO	3) IF S/I is not required, THEN concurrently: • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). • GO TO EP/1/A/5000/ES-0.1 (Reactor Trip Response) Transitions to EP/1/A/5000/ES-0.1 (Reactor Trip Response) and directs actions.
		EXAMINER NOTE: The CSF Status Tree for HEAT SINK will change to a RED status after entry into EP/1/A/5000/ES-0.1 at various times based on the rate of progress through the procedure. **When transition occurs skip forward to the * step on page 23.**
Step 1	**ALL**	**1.** Monitor Enclosure 1 (Foldout Page).

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9

Event Description: Reactor trip/turbine trip due to loss of condenser vacuum. CA pump 1B fails to start. Turbine driven CA pump trips on mechanical overspeed. Loss of all auxiliary feedwater results in loss of secondary heat sink. Auxiliary Pzr spray will not be available resulting in NCS depressurization using Pzr PORV.

Time	Position	Applicant's Actions or Behavior
Step 2	BOP	2. Verify the following: • All 6.9 KV busses – ENERGIZED • VI pressure - GREATER THAN *85* PSIG
Step 3	RO	Announce "Unit 1 Reactor Trip".
Step 4	SRO	Implement RP/0/A/5000/01 (Classification of Emergency).
	ALL	NOTE Enclosure 2 (NC Temperature Control) shall remain in effect until subsequent steps provide alternative NC temperature control guidance.
Step 5	RO	Control NC temperature. REFER TO Enclosure 2 (NC Temperature Control).
Step 6	RO	Verify feedwater status as follows: a. T-Avg - LESS THAN **564°F.** b. All Feedwater Isolation status lights (1SI-5) – LIT. c. Total feed flow to S/G(s) - GREATER THAN **450** GPM. Determines that total feed flow is 0 and informs SRO.
		EXAMINER NOTE: No feedwater will be available at this point and the crew will eventually meet the criteria to transition to FR-H.1 (Response to Loss of Secondary Heat Sink).
	SRO	Transitions to 6.c RNO and directs actions.
Step 6.c RNO	BOP	c. Establish feed flow to maintain at least one S/G N/R level greater that 11% OR total feed flow greater than **450** GPM using one of the following: • CA pumps OR • Main Feedwater System. REFER TO OP/1/A/6250/001 (Condensate and Feedwater System)

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9

Event Description: Reactor trip/turbine trip due to loss of condenser vacuum. CA pump 1B fails to start. Turbine driven CA pump trips on mechanical overspeed. Loss of all auxiliary feedwater results in loss of secondary heat sink. Auxiliary Pzr spray will not be available resulting in

Time	Position	Applicant's Actions or Behavior
		EXAMINER NOTE: The crew may choose to refer to AP/1/A/5500/06 (Loss of S/G Feedwater) at this point to attempt to restore a source of feedwater and/or may choose to attempt to start available CA pumps at this point.
Step 7	RO	Verify adequate shutdown margin as follows: a. DRPI indication - AVAILABLE. b. All control and shutdown rods - FULLY INSERTED. c. All NC T-Colds - GREATER THAN 535°F.
	BOP	d. Stop any boron dilutions in progress.
Step 8	BOP	Verify proper Pzr level control as follows: a. Pzr level - GREATER THAN 17%. b. Charging and letdown - IN SERVICE. c. Pzr level - TRENDING TO "PZR REF LEVEL".
Step 9	RO	Verify proper Pzr pressure control as follows: a. Pzr pressure - GREATER THAN 1845 PSIG. b. Pzr pressure - STABLE AT OR TRENDING TO 2235 PSIG.
Step 10	RO	Control S/G levels as follows: a. Verify N/R level in all S/Gs - GREATER THAN 11%. b. Throttle feed flow to maintain all S/G N/R levels between 11% and 50%.

Step 11	BOP	Verify all AC busses are energized by offsite power as follows:
		• ATrain:
		  • "FTA B/O NORM FDR FRM ATC" - CLOSED
		  • "D/G 1A BKR TO ETA" - OPEN
		  • 1ETA - ENERGIZED.
		• B Train:
		  • "FTB B/O NORM FDR FRM ATD" - CLOSED
		  • "D/G 1B BKR TO ETB" - OPEN
		  • 1ETB - ENERGIZED.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9

Event Description: Reactor trip/turbine trip due to loss of condenser vacuum. CA pump 1B fails to start. Turbine driven CA pump trips on mechanical overspeed. Loss of all auxiliary feedwater results in loss of secondary heat sink. Auxiliary Pzr spray will not be available resulting in NCS depressurization using Pzr PORV.

Time	Position	Amlicant's Actions or Behavior
Step 12	RO	Transfer condenser steam dump to pressure control mode as follows: a. Verify "C-9 COND AVAILABLE FOR STM DUMP" status light (1SI-18) - LIT. b. Verify all MSIVs - OPEN. c. Ensure "STM DUMP CTRL" pot – SET AT 8.43 (1090 PSIG STEAM HEADER PRESSURE). d. WHEN the steam dump valves are closed, THEN: 1) Reset C-7A and C-7B. 2) Place "STM DUMP CTRL" in manual. 3) Adjust the "STM DUMP CTRL" to 0% "STM DUMP CTRL" demand. 4) Place the steam dumps in pressure mode. 5) Place the "STM DUMP CTRL" in automatic.
Step 13	BOP	Verify at least one NC pump – ON.
Step 14	RO	Determine status of N/Is as follows: a. Verify I/R channels - LESS THAN 10-10 AMPS. **EXAMINER NOTE: Based on reader progress through the procedure the I/R channels may *or* may not be < 10-10 AMPS. If they are not, then continue, if they are, then skip to step 15.**
	SRO	Transitions to Step 14 RNO and directs actions.
Step 14 RNO	RO	a. Perform the following: 1) WHEN I/R channels are less than 10-10 Amps, THEN perform Steps 14.b and 14.c. 2) GO TO Step 15.
STEP 15	ALL	Maintain stable plant conditions as follows: a. Pzr pressure at 2235 PSIG.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9

Event Description: Reactor trip/turbine trip due to loss of condenser vacuum. CA pump 1B fails to start. Turbine driven CA pump trips on mechanical overspeed. Loss of all auxiliary feedwater results in loss of secondary heat sink. Auxiliary Pzr spray will not be available resulting in NCS depressurization using Pzr PORV.

Time	Position	Applicant's Actions or Behavior
*		**EXAMINER NOTE: Transition to FR-H.1 should be required by this point due to a red path for secondary heat sink on the Critical Safety Function status trees.** **EXAMINER NOTE: The crew will be informed that the CAPT Trip and Throttle Valve is reset 5 minutes after an operator is dispatched but not prior to entry into FR-H.1.**
Step 1	ALL	IF total feed flow is less than 450 GPM due to operator action, THEN RETURN TO procedure and step in effect. Crew determines that total feed flow is 0 GPM and it is not due to operator action. SRO continues in procedure.
	ALL	CAUTION: IF a non-faulted S/G is available, THEN feed flow should only be established to non-faulted S/G(s) in subsequent steps.
Step 2	RO	Verify secondary heat sink is required as follows: a. NC pressure - GREATER THAN ANY NON-FAULTED S/G PRESSURE. b. Any NC T-Hot - GREATER THAN 350°F.
Step3	ALL	Monitor Enclosure 1 (Foldout page).
Step 4	BOP	Verify at least one NV pump - AVAILABLE.
Step 5	RO	Verify bleed and feed is required as Follows: a. W/R level in at least 3 S/Gs – LESS THAN 24% (36% ACC). Determines that bleed and feed criteria are not met and informs SRO.
	SRO	Transitions to Step 5.a. RNO.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9

Event Description: Reactor trip/turbine trip due to loss of condenser vacuum. CA pump 1B fails to start. Turbine driven CA pump trips on mechanical overspeed. Loss of all auxiliary feedwater results in loss of secondary heat sink. Auxiliary Pzr spray will not be available resulting in NCS depressurization using Pzr PORV.

Time	Position	Applicant's Actions or Behavior
Step 5.a. RNO	ALL	a. Perform the following: 1) Monitor bleed and feed initiation criteria. REFER TO Enclosure 1 (Foldout Page). 2) WHEN criteria is satisfied, THEN GO TO Step 18. 3) GO TO Step 6.
Step 6	RO	Verify S/G inventory loss is minimized as follows: a. All of the following blowdown isolation valves - CLOSED: • 1BB-56A (S/G 1A Bldwn Cont Isol Insd) • 1BB-148B (S/G 1A Bldwn Cont Isol Byp) • 1BB-57B (S/G 1A Bldwn Cont Isol Otsd) • 1BB-19A (S/G 1B Bldwn Cont Isol Insd) • 1BB-150B (S/G 1B Bldwn Cont Isol Byp) • 1BB-21B (S/G 1B Bldwn Cont Isol Otsd) • 1BB-GOA (S/G 1C Bldwn Cont Isol Insd) • 1BB-149B (S/G 1C Bldwn Cont Isol Byp) • 1BB-61B (S/G 1C Bldwn Cont Isol Otsd) • 1BB-8A (S/G 1D Bldwn Cont Isol Insd) • 1BB-147B (S/G 1D Bldwn Cont Isol Byp) • 1BB-1CB (S/G 1D Bldwn Cont Isol Otsd).
	BOP	b. All S/G sample isolation valves - CLOSED.
Step 7	BOP	Attempt to establish CA flow to at least one S/G as follows: a. Verify the following annunciators DARK. • 1AD-5, H/4 "CACST LO LEVEL" • 1AD-8, B/1 "UST LO LEVEL"
	BOP	b. Verify the following CA suction valves - OPEN: • 1CA-6 (CA Pmps Suct From CA CST) • 1CA-4 (CA Pmps Suct From UST)
	BOP	c. Verify proper CA pump status as follows: 1) Power to both motor driven CA pumps - AVAILABLE. 2) 1AD-5, F/3 "CAPT MECH OS TRIP" - DARK. Determines 1AD-5 F/3 is LIT and informs SRO.
	SRO	Transitions to Step 7.c.2) RNO and directs actions.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9

Event Description: Reactor trip/turbine trip due to loss of condenser vacuum. CA pump 1B fails to start. Turbine driven CA pump trips on mechanical overspeed. Loss of all auxiliary feedwater results in loss of secondary heat sink. Auxiliary Pzr spray will not be available resulting in NCS depressurization using Pzr PORV.

Time	Position	Applicant's Actions or Behavior
Step 7.c.2)	BOP	2) Perform the following: a) Dispatch operator to reset the CAPT trip and throttle valve. b) WHEN the CAPT trip and throttle valve is reset, THEN perform Steps 7.c.2 through 7.c.4. c) GO TO Step 7.d. BOP dispatches an operator to locally reset the CAPT trip and throttle valve. SRO transitions to Step 7.d. A/ER.
Step 7.d.	RO	d. Verify all CA isolation valves - OPEN. e. Verify all CA flow control valves - OPEN. f. Start all available CA pumps. g. Verify total feed flow to S/Gs GREATER THAN 450 GPM. Informs SRO that total feed flow is 0 GPM.
	SRO	SRO transitions to Step 7.9. RNO
Step 7.g. RNO	RO/BOP	1) IF CA flow indicated AND flow is being controlled as required by Enclosure 8 (Hot Dry S/G Feed Flow Restoration Limits), THEN GO TO Step 36. Crew determines step does not apply. 2) IF no CA pumps can be started, THEN dispatch operator and maintenance to CA pumps to attempt to restore one CA pump to service per EM/1/A/5200/007 (Troubleshooting Cause For CA Pump(s) Failing To Start). Crew dispatches an operator and maintenance to attempt to restore one CA pump. 3) Dispatch operator(s) to verify proper CA valve alignment. REFER TO Enclosure 2 (Local CA Flowpath Restoration). 4) GO TO Step 8.
	SRO	Transitions to Step 8 A/ER.
Step 8 **CRITICAL STEP**	BOP	Stop all NC pumps.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9

Event Description: Reactor trip/turbine trip due to loss of condenser vacuum. CA pump 1B fails to start. Turbine driven CA pump trips on mechanical overspeed. Loss of all auxiliary feedwater results in loss of secondary heat sink. Auxiliary Pzr spray will not be available resulting in NCS depressurization using Pzr PORV.

Time	Position	Applicant's Actions or Behavior
Step 9	BOP	Verify CM System is in service as follows: • Hotwell pump(s) – ON. • Condensate Booster pump(s) - ON.
Step 10	RO	Attempt to reset Feedwater Isolation as follows: a. Verify the following annunciators DARK: • 1AD-8, D/7 "INNER DOGHOUSE TRAIN A LEVEL HI" • 1AD-8, E/7 "INNER DOGHOUSE TRAIN B LEVEL HI" • 1AD-8, D/8 "OUTER DOGHOUSE TRAIN A LEVEL HI" • 1AD-8, E/8 "OUTER DOGHOUSE TRAIN B LEVEL HI"
	BOP	b. Verify S/I - HAS PREVIOUSLY ACTUATED. Determines that S/I has not previously actuated and informs SRO.
	SRO	Transitions to step 10.b. RNO and directs actions.
Step 10.b. RNO	RO	b. Perform the following: 1) Reset Feedwater Isolation. RO resets Feedwater Isolation by depressing the "CF ISOL RESET" switches on 1MC-3 for "A" "B" trains. Verifies annunciators AD-6 C/6 and AD-6 D/6 are DARK. Reports to SRO that feedwater isolation is reset. 2) IF Feedwater Isolation will not reset, THEN ... Determines step is N/A, CF Isolation IS reset. 3) GO TO Step **10.j.**
	SRO	Transitions to Step 10.j. A/ER.
Step 10.j.	ALL	j. IF AT ANY TIME a subsequent Feedwater Isolation occurs, THEN RETURN TO Step 10.
		EXAMINER NOTE: A subsequent feedwater isolation is expected during the S/G depressurization in Step 15.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9

Event Description: Reactor trip/turbine trip due to loss of condenser vacuum. CA pump 1B fails to start. Turbine driven CA pump trips on mechanical overspeed. Loss of all auxiliary feedwater results in loss of secondary heat sink. Auxiliary Pzr spray will not be available resulting in NCS depressurization using Pzr PORV.

Time	Position	Applicant's Actions or Behavior
Step 11	RO	Attempt to establish CF flow to at least one S/G as follows: a. Place the following valves in manual and closed: • All CF control valves • All CF bypass control valves. RO places the control stations for all CF control valves and all CF bypass control valve in manual and reduces demand to zero.
		EXAMINER NOTE: Crew may decide to attempt to only feed one steam generator. This is acceptable.
	RO	b. Open at least one of the following valves: • 1CA-149 (S/G 1A CF Byp To CA Nozzle) • 1CA-150 (S/G 1B CF Byp To CA Nozzle) • 1CA-151 (S/G 1C CF Byp To CA Nozzle) • 1CA-152 (S/G 1D CF Byp To CA Nozzle) RO opens 1CA-149, 1CA-150, 1CA-151 and 1CA-152 and informs SRO.
	BOP	c. Ensure at least one of the following valves - OPEN: • 1CF-10 (CF Pump 1A Disch Isol) (TB-579, 1E-21) • 1CF-17 (CF Pump 1B Disch Isol) (TB-579, 1E-20). d. Verify the following feedwater pump recirc valves - FULLY OPEN: • 1CF-6 (CF Pump 1A Recirc Ctrl) • 1CF-13 (CF Pump 1B Recirc Ctrl).
	ALL	e. Ensure the CFPT to be started -:RESET. Determines that neither CFPT can be reset due to loss of vacuum. Informs SRO.
	SRO	Transitions to step 11.e. RNO and directs actions.
Step 11.e. RNO	ALL	e. Perform the following 1) Continue attempts to start a CFPT. 2) GO TO step 13.
	SRO	Transitions to Step 13 A/ER.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9

Event Description: Reactor trip/turbine trip due to loss of condenser vacuum. CA pump 1B fails to start. Turbine driven CA pump trips on mechanical overspeed. Loss of all auxiliary feedwater results in loss of secondary heat sink. Auxiliary Pzr spray will not be available resulting in NCS depressurization using Pzr PORV.

Time	Position	Applicant's Actions or Behavior
Step 13	BOP	Depressurize NC System as follows: a. Verify letdown - IN SERVICE. **b.** Verify power to 1NV-37A (NV Supply To Pzr Aux Spray) - AVAILABLE. c. Depressurize NC System to less than 1905 PSIG using NV aux spray as follows: 1) Open the following valves: • 1NV-312A (Chrg Line Cont Isol) • 1NV-314B (Chrg Line Cont Isol). 2) Ensure the following valves -CLOSED: • 1NC-27 (Pzr Spray Ctrl Frm Loop A) • 1NC-29 (Pzr Spray Ctrl Frm Loop B) • 1NV-39A (NV Supply To LOOP D Isol) • 1NV-32B (NV Supply To LOOP A Isol). 3) Maintain charging flow less than 180 GPM. **4)** Throttle 1NV-37A (NV Supply To Pzr Aux Spray) and charging flow as required. BOP determines that 1NV-37A will not open and informs SRO.
	SRO	Transitions to Step 13.c RNO and directs actions.
Step 13.c RNO	BOP	Depressurize NC System to less than 1905 PSIG using one Pzr PORV.
	SRO	Transitions to Step 13.d A/ER and directs actions.
Step 13.d	BOP	d. Maintain NC pressure less than 1905 PSIG.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9

Event Description: Reactor trip/turbine trip due to loss of condenser vacuum. CA pump 1B fails to start. Turbine driven CA pump trips on mechanical overspeed. Loss of all auxiliary feedwater results in loss of secondary heat sink. Auxiliary Pzr spray will not be available resulting in NCS depressurization using Pzr PORV.

Time	Position	Applicant's Actions or Behavior
Step 13.e.	BOP	e. IF AT ANY TIME letdown is lost AND a Pzr PORV is available, THEN: 1) Close 1NV-37A (NV Supply To Pzr Aux Spray). 2) Open one of the following valves: • 1NV-39A (NV Supply To LOOP D Isol) OR • 1NV-32B (NV Supply To LOOP A Isol). 3) Depressurize NC System to less than 1905 PSIG using one Pzr PORV.
Step 14	BOP	Block S/I as follows: a. Verify "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) -LIT. Determines status light is DARK and informs SRO.
	SRO	Transitions to Step 14.a RNO and directs actions
Step 14.a RNO	BOP	a. Perform the following: 1) WHEN "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) is lit, THEN perform Steps 14 through 16. 2) GO TO Step 17.
		EXAMINER NOTE: Initially, S/I cannot be blocked due to NC System pressure above the block set point. Soon after the Pzr PORV is opened, the crew will return to Step 14. Step 17 checks for bleed and feed initiation criteria and then loops back to Step 1.
Step 14	BOP	Block S/I as follows: a. Verify "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) -LIT. b. Depress the "BLOCK pushbuttons for the following signals: • ECCS steam pressure • ECCS Pzr pressure. c. Verify the following status lights (1SI-13) – LIT: • Main Steam Isol • Pzr low pressure S/I. , d. IF AT ANY TIME conditions degrade while in this procedure, THEN manual S/I actuation will be required.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9

Event Description: Reactor trip/turbine trip due to loss of condenser vacuum. CA pump 1B fails to start. Turbine driven CA pump trips on mechanical overspeed. Loss of all auxiliary feedwater results in loss of secondary heat sink. Auxiliary Pzr spray will not be available resulting in NCS depressurization using Pzr PORV.

Time	Position	Applicant's Actions or Behavior
Step 15	RO	Attempt to establish feed flow from CM as follows: a. Close MSIV on S/G(s) not to be steamed.
		EXAMINER NOTE: All four steam generators should be steamed. However, if less than four steam generators were aligned to receive feed flow in step 11.b, then **only** those steam generators should be steamed.
	RO	b. Verify the condenser is available as follows: "C-9 **COND** AVAILABLE FOR STM DUMP" status light (1SI-18) – LIT. Determines that **"C-9"** status light is DARK due to loss of condenser vacuum and informs SRO.
	SRO	Transitions to Step 15.b. RNO and directs actions.
Step 15.b. RNO	**RO**	b. Perform the following: 1) Dump steam using S/G PORVs at maximum rate while attempting to avoid a Main Steam Isolation. RO dumps steam using the S/G PORV's. EXAMINER NOTE: If a Main Steam Isolation signal is received, the S/G PORV's will revert to automatic and close. The RO will have to select manual on the AUTO/MANUAL switch on 1MC-3 to regain control. A feedwater isolation is expected to occur at this point. 2) **IF** no S/G PORV can be operated from the control room, THEN... Determines this step does not apply. 3) **IF** no S/G PORV can be opened, THEN... Determines this step does not apply. 4) GO TO Step 15.f.
	SRO	Transitions to step 15.f. A/ER and directs actions.

Op-Test No.: NRC Scenario No.: 1 Event No.: 7-9

Event Description: Reactor trip/turbine trip due to loss of condenser vacuum. CA pump 1B fails to start. Turbine driven CA pump trips on mechanical overspeed. Loss of all auxiliary feedwater results in loss of secondary heat sink. Auxiliary Pzr spray will not be available resulting in NCS depressurization using Pzr PORV.

Time	Position	Applicant's Actions or Behavior
Step 15.f.	RO	f. WHEN S/G pressure is less than 505 PSIG, THEN stabilize S/G pressure less than 505 PSIG. g. Throttle open CF control valve or CF bypass control valve for S/G(s) to be fed. h. Verify feedwater flow to depressurized S/G(s) - INDICATING FLOW.
	SRO	Returns to Step 7.c.2) and performs 7.c.2) through 7.c.4) as previously directed by Step 7.c.2).b) **RNO**
Step 7.c.2)	BOP	1AD-5, F/3 "CAPT MECH OS TRIP - DARK
Step 7.c.3)	BOP	"CAPT TRIP T/V CTRL" – OPEN Determines valve is closed and informs SRO.
	SRO	Transitions to 7.c.3) RNO and directs actions.
Step 7.c.3) RNO **CRITICAL TASK**	BOP	3) Perform the following: a) Manually open the valve. b) IF the valve will not open, THEN... Determines this step is N/A.
	SRO	Transitions to Step 7.c.4) and directs actions.
Step 7.c.4)	BOP	4) Verify the following valves – OPEN: • 1SA-2 (S/G 1B SM To CAPT) • 1SA-5 (S/G 1C SM To CAPT) Determines that all 4 S/Gs are receiving flow from the CAPT.

Terminate scenario when feedwater flow is indicated to at least one steam generator.

Classification: Site Area Emergency 4.4.S.2-2

Simulation Facility: Catawba **Scenario No.: NRC-2** **Op-Test No:**

Examiners: _____ Operators: _____

_____ _____

_____ _____

Objectives: To evaluate the applicants' ability to decrease power using NOPs while maintaining Tave matched to Tref, and to use AOPs to respond to a high failure of channel I pressurizer pressure and a loss of the 1B nuclear service water pump. The discharge valve for the 1A nuclear service water pump will fail to open when the pump is started, requiring the crew to start a unit two pump. The 1A feedwater pump will trip due to a loss of lube oil, generating a turbine runback signal. The turbine will fail to run back in automatic and a manual runback will be required. Upon completion of the turbine runback, the control rods will continue to insert in automatic, requiring the rods to be taken to manual to stop rod movement. The applicants will be evaluated using EOPs to respond to a steam line break inside containment. Automatic Main Steam Isolation will fail to actuate. Containment spray pump 1B will fail to start automatically or manually, resulting in a complete loss of containment spray capability. The candidates will be required to respond to the high containment pressure using FR-Z.1.

Initial Conditions: 100% power, EOL, Equilibrium Xe.
NCS Boron Concentration 30 ppm.

Turnover: CA pump 1A is out of service for routine maintenance. It is due to be returned to service in 24 hours.

NS pump 1A is out of service for motor replacement. It is due to be returned to service in **24** hours.

Valve 1NC-31B was just closed due to leakage by PORV 1NC-32B. ***An*** R&R is being developed.

Event No.	Malf. No.	Event Type*	Event Description
1		R-BOP	Borate for power decrease
2		N-RO	Decrease power from 100%
3	XMT-NC028 = 2500	I-BOP	Pressurizer pressure channel I fails high

Event No.	Malf. No.	Event Type*	Event Description
	OVR-RN053D = ON MAL-RN003B =2 (BOTH) VLV-RN009F = 0	C-BOP	Loss of operating RN pump (1B) with failure of the 1A RN pump discharge valve to open.
	OVR-FWP018D = OFF OVR-FWP018C = OFF OVR–FWP019C = OFF OVR-FWP019D = OFF		CFPT 1A lube oil pump trips and reserve oil pump does not start resulting in a trip of 1A feedwater pump and generation of a turbine runback signal.
	MAL-EHC003E =BLOCK	C-RO	Failure of automatic turbine runback
	MAL-IRX003A = 0 (AUTO ONLY)	C-RO	Uncontrolled control rod insertion in automatic only
	MAL-SM007D = 4.125E6 RAMP = 60	M	Steam break inside containment (1D steam generator)
	MAL ISE006A =BLOCK MAL ISE006B = BLOCK	C-RO	Failure of automatic Main Steam Isolation
10	MAL-NS001B = BOTH	C-BOP	NS pump 1B fails to start in auto or manual

Op-Test No.: NRC Scenario No.: **2** Event No.: 1

Event Description: Boration for load decrease

Time	Position	Applicant's Actions or Behavior
Step 2.14	SRO/ BOP	Per OP/1/A/6100/003, Enclosure 4.3: Maintain control rods above insertion limit and AFD within its target by boration or dilution per OP/1/A/6150/009.
	SRO	Directs BOP to determine amount of boron to add to begin the load change and provides guidance that the boration should be done in 3 batches (–130 gallons in the first hour).
	BOP	Determines amount of boron to add (–130 gallons over first hour).
	BOP	Refer to OP/1/A/6150/009, Boron Concentration Control.
Step 2.2	BOP	Ensure the following valve control switches in "AUTO": • 1NV-238A (B/A Xfer Pmp To Blender Ctrl) • 1NV-186A (B/A Blender Otlt To VCT Otlt)
Step 2.3	BOP	Adjust the boric acid batch counter to the desired volume of boric acid to be added.
Step 2.4	BOP	Place the "NC MAKEUP MODE SELECT" switch in "BORATE.
Step2.5	BOP	Adjust the controller for 1NV-238A (B/A Xfer Pmp to Blender Ctrl) controller to the desired flow.
Step 2.6	BOP	Ensure 1NV-238A (B/A Xfer Pmp to Blender Ctrl) controller in "AUTO.
Step 2.7	BOP	**NOTE:** If necessary, boration can be manually secured at any time by placing the "NC MAKEUP CONTROL" switch to the "STOP position. Ensure at least one boric acid transfer pump in "AUTO or "ON".
Step 2.8	BOP	Place the "NC MAKEUP CONTROL" switch in "START' position.
Step 2.9	BOP	Verify the following valves open: • 1NV-238A (B/A Xfer Pmp To Blender Ctrl Vlv) • 1NV-186A (B/A Blender Otlt To VCT Otlt)

Op-Test No.: NRC Scenario No.: 2 Event No.: **1**

Event Description: Boration for load decrease

Time	Position	Applicant's Actions or Behavior
Step 2.10	BOP	If in "AUTO, verify the boric acid transfer pump starts.
Step 2.11	BOP	Verify proper flow by observing the boric acid flow totalizer.
Step 2.12	BOP	When the desired volume of boric acid is reached on the boric acid batch counter, ensure the following valves close: • 1NV-238A (B/A Xfer Pmp To Blender Ctrl Vlv) • 1NV-186A (B/A Blender Otlt To VCT Otlt)

Step 2.13	BOP	**IF** desired, flush the makeup line as follows:
		• Open the following valves:
		  • 1NV-242A (RMWST To B/A Blender Ctrl)
		  • 1NV-186A (B/A Blender Otlt To VCT Otlt)
		• Ensure one reactor makeup water pump is in "ON".
		• **WHEN** ~20 gallons of makeup water have been flushed through the makeup line, close the following valves:
		  • 1NV-242A (RMWST To B/A Blender Ctrl)
		  • 1NV-186A (B/A Blender Otlt To VCT Otlt)
		• Place the following valve control switches in "AUTO:
		  • 1NV-242A (RMWST To B/A Blender Ctrl)
		  • 1NV-186A (B/A Blender Otlt To VCT Otlt)
		• **IF NOT** required for current plant operation, place the reactor makeup water pump started in earlier step in "AUTO.

Step 2.14	BOP	**IF** automatic makeup is desired, refer to Enclosure **4.1** (Automatic Makeup).

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

Event Description: Turbine load reduction

Time	Position	Amlicant's Actions or Behavior
Step 2.8	SRO/RO	Per OP/1/A/6100/003, Enclosure 4.3: Coordinate with SOC and reduce load per OP/1/B/6300/001. EXAMINER NOTE: Steps 2.6 and 2.7 are conditional steps that do not apply based on crew turnover information.
Step 2.6	SRO/RO	If a power decrease of more than 20% reactor power is planned, issue Model W/O #91003040 to IAE to prevent the mismatch between OAC heat balance point C1P1385 (Reactor Thermal Power, Best) and any excore power channel exceeding 2%. **EXAMINER NOTE: SRO will determine that this step does not apply per turnover information.** **EXAMINER NOTE: The NOTE following this step does not apply.**
	RO	Refer to OP/1/B/6300/001, Turbine Generator, Enclosure 4.2, Section 2.4.
	SRO	Direct RO to reduce load at a rate of approximately 2 MW/min or 10% per hour to 90% (~1080 MW target).
Step 2.4.1	RO	Depress the "Load Rate" pushbutton and verify it illuminates.
Step 2.4.2	RO	Input the desired load rate on the numeric keypad and verify the load rate appears on the Variable Display.
Step 2.4.3	RO	Depress the "Target" pushbutton and verify it illuminates.
Step 2.4.4	RO	Input the desired load target (~1080 MW) on the numeric keypad and verify the load target appears on the Target Display.
Step 2.4.5	RO	To start load decrease, depress the "Go" pushbutton and verify it illuminates.

Op-Test No.: NRC Scenario No.: 2 Event No.: 3

Event Description: Pressurizer Pressure Channel I Fails High

Time	Position	Amlicant's Actions or Behavior
	BOP	Determines that Pressurizer Pressure Channel I has failed high, informs SRO.
	SRO	Implements AP/1/A/5500/11 (Pressurizer Pressure Anomalies), Case I (Pressurizer Pressure Decreasing) and directs actions.
		EXAMINER NOTE: Steps 1 and 2 are Immediate Action steps and are required to be performed from memory.
Step 1	BOP	Verify all Pzr level channels – INDICATING THE SAME. Determines that Channel I is reading high and informs SRO.
	SRO	Transitions to Step 1 RNO and directs actions.
Step 1 RNO	BOP	IF either selected channel is failed high, THEN place "PZR PRESS CTRL SELECT" switch in any alternate operable channel position.
	SRO	Transitions to Steo 2 A/ER and directs actions.
Step 2	BOP	Verify all Pzr PORVs – CLOSED.
Step 3	BOP	Verify Pzr Spray Valve(s) – CLOSED.
Step 4	BOP	Verify all Pzr heaters – ENERGIZED.
Step 5	BOP	Ensure 1NV-37A (NV Supply To Pzr Aux Spray) – CLOSED.
Step 6	RO	Verify NC pressure – STABLE OR INCREASING.
Step 7	BOP	**IF** a Pzr pressure channel is failed high, **THEN** notify IAE to fail the following bistables for the affected channel under Model W/O #91002943. Bistables shall be tripped within six **(6)** hours: • Pzr low pressure S/I • OT Delta T • Pzr high pressure Reactor Trip • Pzr low pressure Reactor Trip

Op-Test No.: NRC Scenario No.: 2 Event No.: 3

Event Description: Pressurizer Pressure Channel I Fails High

Time	Position	Applicant's Actions or Behavior
Step 8	SRO	Ensure compliance with appropriate Tech Specs: • 3.3.1 (Reactor Trip System Instrumentation) • 3.3.2 (Engineered Safety Features Actuation System) • 3.3.3 (Post Accident Monitoring 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) Determines that 3.3.1 and 3.3.2 apply.
Step 9	BOP	Ensure "PZR PRESS REC SELECT" is selected to an operable channel.
Step 10	ALL	Determine long term plant status. **RETURN TO** procedure in effect.

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

Event Description: Loss of operating RN pump (1**B**) with failure of the 1A RN pump discharge valve to open.

Time	Position	Applicant's Actions or Behavior
	BOP	Recognize trip of RN Pump 1B and inform SRO.
	SRO	Enter AP/0/A/5500/020 (Loss of Nuclear Service Water) Case I (Loss of RN Train) and direct actions.
Step 1	BOP	Start idle RN pump(s) as required. Starts another RN Pump. When the 1A RN pump is started the discharge valve does not open. BOP informs SRO. **EXAMINER NOTE: The SRO may direct securing the 1A RN pump and starting a Unit 2 RN pump at this point or at Step 3.**
Step 2	ALL	Ensure Unit 1 and Unit *2* OATC monitors Enclosure 1 (Foldout Page).
Step 3	BOP	Verify each operating RN pump discharge flow – GREATER THAN 8,600 GPM. Determines that no RN flow exists and informs SRO.
	SRO	Transitions to Step 3 RNO and directs actions.
Step 3 RNO	BOP	Perform the following: a. Stop any RN pumps(s) not required to support system operation. Determines that the discharge valve for the 1A RN pump did not open and informs SRO.
	SRO	Directs BOP to start a Unit 2 RN pump.
	BOP	Starts a Unit **2** RN pump.
Step 4	BOP	Verify each operating RN pump discharge flow – LESS THAN **23,000** GPM.
Step *5*	BOP	Ensure RN pumps – IN OPERATION AS NEEDED. Determines that an RN pump is in operation and no others are needed.

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

Event Description: Loss of operating RN pump (1B) with failure of the 1A RN pump discharge valve to open.

Time	Position	Applicant's Actions or Behavior
Step 6	BOP	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.
Step 7	BOP	Verify each operating RN pump discharge flow – GREATER THAN 8,600 GPM.
Step 8	BOP	Verify RN available to all Unit 1 and Unit 2 D/G(s).
Step 9	BOP	Determine VC/YC status as follows: • Verify VC/YC –ALIGNED TO OPERATING RN TRAIN. • Verify YC Chiller – RUNNING.
Step 10	ALL	Determine and correct cause of loss of RN train.
Step 11	SRO	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). Determines that 3.7.8, 3.6.6, 3.7.5 and 3.0.3 apply.
Step 12	SRO	Determine required notifications: • REFER TO RP/0/A/5000/001 (Classification Of Emergency) • REFER TO RP/0/B/5000/013 (NRC Notification Requirements).

Op-Test No.: NRC Scenario No.: 2 Event No.: **4** Event Description: Loss of operating RN pump (1**B)** with failure of the **1A** RN pump discharge valve to open.		
Time	Position	Applicant's Actions or Behavior
Step 13	BOP	Notify Environmental Chemistry *of* any RN pump shifts that have occurred.
Step **14**	SRO	Determine long term plant status. RETURN TO procedure in effect.

Op-Test No.: NRC Scenario No.: 2 Event No.: 5-6 Event Description: CFPT 1A trip due to loss of lube oil pumps resulting in turbine runback signal. Failure of automatic turbine runback.		
Time	Position	Applicant's Actions or Behavior
	ALL	Observes that feedwater pump 1A has tripped and informs SRO.
	ALL	Determines that a runback should be occurring but turbine is not automatically running back. Recognize conditions for AP/1/A/5500/03 (Load Rejection), inform SRO, and perform immediate actions from memory.
	SRO	Implements AP/1/A/5500/03 (Load Rejection) and directs actions.
		EXAMINER NOTE: Steps 1 and 2 are Immediate Action steps and are required to be performed from memory.
Step 1	RO	Verify turbine load – DECREASING. Determines turbine load is not decreasing and informs SRO.
	SRO	Transitions to Step 1 RNO and directs actions.
Step 1 RNO	RO	Perform the following: a. Select "MANUAL" on the turbine control panel. b. Depress "CONTROL VALVES LOWER pushbutton and reduce turbine load as required.
	SRO	Transitions to Step 2 NER column and directs actions.
Step 2	RO	Verify proper reactor response: • Control rods – IN "AUTO AND STEPPING IN • P/R neutron flux – DECREASING

Op-Test No.: NRC Scenario No.: 2 Event No.: 5-6

Event Description: CFPT 1A trip due to loss of lube oil pumps resulting in turbine runback signal. Failure of automatic turbine runback.

Time	Position	Applicant's Actions or Behavior
Step 3	RO	Verify proper steam dump operation as follows: a. Verify T-Ref instrumentation – AVAILABLE. b. "C-9 COND AVAILABLE FOR STM DUMP status light (1SI-I8) – 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
Step 4	BOP	Verify Pzr PORV and Pzr spray valve status as follows: a. All Pzr PORVs – CLOSED b. Normal Pzr spray valves – CLOSED
Step 5	BOP	Verify proper CM System operation as follows: a. 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 d. Verify standby condensate booster pump(s) – ON **EXAMINER NOTE: Depending on speed of runback in manual, the standby hotwell pump and condensate booster pump may not start. The SRO may direct the BOP to start them per Step 5.c and 5.d RNOs.**

Op-Test No.: NRC Scenario No.: 2 Event No.: 5-6 Event Description: CFPT 1A trip due to loss of lube oil pumps resulting in turbine runback signal. Failure of automatic turbine runback.		
Time	Position	Applicant's Actions or Behavior
Step 6	BOP	Verify the following generator alarms – DARK: • 1AD-11, C/1 "GEN BKR A OVER CURRENT" • 1AD-11, F/1 "GEN BKR B OVER CURRENT"
Step 7	RO	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
		EXAMINER NOTE: **If** alarm in at this point, SRO will **go** to Step ***7*** RNO, otherwise he will continue with Step ***8*** **NER** (below).
Step 7 RNO	SRO	Perform the following: a. Ensure feedwater regulating valves – MODULATING TO CONTROL S/G LEVELS AT PROGRAM SETPOINT. **b.** IF any S/G(s) NR level is decreasing in and uncontrolled manner, THEN: Determines this step is N/A and continues.
	SRO	Transitions to Step ***8*** A/ER column and directs actions.
Step 8	BOP	Verify AS header pressure – GREATER THAN OR EQUAL TO 140 PSIG.
Step **9**	**BOP**	Monitor Enclosure 3 (Rod Insertion Limit Boration). EXAMINER NOTE: **AP/1/A/5500/03,** Enclosure 3 is attached.
Step 10	RO	Verify reactor power – LESS THAN 30% Determines that power is greater than 30% and informs SRO.
	SRO	Transitions to Step 10 RNO and directs actions.

Op-Test No.: NRC Scenario No.: 2 Event No.: 5-6

Event Description: CFPT 1A trip due to loss of lube oil pumps resulting in turbine runback signal. Failure of automatic turbine runback.

Time	Position	Applicant's Actions or Behavior
Step 10 RNO	SRO	a. IF the runback target load is less than 30%, THEN: Determines this step is N/A and continues. b. WHEN the appropriate runback target load is reached, THEN: 1) Stabilize unit at current 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 b. GO TO Step 12.
	SRO	Transitions to Step 12 A/ER and directs actions.
Step 12	RO/BOP	Verify the following PCBs – CLOSED: • Generator breaker 1A • Generator breaker 1B • PCB 14 • PCB 15 • PCB 17 • PCB 18
Step 13	RO	Adjust power factor as necessary. REFER TO Unit 1 Revised Data Book Figure 43.

Op-Test No.: NRC Scenario No.: 2 Event No.: 5-6

Event Description: CFPT 1A trip due to loss of lube oil pumps resulting in turbine runback signal. Failure of automatic turbine runback.

Time	Position	Applicant's Actions or Behavior

Step 14	ALL	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

Step 15	RO/SRO	Notify System Operating Center (SOC) using the red dispatcher telephone of current unit status.
Step 16	ALL	Determine and correct cause of Load Rejection.
Step 17.a	BOP	Shut down unnecessary plant equipment as follows: b. Restore.CM and CF as follows: 1) Verify C-htr drain pumps – **ON.** **EXAMINER NOTE: Based on runback rate, C-Htr Drain Pumps may not be on at this point. If not, then SRO will transition to Step 17.a.1) RNO an direct that action, and then return to A/ER 17.a.2).** 2) Verify both CF Pumps – IN SERVICE Determines that 1A CF pump is tripped and informs SRO. •
	SRO	Transitions to Step 17.a.2) RNO and directs actions.
Step 17.a.2) RNO	SRO	GO TO Step 17.b
	SRO	Transitions to Step 17.b and directs actions.

Op-Test No.: NRC Scenario No.: 2 Event No.: 5-6

Event Description: CFPT 1A trip due to loss of lube oil pumps resulting in turbine runback signal. Failure of automatic turbine runback.

Time	Position	Applicant's Actions or Behavior
17.b	BOP	b. RC pump(s) and cooling tower fans. REFER TO OP/1/B/6400/001A (Condenser Circulating Water)
Step 18	RO	Reset steam dump valves as follows: a. Verify reactor power – STABLE. b. Verify steam dump valves – IN "T-AVG" MODE. c. Verify steam dump valves – CLOSED. d. Reset steam dump valves. e. Verify the following status lights (1SI-18) – DARK. a "C-7A LOSS OF LOAD INTLK COND DUMP" a "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 AUTOMATIC.
Step 19	RO	Verify reactor power – GREATER THAN 15%.
Step 20	RO/BOP	Verify CA Pumps – OFF.
Step 21	RO	Verify reactor power change – GREATER THAN OR EQUAL TO 15% IN A 1 HOUR PERIOD.
Step 22	ALL	Notify the following sections to take appropriate samples: • 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 3.4.1 6 (Sample must be taken between 2 hours and 6 hours following last power change greater than or equal to 15% rated thermal power within a 1 hour period).

Op-Test No.: NRC Scenario No.: 2 Event No.: 5-6

Event Description: CFPT 1A trip due to loss of lube oil pumps resulting in turbine runback signal. Failure of automatic turbine runback.

Time	Position	Amlicant's Actions or Behavior
Step 23	SRO	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) Determines that none apply. **EXAMINER NOTE: Based on** current **rod** positions, **3.1.6** *may* **apply.**
Step **24**	ALL	Notify Reactor Group Engineer of occurrence.
Step 25	ALL	Determine long term plant status. RETURN TO OP/1/A/6100/003 (Controlling Procedure for Unit Operation).

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

Event Description: Uncontrolled rod insertion in automatic only.

Time	Position	Applicant's Actions or Behavior
	RO	Determines that control rods are continuing to insert when no rod motion is required and places control rods in manual, informs SRO.
	SRO	Implements AP/1/A/5500/15 (Rod Control Malfunctions), Case II (Continuous Rod Movement) and directs actions.
		EXAMINER NOTE: Steps 1 and 2 are Immediate Action steps and are reauired to be performed from memory.
Step 1	RO	Ensure "CRD BANK SELECT" switch – IN MANUAL. RO places switch in MANUAL.
Step 2	RO	Ensure all rod motion – STOPS.
Step 3	RO	Manually adjust control rods as necessary to maintain T-Avg within 1°F of T-Ref.
Step 4	RO	Determine and correct cause of continous rod movement.
Step 5	SRO	Ensure compliance with appropriate Tech Specs: • 3.1.1 (Shutdown Margin (SDM)) • 3.1.4 (Rod Group Alignment Limits) • 3.1.5 (Shutdown Bank Insertion Limits) • 3.1.6 (Control Bank Insertion Limits) • 3.3.2 (ESFAS Instrumentation) Determines that 3.1.1 and 3.1.6 apply if the control rods are below the rod insertion limits.
Step 6	SRO	Determine required notifications: • REFER TO RP/0/A/5000/001 (Classification of Emergency) • REFER TO RP/0/B/5000/013 (NRC Notification Requirements)
Step 7	SRO	Determine long term plant status. RETURN TO procedure in effect.

Op-Test No.: NRC Scenario No.: 2 Event No.: 8-10

Event Description: Steam break inside containment on 1D steam generator, NS pump 1B fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Applicant's Actions or Behavior
		EXAMINER NOTE: Crew may manually trip the reactor and safety inject prior to reaching the setpoints based on the trends.
	ALL	Recognize reactor trip and safety injection have occurred.
	RO/BOP	Perform Immediate Actions of E-0 from memory (steps 2-5). **EXAMINER NOTE: Turbine will fail to trip automatically on reactor trip and RO will have to manually trip the turbine.**
	SRO	Enter EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) and direct actions of operators.
Step 1	RO/BOP	Monitor Enclosure 1 (Foldout Page)
Step 2	RO	Verify Reactor Trip: • All rod bottom lights – LIT • All reactor trip and bypass breakers – OPEN • I/R amps – DECREASING
Step 3	RO	Verify Turbine Trip: • All turbine stop valves – CLOSED Determines that turbine has not tripped and informs SRO.
	SRO	Transitions to Step 3.a RNO and directs actions.
Step 3	RO	a. Manually trip the turbine. b. If turbine will not trip, THEN... Determines that turbine has manually tripped and informs SRO.
	SRO	Transitions to Step 4 A/ER and directs actions.
Step 4	BOP	Verify 1ETA and 1ETB – ENERGIZED.

Op-Test No.: NRC Scenario No.: 2 Event No.: 8-10

Event Description: Steam break inside containment on 1D steam generator, NS pump 1B fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Applicant's Actions or Behavior
Step 5	BOP	Verify S/I is actuated: a. "SAFETY INJECTION ACTUATED" status light (1SI-13) – LIT b. E/S load sequencer actuated status lights (1SI-14) – LIT
Step 6	RO	Announce "Unit 1 Safety Injection".
Step 7	SRO	Implement RP/0/A/5000/001 (Classification Of Emergency).
Step 8	RO	Verify all Feedwater Isolation status lights (1SI-5) – LIT
Step 9	BOP	Verify Phase A Containment Isolation status as follows: a. Phase A "RESET" lights – DARK b. Monitor Light Panel Group 5 St lights – LIT
Step 10	BOP	Verify proper Phase B actuation as follows: a. Containment pressure – HAS REMAINED LESS THAN 3 PSIG Determines that pressure has not remained less than 3 psig and informs SRO.
	SRO	Transitions to Step 10.a RNO and directs operators. **EXAMINER NOTE: Greater than 3 psig in containment requires use of ACC numbers throughout the remainder of the scenario. ACC numbers are designated in parentheses behind normal values.**

Op-Test No.: NRC Scenario No.: 2 Event No.: **8-10**

Event Description: Steam break inside containment on 1D steam generator, NS pump 1B fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Applicant's Actions or Behavior
Step 10.a RNO	ALL	Perform the following: NOTE: This time may be used later to determine when to align ND Aux spray. 1) Record approximate time of reactor trip. _____ 2) Verify NS pumps – INDICATING FLOW. BOP determines that both NS pumps are NOT running and informs SRO. **3)** IF flow **is** not indicated, THEN manually initiate Phase B Isolation for affected train(s). BOP manually initiates Phase **B** isolation. ***4)*** Verify Phase **B** Isolation has actuated as follows: a) Phase B Isolation "RESET" lights – DARK. b) IF Phase B Isolation "RESET lights are lit, THEN manually initiate Phase B: Determines that this step b) is not required based on plant conditions.

Op-Test No.: NRC Scenario No.: 2 Event No.: 8-10

Event Description: Steam break inside containment on 1D steam generator, **NS** pump 1**B** fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Applicant's Actions or Behavior
Step 10.a. RNO (Cont.)	BOP/RO	c) Verify following monitor light panel lights – LIT: • Group 1 Sp lights **EXAMINER NOTE: Group 1 Sp lights for NS Pumps will not be lit.** • Group 5 Sp lights • Group 5 St lights L/11 and L/12. d) IF monitor light panel is not in correct alignment, THEN ensure correct valve alignment and component operation. e) IF NS Pump(s) did not start, THEN perform the following for the affected train(s): (1) Reset ECCS. BOP resets B Train ECCS. (2) Reset D/G load sequencer. BOP resets B Train D/G load sequencer. (3) Manually start affected NS Pump. BOP attempts to manually start 1B NS Pump. **EXAMINER NOTE: These actions will be performed for B train, however, 1B NS Pump will not start.** **(4)** IF AT **ANY** TIME a B/O occurs, THEN restart S/I equipment previously on. *5)* Stop all NC pumps while maintaining seal injection flow. RO secures all NC Pumps. **6)** GO TO Step 11.
	SRO	Transitions to Step 11 A/ER and directs actions.

Op-Test No.: NRC Scenario No.: 2 Event No.: **8-10**

Event Description: Steam break inside containment on 1D steam generator, NS pump 1B fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Amlicant's Actions or Behavior
Step 11	RO	Verify proper CA Pump status as follows: a. Motor Driven CA Pumps – ON. Determines that 1A CA Pump is tagged out and crew determines that transition to RNO is not required. b. 3 S/G N/R levels – GREATER THAN 11%.
Step 12	BOP	Verify all of the following S/I pumps – ON: • NV pumps • ND pumps • NI pumps
Step 13	BOP	Verify all KC pumps – ON.

Op-Test No.: NRC Scenario No.: 2 Event No.: **8-10**

Event Description: Steam break inside containment on 1D steam generator, NS pump 1B fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Applicant's Actions or Behavior
Step **14**	BOP	Verify all Unit 1 and Unit 2 RN pumps – ON Determines 1B RN pump not running and informs SRO. EXAMINER NOTE: If the crew had the 1A RN pump breaker racked out due to the failure of the discharge valve earlier, the 1A RN pump will not be runnina.
	SRO	Transitions to Step 14 RNO and directs actions.
		EXAMINER NOTE: The crew may elect not to attempt to start the 1A and 1B RN pumps due to the fact that it tripped earlier due to a relav actuation.
Step 14 RNO	BOP	a. IF any Unit 2 RN pump is off, THEN... SRO determines step does not apply and continues. b.IF any Unit 1 RN pump is off, THEN perform the following for the affected train(s): EXAMINER NOTE: 1B Train ECCS was previously reset during attempt to start 1B NS Pump. 1) Reset ECCS. 2) Reset D/G Load sequencer. 3) Manually start affected pump. Attempts to manually start 1B RN Pump. **4)** IF AT ANY TIME a B/O occurs, THEN restart S/I equipment previously on.
	SRO	Transitions to Step 15 A/ER and directs actions.
Step 15	BOP/ SRO	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).
Step 16	RO	Verify all S/G pressures – GREATER THAN 775 PSIG. Determines all S/G pressures are not > 775 psig and informs SRO.

Op-Test No.: NRC Scenario No.: 2 Event No.: 8-10

Event Description: Steam break inside containment on 1D steam generator, NS pump 1B fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Applicant's Actions or Behavior
	SRO	Transitions to Step 16 RNO and directs actions.
CRITICAL TASK		**EXAMINER NOTE: It is critical that the crew take action to initiate Main Steam Isolation manually upon failed auto action to prevent excessive cooldown and minimize inventory loss resulting from all S/Gs faulted.**
Step 16 RNO	RO	Perform the following: a. Verify the following valves – CLOSED. • All MSIVs • All MSIV Bypass valves • All S/G PORV's **EXAMINER NOTE: If not previously completed, MSIVs should be closed at this point.** **b. IF** any valve is still open, THEN… Determines all valves are closed and informs SRO.
	SRO	Transitions to Step 17 A/ER and directs actions.
Step 17	RO/BOP	Verify proper S/I flow as follows: a. "NV S/I FLOW – INDICATION FLOW. **b.** NC pressure – LESS THAN 1620 PSIG. c. NI pumps – INDICATING FLOW. d. NC pressure – LESS THAN 285 PSIG. Determines NC pressure > 285 psig and informs SRO.
	SRO	Transitions to Step 17.d RNO and directs actions.

Op-Test No.: NRC Scenario No.: 2 Event No.: **8-10**

Event Description: Steam break inside containment on 1D steam generator, NS pump 1B fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Applicant's Actions or Behavior
Step 17.d RNO	BOP	d. Perform the following: 1) Ensure ND Pump miniflow valve on operating ND Pumps – OPEN 2) **IF** the ND Pump miniflow valve(s) cannot be opened, THEN... Determines step 17.d.2) does not apply. 3) ***GO*** TO Step **18**
	SRO	Transitions to Step 18 A/ER and directs actions.
Step 18	BOP	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%.
Step 19	RO	Verify all CA isolation valves – OPEN.
Step 20	BOP	Verify S/I equipment status based on monitor light panel – IN PROPER ALIGNMENT.
	ALL	NOTE: Enclosure **4** (NC Temperature Control) shall remain in effect until subsequent procedures provide alternative NC temperature control auidance.
Step 21	RO	Control NC temperature. REFER TO Enclosure **4** (NC Temperature Control).
Step 22	BOP	Verify Pzr PORV and Pzr spray valve status as follows: a. **All** Pzr PORVs – CLOSED. **b.** Normal Pzr spray valves – CLOSED. c. At least one Pzr PORV isolation valve- OPEN.

Op-Test No.: NRC Scenario No.: 2 Event No.: 8-10

Event Description: Steam break inside containment on 1D steam generator, NS pump 1B fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Applicant's Actions or Behavior
Step 23	RO	Verify NC subcooling based on core exit T/Cs – GREATER THAN 0°F.
Step 24	RO	Verify main steamlines are intact as follows: • All S/G pressures – STABLE OR INCREASING • All S/Gs – PRESSURIZED.
	SRO	Transitions to Step 24 RNO and directs actions.
Step 24 RNO	RO/SRO	IF any S/G is decreasing in an uncontrolled manner OR any S/G is depressurized, THEN concurrently: • Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees). • GO TO EP/1/A/5000/E-2 (Faulted Steam Generator Isolation).
	SRO	Transitions to EP/1/A/5000/E-2 and directs actions.
		EXAMINER NOTE: The following steps will be performed in EP/1/A/5000/FR-Z.1 (Response to High Containment Pressure). If the Critical Safety Function Status Tree for Containment is not ORANGE at this time, continue to page 31.
	ALL	Crew determines that Containment Orange path is valid.
	SRO	Transitions to EP/1/A/5000/FR-Z.1 and directs actions.
Step 1	RO/BOP	Monitor Enclosure 1 (Foldout Page).
Step 2	BOP	Verify proper containment isolation and **VX** operation. REFER TO Enclosure 3 (Containment Isolation VX System Verification).

Op-Test No.: NRC Scenario No.: 2 Event No.: 8-10

Event Description: Steam break inside containment on 1D steam generator, NS pump 1B fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Applicant's Actions or Behavior
Step 3.a.	SRO	Verify proper NS operation as follows: a. IF EP/1/A/5000/ECA-1.1 (Loss Of Emergency Coolant Recirculation) is in effect, THEN: Determines step does not apply and continues to Step **3.b.**
Step 3.b.	BOP	b. Verify NS pumps – ON. Determines that 1B NS Pump is OFF and that 1A NS Pump is out of service and informs SRO.
	SRO	Transitions to Step 3.b. RNO and determines actions have been previously performed. Transitions to Step 3.c. A/ER.
Step 3.c.	BOP	Verify S/I systems - IN INJECTION MODE.
Step 3.d.	BOP	d. Ensure all of the following valves - OPEN: • 1NS-20A (NS Pump 1A Suct From FWST) • 1NS-29A (NS Spray Hdr 1A Cont Isol) • 1NS-32A (NS Spray Hdr 1A Cont Isol) • 1NS-3B (NS Pump 1B Suct From FWST) • 1NS-15B (NS Spray Hdr 1B Cont Isol) • 1NS-12B (NS Spray Hdr 1B Cont Isol).
Step 3.e.	BOP	e. Ensure all of the following valves - CLOSED: • 1NS-18A (NS Pmp A Suct From Cont Sump) • 1NS-1B (NS Pmp B Suct From Cont Sump).
Step **4**	RO	Stop all NC pumps.
Step *5*	RO	Verify the following valves - CLOSED: • All MSIVs • **All** MSIV bypass valves.

Op-Test No.: NRC Scenario No.: 2 Event No.: 8-10

Event Description: Steam break inside containment on 1D steam generator, NS pump 1B fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Applicant's Actions or Behavior
Step 6	RO	Verify main steamlines are intact as follows: a. Verify: • All S/G pressures - STABLE OR • All S/Gs - PRESSURIZED. Determines that 1D steam generator is depressurized and informs **SRO.**
	SRO	Transitions to Step 6.a. RNO and directs actions.
Step 6.a.	RO	a. IF pressure in any S/G is decreasing in an uncontrolled manner OR any S/G is depressurized, THEN GO TO Step 7. Determines that 1D steam generator is depressurized and informs SRO.
	SRO	Transitions to Step 7 and directs actions.
Step 7	RO	Verify at least one S/G pressure - STABLE OR INCREASING. Determines that 1A, 1B and 1C steam generator pressures are stable and informs SRO.
Step 8	RO	Verify at least one intact S/G - AVAILABLE FOR NC SYSTEM COOLDOWN. Determines that 1A, 1B and 1C are available and informs SRO.
		EXAMINER NOTE It is critical that the crew take action to isolate feedwater to the faulted S/G to prevent excessive cooldown and minimize inventory loss and minimize steam release to containment.
Step 9 **CRITICAL TASK**	RO/BOP	Isolate all faulted S/G(s) as follows: Determines that 1D is faulted. d. For S/G 1D: 1) Verify S/G 1D Feedwater Isolation status light (1SI-5) - LIT. 2) Close 1CA-42B (CA Pmp B Disch To S/G 1D Isol) 3) Close 1CA-38A (CA Pmp 1 Disch To S/G 1D Isol)

Op-Test No.: NRC Scenario No.: 2 Event No.: 8-10

Event Description: Steam break inside containment on 1D steam generator, NS pump 1B fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Applicant's Actions or Behavior
Step 10	RO	WHEN NC T-Hots start to increase, THEN dump steam from intact S/G PORVs to stabilize NC T-Hots.
Step 11	BOP	Verify conditions allowing alignment of ND for aux containment spray as follows: a. At least one ND train - ALIGNED AND OPERATING IN COLD LEG RECIRC MODE. Determines that ND is not in CLR and informs SRO.
	SRO	Transitions to Step 11.a RNO and directs actions.
Step 11.a RNO		a. Perform the following: 1) WHEN EP/1/A/5000/ES-1.3 (Transfer To Cold Leg Recirculation) is completed, THEN perform Steps 11 and 12. 2) GO TO Step 13.
	SRO	Transitions to Step 13 A/ER and directs actions.
Step 13.a	BOP	Obtain containment H2 concentration as follows: a. Ensure operator has been dispatched to secure all ice condenser air handling units. REFER TO Enclosure 2 (Securing All Ice Condenser Air Handling Units). Dispatches operator.
Step 13.b.	BOP	b. Verify containment H2 analyzers - IN SERVICE Determines the hydrogen analyzers are not in service and imforms SRO.
	SRO	Transitions to Step 13.b. RNO and directs actions.
Step 13.b. RNO	BOP	b. Perform the following: 1) Dispatch operator to place containment H2 analyzers in service. REFER TO OP/1/A/6450/010 (Containment Hydrogen Control Systems}. Dispatches operator. 2) WHEN H2 analyzers in service, THEN perform Steps 13.c through 15. 3) GO TO Step 16.
	SRO	Transitions to Step 16 A/ER and directs actions.

Op-Test No.: NRC Scenario No.: 2 Event No.: 8-10

Event Description: Steam break inside containment on 1D steam generator, NS pump 1B fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Applicant's Actions or Behavior
Step 16	SRO	RETURN TO procedure and step in effect.
	SRO	Transitions to EP/1/A/5000/E-2 and directs actions.
Step 1	ALL	Monitor Enclosure 1 (Foldout Page).
Step 2	ALL	Maintain any faulted S/G or secondary break isolated during subsequent recovery actions unless needed for NC System cooldown.
Step 3	RO	Verify the following valves - CLOSED: • All MSIVs • All MSIV bypass valves.
Step 4	RO	Verify at least one S/G pressure - STABLE–OR INCREASING. Determines that 1A, 1B and 1C steam generator pressures are stable and informs SRO.
Step 5	RO	Identify faulted S/G(s) as follows: • Verify any S/G pressure - DECREASING IN AN UNCONTROLLED MANNER OR • Verify any S/G – DEPRESSURIZED. Determines 1D steam generator pressure is decreasing in an uncontrolled manner or depressurized and informs SRO.
Step 6	RO	Verify at least one intact S/G - AVAILABLE FOR NC SYSTEM COOLDOWN. Determines that 1A, 1B and 1C are available and informs SRO.
Step 7	RO	Isolate all faulted S/G(s) as follows: Determined need to perform for D S/G. • S/G 1D: a. Verify S/G 1D Feedwater Isolation status light (1SI-5) - LIT. b. Verify S/G 1D PORV - CLOSED. c. Close the following valves: 1) 1SM-74B (S/G 1D Otlt Hdr Bldwn S/G 1D Isol). Closes 1SM-746.

Op-Test No.: NRC Scenario No.: 2 Event No.: 8-10

Event Description: Steam break inside containment on 1D steam generator, NS pump 1B fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Applicant's Actions or Behavior
	BOP	2) 1CA-42B (CA Pmp A Disch To S/G 1D Isol). 3) 1CA-38A (CA Pmp 1 Disch To S/G 1D Isol).
	RO	d. Verify the following blowdown isolation valves - CLOSED: 1) 1BB-8A (S/G 1D Bldwn Cont Isol Insd). 2) 1BB-147B (S/G 1D Bldwn Cont Isol Byp). 3) 1BB-10B (S/G 1D Bldwn Cont Isol Otsd).
Step 8	**RO**	WHEN NC T-Hots start to increase, THEN dump steam from intact S/G PORVs to stabilize NC T-Hots.
Step 9	BOP	Verify the following annunciators - DARK. • 1AD-5, H/4 "CACST LO LEVEL" • 1AD-8, B/1 "UST LO LEVEL"
Step 10	BOP	Verify secondary radiation is normal as follows: a. Ensure the following signals - RESET: 1) Phase A Containment Isolations 2) CA System valve control 3) KC NC NI NM St signals. **b.** Align all S/Gs for chemistry sampling. c. Perform at least one of the following: • Notify Chemistry to periodically sample all S/Gs for activity. OR • Notify RP to periodically frisk all cation columns for activity. d. Verify the following EMF trip 1 lights DARK: • 1EMF-26 (Steamline 1A) • 1EMF-27 (Steamline 1B) • 1EMF-28 (Steamline 1C) • 1EMF-29 (Steamline 1D). e. Verify the S/G(s) fault - INSIDE CONTAINMENT. f. WHEN Chemistry reports activity results, THEN verify all S/Gs indicate no activity.

Op-Test No.: NRC Scenario No.: 2 Event No.: 8-10

Event Description: Steam break inside containment on 1D steam generator, NS pump 1B fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Applicant's Actions or Behavior
Step 11	RO/BOP	Verify S/I termination criteria as follows: a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F. b. Verify secondary heat sink as follows: • N/R level in at least one intact S/G - GREATER THAN 11% (29% ACC) OR • Total feed flow to all intact S/Gs - GREATER THAN 450 GPM. c. NC pressure - STABLE OR INCREASING. d. Pzr level - GREATER THAN 11% (20% ACC). e. GO TO EP/1/A/5000/ES-1.1 (Safety Injection Termination).
	SRO	Transitions to EP/1/A/5000/ES-1.1 and directs actions.
Step 1	ALL	Monitor Enclosure 1 (Foldout Page).
Step 2	BOP	Ensure S/I - RESET: a. ECCS. b. D/G load sequencers. c. IF AT ANY TIME a B/O occurs, THEN restart S/I equipment previously on.
Step 3	BOP	Ensure the following containment isolation signals - RESET: • PhaseA • PhaseB.
Step 4	BOP	Establish VI to containment as follows: • Ensure 1VI-77B (VI Cont Isol) – OPEN. • Verify VI pressure - GREATER THAN 85 PSIG.
Step 5 ~~Step 5~~	RO	Ensure only one NV pump - ON. Secures one NV pump and informs SRO.
Step6	RO	Verify NC pressure - STABLE OR INCREASING.
Step 7	BOP	Verify VI pressure - GREATER THAN 50 PSIG.

Op-Test No.: NRC Scenario No.: 2 Event No.: 8-10

Event Description: Steam break inside containment on 1D steam generator, NS pump 1B fails to start in AUTO or MANUAL, failure of automatic main steam isolation signal.

Time	Position	Applicant's Actions or Behavior
Step 8	BOP	. 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). a. Verify the following valves - OPEN: • 1NV-203A (NV Pumps A&B Recirc Isol) • 1NV-202B (NV Pmps A&B Recirc Isol). **b.** Close the following valves: • 1NI-9A (NV Pmp C/L Inj Isol) • 1NI-10B (NV Pmp C/L Inj Isol).

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

Classification: Alert 4.6.A.1-1

Simulation Facility: Catawba **Scenario No.: NRC-3** **Op-Test No:**

Examiners: _____ Operators: _____

_____ _____

_____ _____

Objectives: To evaluate the applicants' ability to increase power using NOPs while maintaining Tave matched to Tref, and to use AOPs to respond to 1C steam line PORV failing open, a low failure of channel I pressurizer level that results in loss of letdown with the attempt to place excess letdown not being successful. The crew will be allowed to restore normal letdown. A feed water regulating valve on 1D steam generator will fail closed, resulting in the need to control steam generator level manually. The crew will then respond to a steam generator tube leak. The leak will propagate to a tube rupture. The applicants will be evaluated using EOPs to respond to the steam generator tube rupture. The turbine will fail to trip automatically and auxiliary feedwater (CA) pump 1B will fail to start automatically but can be manually started. A success path exists via EP/1/A/5000/E-3.

Event No.	Malf. No.	Event Type*	Event Description
1		R- BOP	Dilute NC system boron for power increase
2	1	N-RO	Increase power from 50%
3	MAL-SM002C =50	C-RO	1SV-7 (S/G 1C PORV) fails 50% open (Will fail to 100% if required)
4	XMT-NC015 =0	I-BOP	Pressurizer level channel I fails low

			Event Description
5	VLV-NV032F = 0	C-BOP	Failure of 1NV-123B to open (Inability to establish excess letdown)
6	MAL-SGL006D = 0	C-RO	S/G 1D Feedwater Controller fails closed.
7	MAL-SG001D = 60		S/G 1D tube leak (–60 gpm)
7a	MAL-SG001D = 345 Ramp = 120	M-ALL	SGTR (S/G 1D) (–345 gpm)
8	MAL-EHC002 = AUTO	C-RO	Failure of automatic turbine trip
9	MAL-CA004B = AUTO	C-BOP	CA pump 1B fails to start in AUTO

Op-Test No.: NRC Scenario No.: 3 Event No.: 1

Event Description: Dilution for power increase

Time	Position	Applicant's Actions or Behavior
		Examiner Note: If the dispatcher is contacted for guidance, the response will be increase at 20%/hr.
Step 2.15	SRO/ BOP	Per OP/1/A/6100/003, Enclosure 4.1 : Maintain control rods above insertion limit and AFD within its target by boration or dilution per OP/1/A/6150/009.
	SRO	Directs BOP to add water to begin the load change and provides guidance that the dilution should be done *in* 3 batches. **EXAMINER NOTE: A normal dilution batch at this core life should be about 200-400 gallons.**
	BOP	Refer to OP/1/A/6150/009 (Boron Concentration Control) Enclosure 4.3 (Dilution).
Step 2.2	BOP	Ensure the following valve control switches in "AUTO: • 1NV-242A (RMWST To B/A Blender Ctrl) • 1NV-181A (B/A Blender Otlt To VCT)
Step 2.3	BOP	Adjust the total makeup batch counter to the desired volume of reactor makeup water to be added.
Step 2.4	BOP	Place the "NC MAKEUP MODE SELECT" switch to the "DILUTE position.
Step 2.5	BOP	Adjust the controller for 1NV-242A (RMWST To B/A Blender Ctrl) to the desired flow.
Step 2.6	BOP	Ensure 1NV-242A (RMWST To B/A Blender Ctrl) controller in "AUTO".
Step 2.7	BOP	Ensure at least one reactor makeup water pump is in "AUTO or "ON.

Op-Test No.: NRC Scenario No.: 3 Event No.: 1

Event Description: Dilution for power increase

Time	Position	Applicant's Actions or Behavior
	BOP	NOTE: If necessary, dilution can be manually secured at any time by placing the "NC MAKEUP CONTROL" switch to the 'STOP position.
Step 2.8	BOP	Place the "NC MAKEUP CONTROL" switch in the "START" position.
Step 2.9	BOP	Verify the following valves open: • 1NV-242A (RMWST To B/A Blender Ctrl) • 1NV-181A (B/A Blender Otlt To VCT)
Step 2.10	BOP	If in "AUTO, verify the reactor makeup water pump starts.
Step 2.11	BOP	When the desired volume of reactor makeup water is reached on the total makeup batch counter, ensure the following valves close: • 1NV-242A (RMWST To B/A Blender Ctrl) • 1NV-181A (B/A Blender Otlt To VCT)
Step 2.12	BOP	If automatic makeup is desired, refer to Enclosure 4.1 (Automatic Makeup).

Op-Test No.: NRC Scenario No.: 3 Event No.: 2

Event Description: Turbine load increase

Time	Position	Applicant's Actions or Behavior
	SRO	Directs RO to increase load at a rate of 2 to 4 MW/min or 10% to 20% per hour.
Step 2.3	SRO/RO	Per OP/1/A/6100/003, Enclosure 4.1: Coordinate with SOC to increase turbine load per OP/1/B/6300/001.
	RO	Refer to OP/1/B/6300/001, Turbine Generator, Enclosure 4.2, Section 2.4.
	SRO	Direct RO to increase load at a rate of approximately 2-4 MW/min or 10%-20% per hour to 100% (target).
Step 2.2.1	RO	Depress the "Load Rate" pushbutton and verify it illuminates.
Step 2.2.2	RO	Input the desired load rate on the numeric keypad and verify the load rate appears on the Variable Display.
Step 2.2.3	RO	Depress the "Target" pushbutton and verify it illuminates.
Step 2.2.4	RO	Input the desired load target on the numeric keypad and verify the load target appears on the Target Display.
Step 2.2.5	RO	To start load increase, depress the "Go" pushbutton and verify it illuminates.
Step 2.2.6	ALL	S/G blowdown changes should be coordinated with Secondary Chemistry.

Op-Test No.: NRC Scenario No.: 3 Event No.: 3

Event Description: Steam Generator 1C PORV (1SV-7) fails open.

Time	Position	Applicant's Actions or Behavior
		NOTE: If candidate does not recognize the failure of 1SV-7, the lead examiner may, at his discretion, direct the booth operator to increase the severity value of the malfunction to 100%.
	RO	Recognize indication that S/G 1C PORV failed to intermediate and informs SRO. 1SV-7 (S/G 1C PORV) indicates INTERMEDIATE.
		EXAMINER NOTE: OMP 1-7 allows RO to isolate a known leak without SRO permission and inform SRO of isolation actions performed.
	SRO	Directs RO to close 1SV-7 (S/G 1C PORV)
	RO	Attempts to close PORV **by:** • Placing **"SG** 1C PORV CTRL MODE" switch in "MANUAL" position. • Positioning 1SV-7 (S/G 1C PORV) controller to zero output. Informs **SRO S/G** 1C PORV will not go CLOSED.
	SRO	Directs RO to close 1SV-26B (S/G 1C PORV ISOL).
	RO	Places 1SV-26B (S/G 1C PORV ISOL) in the "CLOSE position. Informs SRO that S/G 1C PORV isolation valve is CLOSED.

Op-Test No.: NRC Scenario No.: 3 Event No.: 3

Event Description: Steam Generator 1C PORV (1SV-7) fails open.

Time	Position	Applicant's Actions or Behavior
	SRO	Refers to Tech Specs: • TS 3.7.4 (Steam Generator Power Operated Relief Valves (SG PORVs) Determines that 3.7.4 applies.
		EXAMINER NOTE: SRO may implement AP/1/A/5500/28
		EXAMINER NOTE: The following actions are provided in case the SRO enters AP/1/A/5500/28 (Secondary Steam Leak).
	SRO	Implements AP/1/A/5500/28 (Secondary Steam Leak) and directs actions.
Step 1	RO	Monitor Enclosure 1 (Foldout Page).
Step 2	RO	Verify turbine –-ONLINE.
Step 3	**RO**	Verify the following: • Reactor power - LESS THAN OR EQUAL TO 100% POWER. • T-avg – WITHIN 1.5°F of T-Ref. **EXAMINER NOTE: If >1.5°F difference, RO should either verify that control rods are automatically attempting to maintain temperature or take manual action to maintain within the band.**

Op-Test No.: NRC Scenario No.: 3 Event No.: 3

Event Description: Steam Generator 1C PORV (1SV-7) fails open.

Time	Position	Applicant's Actions or Behavior
Step **4**	RO	Verify proper reactor response as follows: • Control rods – IN "AUTO AND STEPPING IN • P/R neutron flux – DECREASING.
Step 5	ALL	IF AT ANY TIME reactor power is greater than 100%, THEN perform Step 3 RNO.
Step **6**	RO	Verify Pzr level – STABLE OR INCREASING.
Step 7	ALL	IF AT ANY TIME Pzr level is decreasing in an uncontrolled manner, THEN RETURN TO Step 6.
Step ***8***	**BOP**	IF AT ANY TIME VCT level goes below 23%, THEN **...** Determines step does not apply at this time. **EXAMINER NOTE: This should not occur during the scenario.**
Step **9**	ALL	Attempt to identify and isolate leak as follows: ***a.*** Verify the following conditions – NORMAL • Containment temperature • Containment pressure • Containment humidity • Containment floor & equipment sump level. b. Dispatch operators to locate and identify source of steam leak.

Op-Test No.: NRC Scenario No.: 3 Event No.: 3

Event Description: Steam Generator 1C PORV (1SV-7) fails open.

Time	Position	Applicant's Actions or Behavior
Step 9.c	RO	c. Verify S/G PORVs – CLOSED. Informs SRO that 1C S/G PORV (1SV-7) is NOT CLOSED.
	SRO	Transitions to Step 9.c RNO and directs actions
Step 9.c RNO	RO	c. IF S/G pressure is less than 1090 PSIG, THEN perform the following: 1) Close affected S/G PORV. Determines PORV will not close and informs SRO. 2) IF S/G PORV is still open, THEN: a) Close affected S/G PORV isolation valve. Closes S/G PORV isolation valve (1SV-26B). b) IF S/G PORV isolation valve still open, THEN.. Determines step does not apply.
	RO	Informs SRO that 1C S/G PORV isolation valve (1SB-26B) is closed.
	SRO	Transitions to Step 9.d A/ER column.
Step 9	RO	d. Verify condenser dump valves – CLOSED. e. Verify atmospheric dump valves – CLOSED. f. Verify CAPT #1 – OFF. g. IF leak is suspected to be in the doghouse, THEN ... Leak location determined to be 1C S/G PORV.

Op-Test No.: NRC Scenario No.: 3 Event No.: 3

Event Description: Steam Generator 1C PORV (1SV-7) fails open.

Time	Position	Applicant's Actions or Behavior
Step 10	SRO	Determine required notifications: • REFER TO RP/0/A/5000/001 (Classification of Emergency) • REFER TO RP/0/B/5000/013 (NRC Notification Requirements).
Step 11	BOP	Notify RP of leak.
Step 12	RO	Verify – **LEAK** ISOLATED.
Step 13	SRO	Determine long term plant status. RETURN TO procedure and step in effect.

Op-Test No.: NRC Scenario No.: 3 Event No.: **4**

Event Description: Pressurizer Level Channel I fails LOW

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes Pressurizer Level Channel I has failed LOW and informs SRO. • 1AD-6, D/9 (PZR LO LEVEL HTR OFF & LETDOWN SECURED annunciator • 1AD-6, A/10 (PZR HTR CONTROLLER TROUBLE) annunciator • Pressurizer level channel I 1NCP5164 off scale – LOW **EXAMINER NOTE: Annunciator response is attached.**
	BOP	Responds to event using the annunciator response. Selects channel III to control pressurizer level. • 1AD-6 E/9 (PZR LO LEVEL DEVIATION) annunciator
	BOP	Recognizes that letdown has been lost due to this failure and informs SRO.
	SRO	Implements AP/1/A/5500/12 (Loss of Charging or Letdown) Case II (Loss of Letdown) and directs actions.
Step 1	BOP	Verify all Pzr level channels – INDICATING THE SAME. Determines that channel I has failed low and informs SRO.
	SRO	Transitions to Step 1 RNO and directs actions.
Step 1 RNO	BOP	IF the controlling channel is failed low, THEN place "PZR LEVEL CTRL SELECT' switch in any alternate operable position.
	SRO	Transitions back to Step 2 A/ER column and directs actions.

Op-Test No.: NRC Scenario No.: 3 Event No.: 4

Event Description: Pressurizer Level Channel I fails LOW

Time	Position	Applicant's Actions or Behavior
Step 2	RO	Stop any power changes.
Step 3	BOP	Verify 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)
Step 4	BOP	Verify PZR level – GREATER THAN 17%.
Step 5	BOP	Control charging to stabilize Pzr level at program level while maintaining seal injection flow. Takes manual control of 1NV-294 and reduces charging flow.
Step 6	BOP	Ensure "PZR HEATER GROUP 1C" – ON.
Step 7	BOP	Control VCT level as follows: a. Verify VCT makeup – SET FOR DESIRED BORON CONCENTRATION b. Verify VCT makeup – IN AUTOMATIC.
Step 8	SRO	Determine and correct cause of loss of letdown.
Step 9	BOP	Ensure "PZR LEVEL TO REC SEL" is selected to an operable channel.

Op-Test No.: NRC Scenario No.: 3 Event No.: 4

Event Description: Pressurizer Level Channel I fails LOW

Time	Position	Applicant's Actions or Behavior
Step 10	SRO	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) • 3.6.3 (Containment Isolation Valves) Determines that 3.3.1 applies.
		EXAMINER NOTE: If the crew decides to repressurize the letdown line, when management is called, advise them to establish excess letdown.

Op-Test No.: NRC Scenario No.: 3 Event No.: **4**

Event Description: Pressurizer Level Channel I fails LOW

Time	Position	Applicant's Actions or Behavior
Step 11	BOP	Evaluate normal letdown restoration as follows: a. 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) Informs SRO that 1NV-2A is closed. b. Perform the following: 1) Establish excess letdown. REFER TO OP/1/A/6200/001 (Chemical and Volume Control System) 2) Dispatch operator(s) to pressurize the normal letdown line. REFER TO Enclosure 1 (Pressurization of Normal Letdown Line). c. Do not continue in this procedure until one of the following is met: • Notified by dispatched operator that the letdown line is pressurized. OR • Station management authorizes normal letdown restoration.

Op-Test No.: NRC Scenario No.: 3 Event No.: *5*

Event Description: Failure of 1NV-123B to open (Inability to establish excess letdown).

Time	Position	Applicant's Actions or Behavior
	SRO	Determine that normal letdown is currently not available due to 1NV-2A closed and directs excess letdown to be placed in service.
	SRO	REFERS TO OP/1/A/6200/001 (Chemical and Volume Control System) Enclosure 4.12 (Establishing/Securing Excess Letdown) and directs operators.
Step 2.1.1	BOP	Notify Primary Chemistry of the following: • Excess Letdown will be placed in service • VCT pressure will be reduced to ~ 20 psig
Step 2.1.2	BOP	CAUTION: At least 15 psig backpressure shall be maintained on the NCP #1 seals Reduce VCT pressure to ~ 20 psig per Enclosure 4.22 (Adjusting the Volume Control Tank (VCT) Hydrogen Pressure)
Step 2.1.3	BOP	Open the following valves to establish KC flow to the Excess Letdown Heat Exchanger: • 1KC-305B (Exs Letdn Hx Supply Cont Isol) • 1KC-315B (Excess Letdn Hx Ret Cont Isol)
Step 2.1.4	BOP	Verify 1NV-125B (Excess Letdn Hx Otlt Ctrl) is in the "VCT" position.
		NOTE: The VCT is the preferred alignment. Alignment to the NCDT will result in a faster reduction in NC System hydrogen concentration.
Step 2.1.5	BOP	IF either of the following conditions exist, place 1NV-125B (Excess Letdn Hx Otlt Ctrl) in the "NCDT" position: • VCT pressure greater than or equal to 45 psig as indicated on 1NVP5500 (VCT Vent Press) • VCT level greater than or equal to 50% as indicated on 1NVP5761 (VCT Level)

Op-Test No.: NRC Scenario No.: 3 Event No.: 5

Event Description: Failure of 1NV-123B to open (Inability to establish excess letdown).

Time	Position	Applicant's Actions or Behavior
Step 2.1.6	BOP	Open the following valves: • 1NV-122B (Loop C To Exs Letdn Hx Isol) • 1NV-123B (Loop C To Exs Letdn Hx Isol) Determines that 1NV-1238 will not open and informs SRO.
		NOTE: When the crew contacts the booth the second time to obtain management approval to restore normal letdown, read them the following CUE: "Station management authorizes normal letdown restoration."
	SRO	Continues with AP/12 at Step 12.
AP/12 Step 12	BOP	Establish letdown as follows: a. Verify ability to establish normal letdown – RESTORED b. Ensure 1NV-849 (Letdn Flow Var Orif Ctrl) valve demand position – 0%. c. Verify the following valves – OPEN: • 1NV-1A (NC Letdn To Regen Hx Isol) • 1NV-2A (NC Letdn To Regen Hx Isol). d. Open the following valves: • 1NV-15B (Letdn Cont Isol) • 1NV-10A (Letdn Orif 1B Otlt Isol). e. Adjust the following valves as required in subsequent steps: • 1NV-148 (Letdn Press Control) to maintain letdown pressure at 350 PSIG • 1NV-294 (NV Pmps A&B Disch Flow Ctrl) to maintain letdown subcoooled. f. Monitor letdown flow and pressure. g. Throttle 1NV-849 (Letdn Flow Var Orif Ctrl) until valve demand is position is 10% h. Verify letdown flow and pressure – INCREASES. Observes that letdown flow and pressure have not increased and informs SRO.

Op-Test No.: NRC Scenario No.: 3 Event No.: 5

Event Description: Failure of **1**NV-123B to open (Inability to establish excess letdown).

Time	Position	Applicant's Actions or Behavior
	SRO	Transitions to Step 12.h. RNO and directs actions.
Step 12.h. RNO	SRO	h. Perform the following: 1) IF 1NV-849 valve demand position is **100% ...** Determines that step does not apply and continues to Step 12 RNO. h.2). 2) Throttle open **1**NV-849 until one *of* the following conditions are met: • Letdown flow and pressure increases OR • Valve demand increases **by 10%** OR • Valve demand position is **100%** open. 3) Repeat Step 12.h. **EXAMINER NOTE: Step 12.h. will be repeated until letdown flow is restored. The scenario will proceed to Event 6 at this point.**

Op-Test No.: NRC Scenario No.: 3 Event No.: **6**

Time	Position	Applicant's Actions or Behavior
	RO	Responds to annunciator 1AD-4 C/4 "S/G D FLOW MISMATCH **LO** CF FLOW" **EXAMINER NOTE: A copy of the annunciator response procedure for this alarm is attached.**
	RO	Determines that 1CF-55 (1D S/G Feedwater Regulating Valve) has failed closed and informs **SRO.**
		EXAMINER NOTE: RO has authority to take control of S/G level in manual if auto control fails per OMP 1-8.
	SRO	Directs RO to take manual control of 1CF-55 and open the valve.
	RO	Places manual/auto station for 1CF-55 in MANUAL and opens valve.
	RO	Match level in S/G D with programmed level and maintain. **EXAMINER NOTE: This valve will remain in manual for the remainder of the scenario.**

Op-Test No.: NRC Scenario No.: 3 Event No.: 7

Event Description: 1D Steam Generator Tube Leak (60 gpm)

Time	Position	Applicant's Actions or Behavior
	ALL	Recognize symptoms of a Steam Generator Tube Leak: • Charging flow increasing • EMF 33, 71, 74, 29, 31 alarm
	RO	Verifies Blowdown automatic actions occur: • 1 BB-69, 73, 24, & 65 BB flow control valves go closed • 1BB-27 & **48,** BB Tank Vent and BB pump discharge close Contacts Chemistry and requests verification that S/G BB sample line isolations have closed.
	SRO	Implements AP/1/A/5500/10 (Reactor Coolant Leak) Case **I,** Steam Generator Tube Leak, and directs actions.
Step 1	ALL	Monitor Enclosure 1 (Foldout Page)
Step 2	***RO/***BOP	Verify Pzr level – STABLE **OR** INCREASING. Determines Pzr level is decreasing and informs **SRO.**
	SRO	Transitions to Step 2 RNO and directs actions.

Op-Test No.: NRC Scenario No.: 3 Event No.: 7 Event Description: 1D Steam Generator Tube Leak (60 gpm)		
Time	Position	Applicant's Actions or Behavior
Step 2 RNO	BOP	Perform the following: a. Maintain charging flow less than 180 GPM. b. Manually throttle 1NV-294 (NV Pmps A&B Disch Flow Ctrl) to stabilize Pzr level. c. IF Pzr level is stable OR increasing, THEN GO TO Step 3. Determines Pzr level is stable or increasing and informs **SRO.**
	SRO	Transitions to Step 3 A/ER.
Step 3	ALL	IF AT ANY TIME the S/G tube leak increases, THEN perform Step 2.
Step 4	BOP	Verify Pzr pressure - TRENDING TO OR STABLE AT 2235 PSIG.
Step 5	ALL	• IF AT ANY TIME 1AD-7, I/1 "VCT LO LVL" alarm is lit, THEN... Determines that alarm is NOT lit and informs **SRO.**
		NOTE The OAC calculated leak rate may be invalid during mode changes and/or transient conditions unless there is current, coordinated sampling data available.

Op-Test No.: NRC Scenario No.: 3 Event No.: 7

Event Description: 1D Steam Generator Tube Leak (60 gpm)

Time	Position	Applicant's Actions or Behavior

Step 6	RO	Determine S/G leak rate by any of the following methods:
		Monitor the following computer points:
		• C1PO187 (Estimated Total Pri To Sec Leakrate)
		• C1P0189 (Pri To Sec Leakrate 15 Min Running Avg)
		• EROSLEAK (Primary To Secondary Leakage).
		
		OR
		
		NOTE The S/G Leakage EMFs are highly sensitive which may cause the EMFs located on the adjacent steamline to be increasing or in alarm.
		• ***S/G*** leakage EMF indication(s):
		  • 1EMF-71 (S/G A Leakage)
		  • 1EMF-72 (S/G B Leakage)
		  • 1EMF-73 (S/G C Leakage)
		  • 1EMF-74 (S/G D Leakage).
		OR
		• Compare charging flow and letdown **flow**
		OR
		• Monitor OAC NV Graphic
		OR
		• Initiate OAC Program "NSNCLEAK"
		OR
		• Monitor OAC point C1P0976 (Gross NC System Leak Rate, Ten Min Run Avg).
		
		EXAMINER NOTE: Normally crews use NV OAC graphic and/or by comparing charging and letdown flows.

		NOTE: In subsequent steps the term "leaking S/G" is a S/G with primary to secondary leakage.

Op-Test No.: NRC Scenario No.: 3 Event No.: 7

Event Description: 1D Steam Generator Tube Leak (60 gpm)

Time	Position	Applicant's Actions or Behavior
Step 7	BOP	Identify the leaking S/G(s) as follows: a. Notify RP to frisk all cation columns. NOTE: The S/G Leakage EMFs are highly sensitive which may cause the EMFs located on the adjacent steamline to be increasing or in alarm. b. Verify any of the following S/G leakage EMF indication(s) - INCREASING OR IN ALARM: • 1EMF-71 (S/G A Leakage) • 1EMF-72 (S/G B Leakage) • 1EMF-73 (S/G C Leakage) • 1EMF-74 (S/G D Leakage). c. Verify any of the following S/G steamline EMF indication(s) - INCREASING OR IN ALARM: • 1EMF-26 (Steamline 1A) • 1EMF-27 (Steamline 1B) • 1EMF-28 (Steamline 1C) • 1EMF-29 (Steamline 1D). d. Verify CF flow - LOWER TO ANY S/G AS COMPARED TO OTHERS. e. Notify Secondary Chemistry to determine leaking S/G by sampling. Determines that 1EMF-71, 74, and 29 are in alarm and informs SRO.
		NOTE: • The following leak rates are based on leakage in one S/G. • In the event of an oscillating leak, the leak rate shall be determined based on the peak value of the spike.
Step 8	BOP	Verify leak rate - GREATER THAN OR EQUAL TO 5 GPD. Determines from charging flow increase that the leak is greater than 5 GPD.

Op-Test No.: NRC Scenario No.: 3 Event No.: 7 Event Description: 1D Steam Generator Tube Leak (60 gpm)		
Time	Position	Applicant's Actions or Behavior
Step 9	BOP	Verify leak rate - GREATER THAN OR EQUAL TO **40** GPD. Determines from charging **flow** increase that the leak is greater than 40 GPD.
		EXAMINER NOTE: At this point the leak will be increased to 345 GPM over two minutes. The crew will return to step 2 of AP/10 and perform actions.
	ALL	Determines that leak rate has increased and returns to Step 2.
Step 2	**RO/**BOP	Verify Pzr level – STABLE **OR** INCREASING. Determines Pzr level is decreasing and informs **SRO.**
	SRO	Transitions to Step 2 RNO and directs actions.

Op-Test No.: NRC Scenario No.: 3 Event No.: 7

Event Description: 1D Steam Generator Tube Leak (60 gpm)

Time	Position	Applicant's Actions or Behavior
Step 2 RNO	BOP	Perform the following: a. Maintain charging flow less than 180 GPM. b. Manually throttle 1NV-294 (NV Pmps A&B Disch Flow Ctrl) to stabilize Pzr level. c. IF Pzr level is stable OR increasing, THEN GO TO Step 3. Determines Pzr level is continuing to decreasing and informs SRO. d. IF Pzr level continues to decrease, THEN: **EXAMINER NOTE: If letdown flow was restored in Event 5, the BOP will reduce letdown to 45 GPM at this point. Otherwise, the steps for letdown reduction will be skipped.** 1) Reduce letdown to 45 GPM as follows: a) Manually control 1NV-148 (Letdn Press Control) to maintain letdown pressure at 350 PSIG. b) IF 1NV-13A (Letdn Orif 1A Otlt Cont Isol) is open, Determines that 1NV-13A is not open and that step does not apply. c) IF 1NV-10A (Letdn Orif 1B Otlt Cont Isol) is open, THEN throttle 1NV-849 (Letdn Flow Var Orif Ctrl) until letdown flow is 45 GPM. d) WHEN letdown pressure is stable at 350 PSIG, THEN place 1NV-148 (Letdn Press Control) in "AUTO".
Step 2.2) RNO	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). Closes valves and informs SRO.
Step 2.3) RNO	BOP	3) IF Pzr level is stable OR increasing, THEN GO TO Step 3. Determines that PZR level is decreasing and informs SRO.

Op-Test No.: NRC Scenario No.: 3 Event No.: 7 Event Description: 1D Steam Generator Tube Leak (60 gpm)		
Time	Position	Applicant's Actions or Behavior
Step 2.d.4) RNO	BOP	4) IF Pzr level continues to decrease, THEN: a) Start an additional NV pump as follows: (1) Open 1NV-252A (NV Pumps Suct From FWST) (2) Open 1NV-253B (NV Pumps Suct From FWST) (3) Close 1NV-188A (VCT Otlt Isol) **(4)** Close 1NV-189B (VCT Otlt Isol) ***(5)*** Start the desired NV Pump. Positions valves appropriately and starts 1**A** NV Pump.
	RO	b) Adjust Control Rods and turbine load as required to maintain T-Avg within 1°F of T-Ref. REFER TO the following: • AP/1/A/5500/09 (Rapid Downpower) OR • OP1/A/6100/003 (Controlling Procedure for Unit Operation
	SRO	c) IF Pzr level is stable OR increasing THEN GO TO Step 3. Determines that Pzr level is continuing to decrease and continues in RNO.
	ALL	d) IF Pzr level continues to decrease OR Pzr level cannot be maintained greater than 11%, THEN: (1) Manually trip reactor (2) Manually initiate S/I (3) GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).
	SRO	Directs RO to trip the reactor and the BOP to manually initiate S/I.

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automatically start.

Time	Position	Applicant's Actions or Behavior
	SRO	Enters EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection) and directs operators
Step 1	ALL	Monitor Enclosure 1 (Foldout Page)
		EXAMINER NOTE: Steps 2 through 5 are Immediate Action steps and must be performed from memory.
Step 2	RO	Verify Reactor Trip: • All rod bottom lights – LIT • All reactor trip and bypass breakers – OPEN • I/R amps – DECREASING
Step 3	RO	Verify Turbine Trip: • All turbine stop valves – CLOSED Determines that the turbine is not tripped and manually trips the turbine. Informs the SRO of this when the step is read aloud.
	SRO	Transitions to Step 3 RNO and directs actions.
Step 3 RNO	RO	a. Manually trip the turbine Depresses the manual trip pushbutton and verifies that all turbine stop valves are closed and informs SRO.
	SRO	Transitions to Step 4. A/ER and directs actions.
Step 4	BOP	Verify 1ETA and 1ETB – ENERGIZED.
Step 5	BOP	Verify S/I is actuated: a. "SAFETY INJECTION ACTUATED" status light (1SI-13) – LIT b. E/S load sequencer actuated status lights (1SI-14) – LIT
Step 6	RO	Announce "Unit 1 Safety Injection".

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automatically start.

Time	Position	Applicant's Actions or Behavior
Step 7	SRO	Implement RP/0/A/5000/01 (Classification Of Emergency).
Step 8	RO	Verify all Feedwater Isolation status lights (1SI-5) – LIT
Step 9	BOP	Verify Phase A Containment Isolation status as follows: a. Phase A "RESET" lights – DARK b. Monitor Light Panel Group 5 St lights – LIT EXAMINER NOTE: 1KC-305 may be dark due to attempt to put excess letdown in service earlier in the scenario. If so, BOP will close it in response to this step's RNO.
Step 10	ALL	Verify proper Phase B actuation as follows: a. Containment pressure – HAS REMAINED LESS THAN 3 PSIG b. IF AN ANY TIME containment pressure exceeds 3 PSIG while in this procedure, THEN perform Step 10.a.
Step 11.a	RO	Verify proper CA pump status as follows: a. Motor driven CA pumps – ON Determines that 1A and 1B CA pumps are off and informs SRO.
Step 11.a RNO	BOP	Transitions to Step 11.a RNO and directs actions. a. Perform the following for the affected train(s): 1) Reset ECCS. 2) Reset D/G load sequencer. 3) Manually start affected motor driven CA pump. Starts the 1B CA Pump manually. 4) IF AT ANY TIME a B/O occurs, THEN restart S/I equipment previously on. **EXAMINER NOTE: Crew may only reset B Train since 1A CA Pump is tagged out and there is no benefit for resetting A Train.**

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automatically start.

Time	Position	Applicant's Actions or Behavior
	SRO	Transitions to Step 11.b A/ER and directs actions.
Step 11.b	RO	b. 3 S/G N/R levels – GREATER THAN 11%
Step 12	BOP	Verify all of the following S/I pumps – ON: • NV pumps • ND pumps • NI pumps
Step 13	BOP	Verify all KC pumps – ON.
Step 14	BOP	Verify all Unit 1 and Unit 2 RN pumps – ON
Step 15	BOP	Verify proper ventilation systems operation as follow: • REFER TO Enclosure 2 (Ventilation System Verification) • Notify Unit 2 operator to perform Enclosure 3 (Opposite Unit Ventilation Verification)
Step 16	RO	Verify all S/G pressures – GREATER THAN 775 PSIG.
Step 17	BOP	Verify proper S/I flow as follows: a. "NV S/I FLOW – INDICATING FLOW b. NC Pressure – LESS THAN 1620 PSIG Determines NC pressure is greater than 1620 psig and informs SRO.
	SRO	Transitions to Step 17.b RNO and directs actions.

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9 Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automatically start.		
Time	Position	Applicant's Actions or Behavior
Step 17.b RNO	BOP	b. Perform the following: 1) Ensure ND pump miniflow valve on operating ND pump(s) – OPEN. 2) IF the ND Pump miniflow valve(s) cannot be opened, THEN perform the following for the affected train(s): Determines that this step is N/A and continues in RNO column. 3) GO TO Step 18.
	SRO	Transition to step 18 A/ER and directs actions.
Step 18	**RO**	Control S/G levels as follows: a. Verify total CA flow – GREATER THAN 450 GPM. b. 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%.
Step 19	RO	Verify all CA isolation valves – OPEN.
Step 20	BOP	Verify S/I equipment status based on monitor light panel – IN PROPER ALIGNMENT. Determines that 1A CA pump and possibly 1KC-305 are not in proper alignment and informs **SRO.**
	SRO	Transition to Step 20 RNO and directs actions.
Step 20 RNO	**BOP**	Manually align equipment.
	SRO	Transitions to Step 21 A/ER and directs actions.
	RO	NOTE: Enclosure **4** (NC Temperature Control) shall remain in effect until subsequent procedures provide alternative NC temperature control guidance.

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automatically start.

Time	Position	Applicant's Actions or Behavior
Step 21	RO	Control NC temperature. REFER TO Enclosure 4 (NC Temperature Control).
Step 22	BOP	Verify Pzr PORV and Pzr spray valve status as follows: a. All Pzr PORVs – CLOSED. **b.** Normal Pzr spray valves – CLOSED. c. At least one Pzr PORV isolation valve- OPEN.
Step 23	RO	Verify NC subcooling based on core exit T/Cs – GREATER THAN 0°F.
Step 24	RO	Verify main steamlines are intact as follows: • All S/G pressures – STABLE OR INCREASING

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automatically start.

Time	Position	Applicant's Actions or Behavior

Step 25	RO/BOP	Verify S/G tubes are intact as follows:
		• Verify the following EMF trip 1 lights – DARK:
		  • 1EMF-33 (Condenser Air Ejector Exhaust)
		  • 1EMF-34 (S/G Sample)
		  • 1EMF-26 (Steamline 1A)
		  • 1EMF-27 (Steamline 1B)
		  • 1EMF-28 (Steamline 1C)
		  • 1EMF-29 (Steamline 1D)
		• All S/G levels – STABLE OR INCREASING IN A CONTROLLED MANNER
		Determines that 1EMF-33 and 1EMF-29 are in alarm, and/or 1D S/G level is increasing in an uncontrolled manner and informs SRO.

	SRO	Transitions to Step 25 RNO and directs actions.
	SRO	IF any EMF trip 1 light is lit OR any S/G level is increasing in an uncontrolled manner, THEN concurrently: • Implements EP/1/A/5000/F-0 (Critical Safety Function Status Trees) • GO TO EP/1/A/5000/E-3 (Steam Generator Tube Rupture).
	SRO	Transitions to EP/1/A/5000/E-3 and directs actions.
Step 1	RO/BOP	Monitor Enclosure 1 (Foldout Page)

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automatically start.

Time	Position	Applicant's Actions or Behavior
Step 2	RO/BOP	Identify ruptured S/Gs as follows: • S/G level – INCREASING IN AN UNCONTROLLED MANNER OR • Chemistry or **RP** determines ruptured S/G by frisking the cation columns in the CT lab. OR • The following EMF trip 1 lights – LIT: • 1EMF-26 (Steamline 1A) • 1EMF-27 (Steamline 1B) • 1EMF-28 (Steamline 1C) • 1EMF-29 (Steamline 1D) OR • Chemistry determines ruptured S/G using EMF-34 (S/G Sample). OR • IF S/G Sampling is required to identify ruptured S/G(s), THEN: a. Ensure the following signals reset: 1) Phase A Containment Isolations 2) CA System valve control 3) KC NC NI NM St signals b. Align all S/Gs for Chemistry sampling. c. Notify Chemistry to sample all S/Gs for activity. **EXAMINER NOTE: Normally crews rely on EMF trip 1 lights and ask for Chemistry confirmatory samples.**
Step 3	**RO**	Verify at least one intact ***S/G*** – AVAILABLE FOR NC SYSTEM COOLDOWN.

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automatically start.

Time	Position	Applicant's Actions or Behavior
Step 4	RO	Isolate steam flow from ruptured S/Gs as follows: a. Verify all ruptured S/Gs PORV – CLOSED b. Verify S/G(s) 1B and 1C – INTACT
Step 4.c	RO	c. Isolate blowdown and steam drain on all ruptured S/G(s) as follows: Determines this step is N/A for S/Gs 1A, 1B, and 1C. • 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)
Step 5	RO	Close the following valves on all ruptured S/G(s): • MSIV • MSIV Bypass valve Closes MSIV and verifies MSIV Bypass valve closed on 1D S/G.

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automatically start.

Time	Position	Applicant's Actions or Behavior
Step **6**	RO/BOP	Control ruptured S/G(s) level as follows: a. Verify ruptured S/G(s) N/R level – GREATER THAN 16% (29% ACC). b. Isolate feed flow to all ruptured S/G(s) as follows: Determines this step is N/A for S/Gs 1A, 1B, and 1C. • S/G 1D: 1) Close 1CA-42B (CA Pmp A 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 **16%** (29% ACC), THEN perform step **6.** **EXAMINER NOTE: This *action* should not be required.**
Step 7	BOP/RO	Verify Pzr PORV and isolation valve status as follows: a. Power to all Pzr PORV isolation valves – AVAILABLE b. All Pzr PORVs – CLOSED c. At least one Pzr PORV isolation valve – OPEN **d.** IF AT ANY TIME Pzr PORV opens due to high pressure while in this procedure, THEN, after Pzr pressure decreases to less than 2315 PSIG. perform Step **7.b**
Step 8	**RO**	Verify main steamlines are intact as follows: • All S/G pressures – STABLE OR INCREASING • All S/Gs – PRESSURIZED

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automatically start.

Time	Position	Applicant's Actions or Behavior
Step 9	RO/BOP	Control intact S/G levels as follows: a. Verify N/R level in all intact S/Gs – GREATER THAN 11% (29% ACC). Determines that not all steam generator levels are greater than 11% and informs SRO.
	SRO	Transitions to Step 9.a. RNO and directs actions.
Step 9.a. RNO	RO/BOP	a. Perform the following: 1) Maintain total feed flow greater than 450 GPM to intact S/Gs until at least one S/G N/R level greater than 11% (29% ACC). Determines that at least one intact S/G N/R level is greater than 11% and informs SRO.
	SRO	Transitions to Step 9.b. A/ER and directs actions.
Step 9.b.		b. Throttle feed flow to maintain all intact S/G N/R levels between 11% (29% ACC) and 50%.
Step 10	BOP	Ensure S/I – RESET: a. ECCS b. D/G load sequencers c. IF AT ANY TIME a B/O occurs, THEN restart S/I equipment previously on **Examiner Note: B Train ECCS and load sequencer were previously reset to allow B CA pump manual start.**
Step 11	BOP	Ensure the following containment isolation signals – RESET: • Phase A • Phase B
Step 12	BOP	Establish VI to containment as follows: a. Ensures 1VI-77B (VI Cont Isol) – OPEN b. Verify VI pressure – GREATER THAN 85 PSIG

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automatically start.

Time	Position	Applicant's Actions or Behavior

Step 13	BOP	Verify all AC busses are energized by offsite power as follows:
		• ATrain:
		  • "FTA B/O NORM FDR FRM A T C – CLOSED
		  • "D/G 1A BKR TO E T A – OPEN
		  • 1ETA – ENERGIZED
		• B Train:
		  • "FTB B/O NORM FDR FRM A T D – CLOSED
		  • "D/G 1B BKR TO ETB" – OPEN
		  • 1**ETB** – ENERGIZED.

Step 14	BOP/RO	Verify criteria to stop operating ND pumps as follows: a. At least one ND pump – ON b. NC pressure – GREATER THAN 285 **PSIG** **c.** Ensure all ND pump(s) not supporting Cold Leg Recirc – STOPPED d. IF AT ANY TIME NC pressure decreases to less than 285 **PSIG** in an uncontrolled manner, THEN restart ND pumps.
Step 15	**SRO**	Verify ruptured S/G(s) – IDENTIFIED. Determines 1D S/G is the ruptured S/G.
Step **16**	RO	Verify the following valves **on** all ruptured S/Gs – CLOSED: • MSIV • MSIV bypass valves Ensures closed for1 D S/G.
Step 17	**RO**	Verify at least one NC pump – ON.

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automaticallv start.

Time	Position	Amlicant's Actions or Behavior
Step 18	BOP	WHEN "P-11 PZR S/I BLOCK PERMISSIVE" status light (1SI-18) is lit, THEN: a. Depress ECCS steam pressure "BLOCK" pushbuttons b. Verify main steam isolation blocked status lights (1SI-13) – LIT c. Maintain NC pressure less than 1955 PSIG using one of the following: • Pzrspray OR • Pzr PORV **EXAMINER NOTE: Initially, this status light will be dark but will light during the cooldown procedure loop during step 19.**
	ALL	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, Main Steam Isolation will occur if the high steam pressure rate setpoint is exceeded.

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B **CA** Pump to automatically start.

Time	Position	Applicant's Actions or Behavior
		EXAMINER NOTE: Cooldown and depressurization to minimize break flow is a CRITICAL TASK. These are noted in the auide.
Step 19	RO	Initiate NC System cooldown as follows: **b.** Determine required core exit temperature from the table below: **EXAMINER NOTE: Based on S/G pressure of 1100-1199 psig, the crew should cooldown the NCS to < 520 °F.** c. Verify the condenser is available as follows: . • "C-9 COND AVAILABLE FOR STM DUMP status light (1SI-18) – LIT • MSlV on intact S/G(s) – OPEN d. WHEN "P-12 LO-LO TAVG" status light (1SI-18) is lit, THEN place the steam dump interlock bypass switches in "BYP INTK." e. Verify steam dumps – IN PRESSURE MODE Determines steam dumps are in "T AVG" Mode and informs SRO.
	SRO	Transition to Step 19.e RNO and directs actions.
Step 19.e RNO	RO	Place steam dumps in pressure mode as follows: 1) Place "STM DUMP CTRL" in manual. 2) Manually adjust the "STM DUMP CTRL" to match "STM DUMP CTRL" demand and "% STM DUMP DEMAND. 3) WHEN demand on the **"STM** DUMP CTRL" ***is*** equal to the "% STM DUMP DEMAND, THEN place the steam dumps in pressure mode.
	SRO	Transition to Step 19.f A/ER column and direct actions.
	RO	**EXAMINER NOTE: If Main Steam Isolation occurs during the cooldown, the SRO will direct steam to be dumped from intact S/G PORVs per step 19.f RNO.**

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automatically start.

Time	Position	Applicant's Actions or Behavior
CRITICAL TASK	RO	f. Dump steam to condenser from intact S/G(s) at maximum rate while attempting to avoid a Main Steam Isolation. g. Verify main steam isolation blocked status lights (1SI-13) – LIT. **EXAMINER NOTE: Initially, main steam isolation status light will be dark.** Determines main steam isolation lights dark and informs SRO.
	SRO	Transitions to Step 19.g RNO and directs actions.
Step 19.g RNO	BOP	g. IF pressure in S/Gs used for cooldown is approaching 800 PSIG, THEN: 1) Depressurize NC System to less that 1955 PSIG using one of the following: • Pzr spray OR • Pzr PORV. 2) Maintain NC pressure less than 1955 PSIG. **EXAMINER NOTE: This step may not be used.**
	SRO	Transitions to Step 19.h A/ER and directs actions.
Step 19	RO	h. Verify core exit T/Cs – LESS THAN REQUIRED TEMPERATURE. **EXAMINER NOTE: Procedure will loop in Step 19 until the required temperature is reached.** i. Stabilize core exit T/Cs – LESS THAN REQUIRED TEMPERATURE.
	BOP	Depresses Main Steam pressure "Block" pushbuttons and maintains NC pressure <1955 psig. **EXAMINER NOTE: Sometime during the depressurization, the status lights from Step 18 will light. At that point this step will be performed.**
Step 20	SRO	Verify NC System cooldown in Step 19 – COMPLETED.

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automatically start.

Time / Time	Position	Applicant's Actions or Behavior
Step 21 Step **21**	RO	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 **21.**
Step 22 Step **22**	RO	Verify NC subcooling based on core exit T/Cs – GREATER THAN **20°F.**

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automaticallv start.

Time	Position	Applicant's Actions or Behavior
Step 23 CRITICAL TASK	BOP	Depressurize NC System using PZR Spray as follows: a. Verify normal Pzr spray flow – AVAILABLE. b. Verify Pzr level – LESS THAN 76% (73% ACC). c. Depressurize NC System with maximum available spray. d. Verify subcooling based on core exit T/Cs – GREATER THAN 0° F. e. Verify Pzr level – LESS THAN 76% (73% ACC). f. Verify NC pressure – LESS THAN RUPTURED S/G(s) PRESSURE. g. Verify Pzr level – GREATER THAN 11% (20% ACC). EXAMINER NOTE: SRO will loop back through this step until one of the conditions is met. At that time, the depressurization will be stopped. The SRO may determine that sprays are not effectively depressurizing the NCS and transition to Step 23.f RNO or Step 23.g RNO which transitions to Step 24 A/ER and use Pzr PORVs instead. h. Close the following valve(s): 1) Pzr spray valves 2) 1NV-37A (NV Supply To Pzr Aux Spray) i. Observe Caution prior to step 26 and GO TO Step 26.
Step 24	BOP	EXAMINER NOTE: If this option for depressurization is used, the SRO will loop back through this step until one of the conditions is met. Otherwise skip to Step 26. Depressurize NC System using PZR PORV as follows: a. Verify at least one Pzr PORV – AVAILABLE b. Verify Pzr level – LESS THAN 76% (73% ACC) c. Open one Pzr PORV. d. Verify subcooling based on core exit T/Cs – GREATER THAN 0°F e. Verifv Pzr level – LESS THAN 76% (73% ACC)

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9

Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automatically start.

Time	Position	Applicant's Actions or Behavior
Step 24 (cont.)	BOP	f. Verify NC pressure – LESS THAN RUPTURED S/G(s) PRESSURE. h. Verify Pzr level – GREATER THAN 11% (20% ACC) i. Close Pzr PORV. j. Close Pzr spray valve(s).
Step 25	RO	Verify NC Pressure - INCREASING. RO observes NC Pressure increasina and informs SRO.
		CAUTION: S/I must be terminated when termination criteria are satisfied to prevent overfilling the ruptured S/G(s).
Step 26	RO/BOP	Verify S/I termination criteria as follows: a. NC subcooling based on core exit T/Cs - GREATER THAN 0°F. b. Verify secondary heat sink as follows: • 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% (20% ACC).
Step 27	BOP	Stop S/I pumps as follows: a. Stop NI pumps. b. Ensure only one NV pump – ON. Secures both NI Pumps and one NV Pump
Step 28	BOP	Verify VI pressure - GREATER THAN 50 PSIG.

Op-Test No.: NRC Scenario No. 3 Event No. 7a-9 Event Description: 1D Steam Generator Tube Rupture (345 gpm) coincident with failure of automatic turbine trip and failure of 1B CA Pump to automatically start.		
Time	Position	Applicant's Actions or Behavior
Step 29	RO/BOP	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). **EXAMINER NOTE: These valves may be closed, depending upon NC system pressure. If so, SRO will direct actions per Step 29.b RNO to open them.**
Step 29.c.	BOP	c. Close the following valves: • 1NI-9A (NV Pmp C/L Inj Isol) • 1NI-10B (NV Pmp C/L Inj Isol).

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

Classification: Site Area Emergency 4.1.S.3