INITIAL SUBMITTAL OF THE SCENARIOS

FOR THE KEWAUNEE INITIAL EXAMINATION - AUG/SEP 2002

DYNAMIC EXAM SCENARIO ID#: SES-2002301: #1

SIMULATOR SHIFT TURNOVER:

Per Scenario Outline.

SIMULATOR SCENARIO SET UP

STEP COUNTERS ON _____

INIT into IC _____

NTP-6410, Communicator Telephone Log, available _____

NTP 6411, Simulator Setup Checklist, completed _____

NTP-6412, Simulator Book Preparation Checklist, completed _____

NTP-4 Attachment 10, Simulator Scenario Briefing Sheet, completed _____

NTP-4, Attachment 13, KNPP Simulator Security Checklist, completed _____

SCENARIO GUIDE:

1. **Initialize to a 50% Power IC or saved specific SES IC.**
2. **Place RHR Pump A control switch in pullout and place a Hold Card on the switch.**
3. **Place AFW Pump B control switch in pullout and place a Hold Card on the switch.**
4. **Place an "Out of Service" sticker on S/G B Level Indicator LI-472.**
5. **Ensure Circulating Water Pump A is running, CW Pump B is OFF.**
6. **Preload (or verify preloaded) and verify active the following simulator codes:**

TIME	TYPE	DESCRIPTION	RAMP START VALUE	RAMP TIME	DELAY TIME	VALUE*	TRIGGER
Preload	Malf	RH04B - Failure to Auto Start, RHR Pump 1B	----	----	----	----	----
Preload	Meter	MCA, AO-41052-02, LI-472	----	-----	----	0	----
Preload	Remote Function	RP191, 472A, Lo/Lo Level Logic	----	----	----	TRIP	----
Preload	Remote Function	RP192, 472B, Hi Level Logic	----	----	----	TRIP	----
Preload	Remote Function	RP193, 472C, Lo Level Logic	----	----	----	TRIP	----
Preload	Annunciator	47065-F, SER0812, AMSAC in Test	----	----	----	Crywolf	----
Preload	Lights	MVB, DO-47033:0401, TLA-16 AMSAC Channel Abnormal	----	----	----	ON	----

* The input under the "VALUE" column includes Severity Value, Analog Value, Digital Value, Remote Value, and Malfunction Value inputs as appropriate for each action.

Use the Instructor Summary Station to verify the simulator codes in the table below are assigned to the appropriate Trigger with the appropriate value(s).

These events will be input as shown in the guidance following the table.

TIME	TYPE	DESCRIPTION	RAMP START VALUE	RAMP TIME	DELAY TIME	VALUE*	TRIGGER**
Event 2	System Override	RX211, LT-461, SG Level	As found	5	----	0	1
Event 2 – (A-MI-87)	Remote Function	RP170, 461B – Lo/Lo Level Logic	----	----	----	TRIP	2
Event 2 – (A-MI-87)	Remote Function	RP169, 461A – Hi Level Logic	----	----	30	TRIP	2
Event 3	Malfunction	CW04A, Timed/Inst Overcurrent, CW Pump 1A	As found	----	----	75	3
Event 4	Malfunction	RC08, Reactor Coolant System Leaks	----	----	----	2	4
Event 4a	Malfunction	RC08, Reactor Coolant System Leaks	As found	----	----	6	----
Event 5-7	Malfunction	RC04A, Loss of Coolant Accident – Cold Leg(1A)	----	----	----	100	5
Event 5-7 (ES-1.3)	System Override	SI101, LT- RWST level	As found	----	----	36	6
Event 5-7 (ES-1.3)	Meter	MCC, AO-41303-02, FI-928	----	----	----	0	7
Event 5-7 (ES1.3)	Meter	MCC, AO-41306, PI-628	----	----	----	0	7
Event 5-7 (ES-1.3)	Meter	MCC, AO-41336	----	----	----	9.5	8
Event 5-7 (ES-1.3)	Malfunction	SI101, LT- RWST level	As found	----	----	9	----

* The input under the "VALUE" column includes Severity Value, Analog Value, Digital Value, Remote Value, and Malfunction Value inputs as appropriate for each action.

** See following page for specific guidance on Trigger activation.

Simulator Operator Guidance:

Trigger 1 – Activate when requested by Lead Examiner to fail LT-461 low.
Trigger 2 – Activate to trip bistable 461A and 461B per A-MI-87 (I&C) **Note: 461B will trip after a 30 second delay.**
Trigger 3 – Activate when requested by Lead Examiner to trip CW Pump A. NOTE: Due to the nature of this malfunction, the pump will not trip for about 5 minutes..
Trigger 4 – Activate when requested by Lead Examiner to initiate a 50 gpm RCS leak. **NOTE: Modify this malfunction (RC08), when requested by lead examiner, to the values shown in Event 4a (Increase RC08 leak to 6%).**
Trigger 5 – Activate immediately upon manual reactor trip to cause LBLOCA.
Trigger 6 – Activate when requested by Lead Examiner to lower RWST level to 36% - **NOTE: AFTER ACTIVATING THIS TRIGGER, THE SYSTEM OVERRIDE (SI101) MUST BE REMOVED USING THE INSTRUCTOR STATION SUMMARY.**
Trigger 7 – Activate **AFTER** RHR Pump B is stopped in ES-1.3.
Trigger 8 – Activate **IMMEDIATELY** when control switch for RHR Pump B is taken to START.
OTHER - (if required) Insert last system override (SI101) shown on page 3 to lower RWST level to 9%. **NOTE: AFTER INSERTING THIS OVERRIDE, IT MUST BE REMOVED USING THE INSTRUCTOR STATION SUMMARY.**

ANTICIPATED BOOTH COMMUNICATION/GUIDANCE:

Event 1: This event is a normal up-power. The field operators should be informed of the power escalation, with an acknowledgement by the communicator.

Event 2: This event is a failure of Steam Generator 'A' Level Transmitter LT-461 (fails low). This failure will cause S/G 'A' Feedwater Flow Control Valve to fully open, requiring the operator to take manual control of the valve by placing the controller in manual and adjusting to lower and maintain level. After stabilizing the plant, A-MI-87 will be utilized to remove the channel from service. The CRS will request SP 47-316A to check redundant channel bistables. The communicator should inform the CRS that SP 47-316A is complete and no redundant channel bistables were found tripped. I&C will also be requested to trip the bistables associated with the level channel. The paperwork (A-MI-87) should be obtained from the CRS and the bistables tripped per this simulator guide. After tripping the bistables, the A-MI-87 paperwork should be signed off as appropriate and returned to the control room.

Event 3: This event is a failure of the running CW pump (CW Pump 'A'). The standby pump must be started to prevent a turbine trip on lowering vacuum. After starting the standby CW pump, a field operator may be contacted to align Service Water to CW Pump 'B', as well as to verify seal water and oil levels. This request should be acknowledge and reported back as complete after allowing sufficient time to complete the task (5-10 minutes). If an operator is dispatched to the breaker for CW Pump A, it should be reported back that the breaker has tripped on overcurrent. If local investigation of the tripped pump/motor is requested, it should be reported that all appears normal. Local checks of the travelling screens will also be requested. It should be reported that there are no problems with the screens and they are operating normally. Forebay level should be reported as normal if asked.

Event 4: This event is a small RCS leak (50 gpm) inside containment. The small break failure should be inserted at the request of the lead examiner. A-RM-45 and A-RC-36D will be entered due to the RCS leak. After plant conditions have stabilized, letdown is isolated (for leak location diagnosis), and the determination made that the leak still exists, the leak size will be increased such that charging flow is unable to maintain sufficient pressurizer level. A manual reactor trip should be directed prior to pressurizer level going off-scale low. When Radiation Protection is notified of the event, acknowledge the report. No additional communications are foreseen. When the reactor is tripped, proceed to the next event series.

Event 5, 6, 7: This series of events includes the initiation of a Large Break LOCA upon tripping of the reactor, a failure of RHR Pump B to Auto-start, and a subsequent failure of RHR Pump B (broken coupling) upon restart of RHR Pump B after alignment for Containment Sump Recirculation. A field operator may be requested to investigate RHR Pump B when started after alignment for Sump Recirculation. If requested, the report back should indicate that local discharge pressure is zero and there is no flow noise from the RHR piping. No additional booth communications are expected.

Op-Test No: 2002301 Scenario No: 1 Event No: 1 Page 1 of 2

Event Description: **Perform Normal Up-Power (Reactivity Manipulation).**

Time/Notes	Position	Applicant's Actions or Behavior
At the discretion of the lead examiner, the normal up-power brief may be conducted in the classroom prior to entering the simulator.		
	CRS	Brief crew on evolution, including discussion of N-0-03 (Plant Operation Greater Than 35% Power) precautions and limitations, for commencing up-power.
	CRS	Implement actions of N-0-03
	RO	Perform reactivity estimate based on planned load increase.
	CRS	Direct increase to 100% power.
	BOP	Increase load per N-TB-54: • Review applicable Precautions & Limitations. • Determine maximum loading rate based on fuel performance (40 MW/hr) • Determine maximum load rate based on turbine operating limits per Figures 2 & 3. • Adjust turbine controls to clear Valve Position Limiter: 1. Lower the setter to ≤ value stated on EH Panel Plaque. 2. Set loading rate to ≤ 5% per minute. 3. Depress GO pushbutton. 4. When VPL light goes out, push the HOLD pushbutton. • Verify/set Valve Position Limit to 100%. • Set setter to desired load. • Verify/set loading rate to 0.25% per min (minimum loading rate of 0.25% per min is normal plant practice). • Verify loading rate is less than maximum allowable rate. • Inform Energy Supply & Control of rate and amount of load pickup. • Depress GO. • Verify load increases.

Event Description: **Perform Normal Up-Power (Reactivity Manipulation).**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Perform reactivity adjustments: Rod Control (rod motion at 1.5 °F difference Tave-Tref) AND/OR Boron Concentration Control (initiate dilution) per N-CV-35A: • Review applicable Precautions & Limitations • Verify at least one RXCP in operation • Determine rate and magnitude of dilution • Position Reactor Makeup Mode Selector to DILUTE or ALT DIL. • Adjust MU-1022/CV-31095, Blender Control Rx Mu Flow, to required flow rate • Set Rx Make-up Totalizer to required quantity • Position Reactor Makeup Control switch to START • Verify required change has been achieved by monitoring: 1. Rod Position 2. Boron Concentration 3. Tave • When dilution is complete: 1. Position Reactor Makeup Mode Selector to AUTO 2. Position Reactor Makeup Control switch to START 3. Adjust CVC-403/CV-31092, Blender Control BA Flow, to current RCS boron concentration • If RCS boron concentration has been changed by >50 ppm, operate Przr heaters as necessary to equalize RCS and Przr boron.
	BOP	Adjust Heater Drain Pump speed as required to maintain equal loading on pumps.

Once power has been raised 5% and/or at the discretion of the Lead Examiner, proceed to the next event (Event #2).

Op-Test No: 2002301 Scenario No: 1 Event No: 2 Page 1 of 2

Event Description: **Steam Generator 'A' level control channel LT-461 fails low.**

Time/Notes	Position	Applicant's Actions or Behavior
	BOP	Identify/report failed S/G A level channel LT-461. Available indications: • Annunciator "S/G A Program Level Deviation" (47062-A). • Annunciator "S/G A Bypass CV Level Deviation" (47062-B). • Annunciator "S/G A Level Low Low", (47064-A). • Level indicator LI-461 failed to zero.
	BOP	Refer to above annunciator response procedures, place FW-7A, S/G 'A' Main FW Flow Control Valve to MANUAL, and adjust to restore level to 44%. **NOTE:** Level control of the 'A' S/G will be required to be controlled in Manual for the remainder of the scenario when using Main Feedwater.
	CRS	Direct power ramp be placed on hold.
	CRS	Implement A-MI-87 "Bistable Tripping for Failed Reactor Protection or Safeguards Inst.", to remove LT-461 from service – bistable tripping must be performed within 6 hours per A-MI-87. **NOTE:** A-FW-05A, Abnormal Feedwater System Operation, may be referenced but no additional actions are required by this procedure.
	CRS	Direct actions to remove LT-461 from service: • Direct I&C to perform SP 47-316A to check redundant channel bistable contacts for LT-461 removal from service. (NOTE: Communicator will inform Control Room that SP 47-316A is complete.)
	BOP	Perform/verify prerequisite lineup of "Removal From Service". • Ensure FW-7A, S/G 'A' Main FW Flow Control Valve, is in MANUAL. • Ensure FW-10A, S/G 'A' Bypass FW Flow Control Valve, to MANUAL.
	CRS	Direct I&C to trip associated bistables for LT-461.

Op-Test No: 2002301 Scenario No: 1 Event No: 2 Page 2 of 2

Event Description: **Steam Generator 'A' level control channel LT-461 fails low.**

Time/Notes	Position	Applicant's Actions or Behavior
NOTE: Simulator Booth Operator will obtain A-MI-87 paperwork from CRS/BOP and perform the bistable tripping when directed. When complete, the applicable pages and steps of A-MI-87 will be returned to the CRS/BOP.		
	BOP	Complete verification steps of A-MI-87 following bistable tripping. • Ensure the following annunciators/status lights are ON: 1. Annunciator "S/G A LEVEL LOW LOW" (47064-A) 2. Annunciator "S/G A LEVEL HIGH" (47064-B) 3. Status Light "S/G A Low-Low Level" (44907-1101) 4. Status Light "S/G A Hi-Hi Level" (44908-0801)
	CRS	Review Technical Specification 3.5.b & c: • Table 3.5-2: 1. No. 12 - Lo-Lo Steam Generator Water Level 2. Determines continued operation acceptable (2 channels/loop required OPERABLE) • Table 3.5-3: 1. No. 4.a - MDAFW Pumps - Either S/G LO-LO level 2. No. 5.a - TDAFW Pump - Both S/G LO-LO level 3. Determine continued operation acceptable (2 channels/loop required OPERABLE) • Table TS 3.5-4: 1. No. 4.a - Hi-Hi Steam Generator Level Main Feedwater Isolation 2. Determine continued operation acceptable (2 channels required OPERABLE)
	CRS	Inform I&C to investigate Steam Generator level channel LT-461 failure/status.
At the discretion of the Lead Examiner, proceed to the next event (Event #3).		

Op-Test No: 2002301 Scenario No: 1 Event No: 3 Page 1 of 2

Event Description: **The running Circulating Water Pump trips on overcurrent requiring manual start of the standby pump.**

Time/Notes	Position	Applicant's Actions or Behavior
	BOP	Identify/report trip of Circulating Water Pump 'A'. Available indications: • Annunciator "Bus 3 Feeder Bkr Trip" (47082-C). • Annunciator "Bus 3 Feeder Bkr Overload", (47083-C). • Annunciator "TLA-20 - 4160V Stator Temp Hi" (47033-45). • White disagreement light on CW Pump 'A'.
	RO/BOP	Refer to above annunciator response procedures, inform CRS of required actions (GO TO E-CW-04).
	CRS	Implement required actions of E-CW-04, Loss of Circulating Water. **NOTE:** N-CW-04 and A-CW-04 are also referenced by the above annunciator response procedures. These may be referenced for any additional actions, however, plant conditions require entry to E-CW-04.
	BOP	Check annunciator 47051-M, "CW Pumps Low Low Level Trip" not lit. (Continuous Action Step)
	BOP	Verify at least one CW pump running (Continuous Action). • No CW pumps are running, the standby 'B' CW pump is started. Forebay level is adequate.
	BOP	Check number of CW pumps running - NOT CHANGED (Continuous Action). The crew has no information to inform them of a liquid discharge in progress. Any liquid discharge is required to be secured due to the change in CW flow.
	BOP	Check condenser vacuum normal. • No condenser vacuum PPCS alarms. • Condenser back pressure ≤ 2.5 inches HG abs. **NOTE:** A condenser vacuum PPCS alarm may be received during this transient depending on timing of procedural actions. A slight reduction in turbine load may be required.

Op-Test No: 2002301 Scenario No: 1 Event No: 3 Page 2 of 2

Event Description: **The running Circulating Water Pump trips on overcurrent requiring manual start of the standby pump.**

Time/Notes	Position	Applicant's Actions or Behavior
	BOP	Verify CW Pump discharge valve position. • CW Pump discharge check valve is OPEN for any running CW pump. • CW Pump discharge check valve is SHUT for any idle CW pump.
	BOP	Verify condenser waterbox inlet valves OPEN.
	BOP	Locally verify traveling screen operation. • Auxiliary operator contacted to: 1. Verify spray flow pressure is > 60 psig. 2. Check if any traveling screens are running
	BOP	Check traveling screens NOT fouled. • Check annunciator 47054-Q, "Traveling Water Screen DP High" – Not Lit. • Check traveling screens DP ≤ 6 inches water. • Locally monitor traveling screens.
	BOP	Monitor condenser parameters. • Condenser CW delta-T normal. • Condenser back pressure normal.
	BOP	Locally verify Forebay level stable OR increasing.
	BOP	Check Forebay level normal • Check Forebay level > 64% • Check Forebay level stable or increasing.
	CRS	Return to procedure and step in effect (N-0-03 is the plant procedure currently in effect for plant startup). Also, N-CW-04 should be referenced to ensure SW-143B, Thrust Bearing Cooler Isolation, is opened, as well as verification of proper seal water flow and oil levels.

At the discretion of the Lead Examiner, proceed to the next event (Event #4).

Op-Test No: 2002301 Scenario No: 1 Event No: 4 Page 1 of 3

Event Description: **Reactor coolant leak develops inside containment on the 'A' RCS loop, eventually leading to reactor trip.**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Identify/report elevated readings on Radiation Monitors R2 and R7. Available indications: • Annunciator "Radiation Indication Alert" (47012-B). • Annunciator "Radiation Indication High" (47011-B). • Annunciator "TLA-15 – RMS Above Normal" (47033-35). • Individual radiation monitor readings on rad monitor drawers.
	RO/BOP	Refer to above annunciator response procedures, inform CRS of required actions (GO TO A-RM-45).
	CRS	Implement required actions of A-RM-45, Abnormal Radiation Monitoring System.
	RO/BOP	IMMEDIATE ACTIONs of A-RM-45: • Announce event using plant Gaitronics. • Actuate the Containment Evacuation alarm.
	CRS	Transition to A-RC-36D, Reactor Coolant Leak, per A-RM-45 steps 4.3.1 and 4.7.1.
	RO	Identify lowering pressurizer level and increasing charging pump speed.
	RO	IMMEDIATE ACTIONs of A-RC-36D: IF RCS subcooling based on CETs is < 30 °F OR If Pressurizer level cannot be maintained > 5% THEN Trip the reactor and Actuate Safety Injection.
	RO	Increase charging pump speed to maintain pressurizer level.
	RO	Position pressurizer heater switches to ON to maintain RCS pressure.

Event Description: **Reactor coolant leak develops inside containment on the 'A' RCS loop, eventually leading to reactor trip.**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Isolate Letdown if required by closing the following valves: • LD-2, Letdown Isolation • LD-3, Letdown Isolation • LD-4A, Letdown Orifice A Isolation • LD-4B, Letdown Orifice B Isolation • LD-4C, Letdown Orifice C Isolation
	RO	Verify Reactor Makeup System operating.
	CREW	Using available indications and Section 2.0 of A-RC-36D, determine source of leakage. **NOTE:** No indications to positively identify the source of leakage will be available. However, after letdown is isolated, the crew should determine that the leak is still present.
	RO	Perform a charging versus letdown flow balance to determine leak rate. **NOTE:** Initial leak rate is 40-50 gpm.
	CRS	Notify HP/RP of existing conditions.
	CRS	Initiate SP 36-082, Reactor Coolant System Leak Rate Check.
	CRS	Technical Specifications should be referenced at some point. TS 3.1.d.3 is applicable due to > 10 gpm RCS leakage requiring the plant be placed in Hot Shutdown within 12 hours. TS 3.1.d.4 may also be deemed applicable, however, TS 3.1.d.3 is more limiting.

Op-Test No: 2002301	Scenario No: 1	Event No: 4	Page 3 of 3

Event Description: **Reactor coolant leak develops inside containment on the 'A' RCS loop, eventually leading to reactor trip.**

Time/Notes	Position	Applicant's Actions or Behavior
NOTE: After the crew isolates letdown and determines that the leak is NOT isolated, the leak size will be increased (at the direction of the Lead Examiner) such that pressurizer level cannot be maintained > 5%.		
	RO	Identify leak has increased by observing charging pump speed rising, pressurizer level lowering.
NOTE: The following step is a Critical Task.		
	RO/CRS	Implement Immediate Action of A-RC-36D due to inability to maintain Pressurizer Level > 5%. ***Reactor Trip and SI required to be ordered prior to pressurizer level going off-scale low.***
When a reactor trip and SI is ordered, proceed to the next event (Event #5, 6, and 7).		

Op-Test No: 2002301	Scenario No: 1	Event No: 5,6,7	Page 1 of 7

Event Description: **Large break LOCA occurs upon initiating reactor trip with failure of RHR Pump 'B' to Auto-start and subsequent RHR Pump 'B' coupling failure upon re-start for sump recirculation.**

Time/Notes	Position	Applicant's Actions or Behavior
	CRS	Implement E-0 "REACTOR TRIP OR SI"
	RO	Verify reactor trip: • Reactor trip & bypass breakers open • Rod Position Indicators read ZERO • Rod bottom lights LIT • Neutron flux decreasing
	BOP	Verify Turbine Trip: • HP turbine impulse pressure PI-485/486 trending toward ZERO • All turbine STOP VALVES closed Verify power to Emergency AC Buses • Bus 5 energized • Bus 6 energized
	RO	Determine if SI needed/actuated: • SI will be actuated due to LBLOCA. 1. Annunciator 47021-A "SI TRAIN A ACTUATED lit" 2. Annunciator 47021-B "SI TRAIN B ACTUATED lit" • **RO should also identify failure to start of RHR Pump 'B'. After the SI Sequencer and immediate actions are complete, an attempt may be made to start RHR Pump 'B'.**
	BOP	Verify Feedwater Isolation: • FW-7A and FW-7B Main FW Flow Control Valves closed. • FW-10A and FW-10B Main FW Bypass Flow Control Valves closed. • Both Feedwater Pumps off.
	CREW	RXCPs should be tripped per E-0 Quick Reference Foldout (QRF) Step 1: • After verifying ECCS flow and inadequate subcooling, both RXCPs should be stopped.

Event Description: **Large break LOCA occurs upon initiating reactor trip with failure of RHR Pump 'B' to Auto-start and subsequent RHR Pump 'B' coupling failure upon re-start for sump recirculation.**

Time/Notes	Position	Applicant's Actions or Behavior
	BOP	Make plant announcement for Safety Injection.
	BOP	Check Main Steamline Isolation: • Main Steamline isolation is required due to high containment pressure – MSIVs and MSIV Bypass Valves should be verified shut.
	RO/BOP	Verify Containment Spray NOT required: • Containment Spray **is** required due to high containment pressure and will be functioning normally.
	BOP	Verify Containment Cooling: • Fan Coil Units running. • Verify SW-903A-D CFCU SW Return Isolation valves open. • Verify RBV-150A-D CFCU Emergency Dampers OPEN.
	BOP	Verify Aux Bldg Special Vent running: • Annunciator 47052-G "ZONE SV BNDRY DAMPER NOT CLOSED" not lit. • Verify Zone SV fans running.
	BOP	Verify Service Water Alignment • Verify all Service Water Pumps (A1, A2, B1, B2) running. • Verify SW Header selected on Turbine Bldg selector switch is > 82.5 psig.
	BOP	Verify AFW Pumps running: • Verify Motor Driven AFW Pump 'A' is running. • Since BOTH Motor Driven AFW Pumps are not available, the Turbine Driven AFW Pump is NOT secured at this time. (TDAFWP should be secured when the RCS temperature control step is reached).

Event Description: **Large break LOCA occurs upon initiating reactor trip with failure of RHR Pump 'B' to Auto-start and subsequent RHR Pump 'B' coupling failure upon re-start for sump recirculation.**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Verify Containment and Containment Ventilation Isolation: • Verify all CI Active Status Panel Lights lit.
NOTE: The following highlighted step to start RHR Pump 'B' is a Critical Task.		
	RO	Verify ESF Equipment running: • SI pumps – both should be running. • ***RHR pumps – 'A' Pump is tagged out and unavailable. RHR Pump 'B' must be manually started at this time if not previously started.*** • CC Pumps – both should be running, one should be stopped and placed in pullout. • SI Active Status Panel – all lights will be lit with the exception of the previously tagged out equipment.
	RO	Verify SI flow: • SI flow indicated on F925. • RHR Flow indicated on F928.
	BOP	Verify total AFW flow > 200 gpm. • Adequate AFW flow is available
	RO	Check RXCP Seal Cooling: • CC Supply for Thermal Barrier Isolation Valves CC-600, CC-601A(B), CC-610A(B) and CC-612A(B) open • Thermal Barrier temperatures T610 and T614 normal • RXCP Bearing Temperatures T125 and T132 normal
	RO	Check RCS temperatures: • RCS Average Temperature will be lowering due to the LBLOCA.

Event Description: **Large break LOCA occurs upon initiating reactor trip with failure of RHR Pump 'B' to Auto-start and subsequent RHR Pump 'B' coupling failure upon re-start for sump recirculation.**

Time/Notes	Position	Applicant's Actions or Behavior
	BOP	Due to lowering RCS temperature, the following actions are required: • Stop dumping steam. • Place the Turbine Driven AFW Pump control switch in pullout since Motor Driven AFW Pump 'A' is running. • If S/G levels are > 4% (15% adverse), then AFW flow should be reduced. • MSIVs and MSIV Bypass valves should be verified shut.
	RO	Check Pressurizer PORVs and Spray Valves closed: • Both PORVs closed. • Normal Pressurizer Spray valves closed. • CVC-15 Aux Spray Valve closed.
	RO	Check if RXCPs should be tripped: • If not previously performed per E-0 Quick Reference Foldout (QRF) Step #1, then both RXCPS should be stopped at this time.
	BOP	Check if Steam Generators are faulted: • There are no indications of any faulted Steam Generators. S/G pressures may be lowering but should be consistent with RCS temperatures.
	CREW	Check that Steam Generator tubes are NOT ruptured. • There are no indications of any S/G tube leakage.
	CREW	Check if RCS is intact. RCS determined NOT to be intact based on RCS pressure, Containment parameters, and ECCS flows.
	CRS	Based on the RCS not being intact, transition is made to E-1, Loss of Reactor or Secondary Coolant.

Event Description: **Large break LOCA occurs upon initiating reactor trip with failure of RHR Pump 'B' to Auto-start and subsequent RHR Pump 'B' coupling failure upon re-start for sump recirculation.**

Time/Notes	Position	Applicant's Actions or Behavior
NOTE: Upon transition to E-1, a Red Path may be identified requiring entry to FR-P.1, Response To Imminent Pressurized Thermal Shock Condition. The transition to FR-P.1 should be made, but should then be exited at step 1 based on RCS pressure < 150 psig and RHR flow > 375 gpm. The CRS should then return to E-1 at the step in effect.		
NOTE: Upon return to E-1 from FR-P.1, the crew should be informed that time compression is being used to lower RWST level. The following statement should be given to the crew: "Attention in Control Room, time compression is being used to lower RWST level." Repeat if necessary.		
	RO	Check if RXCPs should be tripped: • Both RXCPs should have already been secured per E-0. **NOTE: Transition may be made to ES-1.3 prior to E-1 implementation based on the Quick Reference Foldout Page (RWST <37%).**
	RO	Check RWST level > 37%: **NOTE: Due to time compression, RWST level is < 37%.**
	CRS	Based on the information provided to the crew regarding RWST level, a transition should be made to ES-1.3, Transfer To Containment Sump Recirculation.
	RO	Check Containment Sump B Level > 1ft. • Adequate sump level exists.
	RO	Reset SI – depress both SI reset pushbuttons. Reset Containment Spray – depress both CS reset pushbuttons.

Event Description: **Large break LOCA occurs upon initiating reactor trip with failure of RHR Pump 'B' to Auto-start and subsequent RHR Pump 'B' coupling failure upon re-start for sump recirculation.**

Time/Notes	Position	Applicant's Actions or Behavior
	RO/BOP	Establish Component Cooling flow to the RHR Heat Exchangers. • Verify both CC Pumps running – the CC Pump previously secured should now be started. • Open SW-1300A, CC Heat Exchanger A Outlet. • Open SW-1300B, CC Heat Exchanger B Outlet. • Open CC-400A, CC To RHR HX A. • Open CC-400B, CC To RHR HX B.
	RO	Verify LD-6, letdown line isolation closed.
	RO	Align Charging Pumps to the VCT. • Verify Makeup Boric Acid Controller set to 11.0. • Verify Makeup Mode Selector in Auto. • Verify VCT level > 5% If VCT level is < 5%, re-alignment of Charging Pump suction is NOT performed. IF VCT level is > 5%, the following steps are performed. • Open CVC-1, VCT to Charging Pumps Isolation. • Close CVC-301, Refueling Water Emergency Makeup to Charging Pump. Since no Charging Pumps are currently running, none are started. A transition to the next step should be made.
	RO	Check RCS Pressure <2100 psig (1900 psig for adverse Cont.).
	RO	Close Both SI Recirculation to RWST Valves • SI-208 and SI-209.
	RO	Verify Train A Injection Flow. • Safety Injection Pump A will indicate flow, RHR Pump A is tagged out.
	RO	Check ICS Pump A Running – it is running.

Event Description: **Large break LOCA occurs upon initiating reactor trip with failure of RHR Pump 'B' to Auto-start and subsequent RHR Pump 'B' coupling failure upon re-start for sump recirculation.**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Stop Train B Pumps. • RHR Pump B. • SI Pump B. • ICS Pump B.
	RO	Align the operating train ('B' Train) for Sump Recirculation. • SI-350B, Containment Sump B Supply To RHR Pump B, is opened. • SI-300B, RWST Supply To RHR Pump B, is closed. • SI-351B, Containment Sump B Supply to RHR Pump B, is opened. • RHR-8B, RHR Heat Exchanger Flow CV, is closed. • **RHR Pump 'B' is started – NOTE: Upon start of RHR Pump 'B', a pump/motor coupling break will occur – indications are as follows:** **1. Minimum amps.** **2. No indicated pump flow.** **3. No indicated discharge pressure.** If the RHR Pump B failure is not recognized, an attempt may be made to adjust flow by opening RHR-8B.. At this time, recognition of pump failure should occur since there will be no flow from the pump.
NOTE: An additional cue from the Floor Instructor or Lead Examiner to accelerate lowering of RWST level may be necessary at this time. When Step 14 of ES-1.3 is reached, the crew should be informed that time compression is being used and RWST level is 9%.		
	CRS	Dependent upon the time of recognition of the RHR Pump B failure, a transition to either Step 13 or Step 14 of ES-1.3 should occur. It should be recognized that Step 13 should **NOT** be performed as this will align SI Pump B to RHR Pump B suction. Step 14 is unable to be performed as well since RHR Pump A is tagged out and unavailable. The Contingency Action of Step 14 requires a transition to ECA-1.1, Loss of Emergency Coolant Recirculation.
NOTE: At the discretion of the Lead Examiner, the scenario may be terminated at this point.		

DYNAMIC EXAM SCENARIO ID#: SES-2002301: #2

SIMULATOR SHIFT TURNOVER:

Per Scenario Outline.

SIMULATOR SCENARIO SET UP

STEP COUNTERS ON _____

INIT into IC _____

NTP-6410, Communicator Telephone Log, available _____

NTP 6411, Simulator Setup Checklist, completed _____

NTP-6412, Simulator Book Preparation Checklist, completed _____

NTP-4 Attachment 10, Simulator Scenario Briefing Sheet, completed _____

NTP-4, Attachment 13, KNPP Simulator Security Checklist, completed _____

SCENARIO GUIDE:

1. **Initialize to a 100% Power IC or saved specific SES IC.**
2. **Place RHR Pump A control switch in pullout and place a Hold Card on the switch.**
3. **Place AFW Pump B control switch in pullout and place a Hold Card on the switch.**
4. **Place an "Out of Service" sticker on S/G B Level Indicator LI-472.**
5. **Verify Trigger 1 is set to the following: Event – "hwztct6155". Command – "dmf tc07".**
6. **Preload (or verify preloaded) and verify active the following simulator codes:**

TIME	TYPE	DESCRIPTION	RAMP START VALUE	RAMP TIME	DELAY TIME	VALUE*	TRIGGER
Preload	Malfunction	SER0966, Beta Annunciator Driver Override	----	----	----	Block	----
Preload	Malfunction	TC07, Turbine Fails To Trip	----	----	----	----	----
Preload	Lights	MCA, DO-46131-G, BT2A	----	----	----	OFF	----
Preload	Lights	MCA, DO-46131-R, BT2A	----	----	----	ON	----
Preload	Lights	MCA, DO-46132-G, BT3A	----	----	----	OFF	----
Preload	Lights	MCA, DO-46132-R, BT3A	----	----	----	ON	----
Preload	Meter	MCA, AO-41052-02, LI-472	----	-----	----	0	----
Preload	Remote Function	RP191, 472A, Lo/Lo Level Logic	----	----	----	TRIP	----
Preload	Remote Function	RP192, 472B, Hi Level Logic	----	----	----	TRIP	----
Preload	Remote Function	RP193, 472C, Lo Level Logic	----	----	----	TRIP	----
Preload	Annunciator	47065-F, SER0812, AMSAC in Test	----	----	----	Crywolf	----
Preload	Lights	MVB, DO-47033:0401, TLA-16 AMSAC Channel Abnormal	----	----	----	ON	----

* The input under the "VALUE" column includes Severity Value, Analog Value, Digital Value, Remote Value, and Malfunction Value inputs as appropriate for each action.

Use the Instructor Summary Station to verify the simulator codes in the table below are assigned to the appropriate Trigger with the appropriate value(s).

These events will be input as shown in the guidance following the table.

TIME	TYPE	DESCRIPTION	RAMP START VALUE	RAMP TIME	DELAY TIME	VALUE*	TRIGGER**
Event 2	System Override	RX203, PT-431, PRZ Press	As found	5	----	2500	3
Event 2 - (A-MI-87)	Remote Function	RP141, 407C – Over Temp Trip	----	----	----	TRIP	4
Event 2 - (A-MI-87)	Remote Function	RP142, 407D – Rod Stop	----	----	20	TRIP	4
Event 2 - (A-MI-87)	Remote Function	RP164, 431A – Hi Press Trip	----	----	40	TRIP	4
Event 2 - (A-MI-87)	Remote Function	RP167, 431J – Lo Press Trip	----	----	60	TRIP	4
Event 2 - (A-MI-87)	Remote Function	RP166, 431I – Unblock SI	----	----	80	TRIP	4
Event 2 - (A-MI-87)	Remote Function	RP165, 431G - SI	----	----	100	TRIP	4
Event 3	Controllers	MCA, AI-43001-R1, SW-2602 Setpt Adj	As found	1200	----	100	5
Event 4	Malfunction	SG02A, Steam Generator Tube Leak, Inlet Tubesheet	----	----	----	75	6
Event 4	Switches	MCA, DI-43012-01-Auto, FW-7A	----	----	----	ON	7
Event 4	Controllers	MCA, AI-43012-01-R1, FW-7A Setpt Adj	As found	60	----	0	7
Event 5-7	Malfunction	SG01A, Steam Generator Tube Leak, Inlet Tubesheet	----	----	----	8	8

* The input under the "VALUE" column includes Severity Value, Analog Value, Digital Value, Remote Value, and Malfunction Value inputs as appropriate for each action.

** See following page for specific guidance on Trigger activation.

Simulator Operator Guidance:

Trigger 1 – **DO NOT MANUALLY ACTIVATE.** This is an Automatic trigger – this trigger will deactivate the Auto Turbine Trip Failure (TC07) when the manual turbine trip pushbutton is depressed.
Trigger 2 – Not Used.
Trigger 3 - Activate when requested by Lead Examiner to fail PT-431 high.
Trigger 4 – Activate to trip all bistables associated with PT-431 per A-MI-87 (I&C) **Note: All bistables will trip in procedure sequence in 20 sec. intervals.**
Trigger 5 – Activate when requested by Lead Examiner to fail SW-2602 closed (ramp closed).
Trigger 6 – Activate when requested by Lead Examiner to initiate ≈30 gpm tube leak. **NOTE: Monitoring of the BOP operator is required and all preloaded "Light" malfunctions (4) associated with SG A blowdown valves BT-2A AND BT-3A deleted when the control switches are taken to close. Use the Instructor Station Summary page.**
Trigger 7 – Activate when requested by Lead Examiner to fail Main Feedwater Control Valve closed (in order to initiate a reactor trip).
Trigger 8 – Activate immediately following the manual tripping of the Main Turbine by the BOP operator.

ANTICIPATED BOOTH COMMUNICATION/GUIDANCE:

Event 1: This event is a normal down-power. The field operators should be informed of the power decrease, with an acknowledgement by the communicator.

Event 2: This event is a failure of Pressurizer Pressure Transmitter PT-431 (fails high). This failure will cause the pressurizer spray valves to fully open, as well as turning off all heaters. This will require the operator to swap pressurizer pressure control channels or take manual control of the spray valves. After stabilizing the plant, A-MI-87 will be utilized to remove the channel from service. The CRS will request SP 47-316C to check redundant channel bistables. The communicator should inform the CRS that SP 47-316C is complete and no redundant channel bistables were found tripped. I&C will also be requested to trip the bistables associated with the level channel. The paperwork (A-MI-87) should be obtained from the CRS and the bistables tripped per this simulator guide. After tripping the bistables, the A-MI-87 paperwork should be signed off as appropriate and returned to the control room.

Event 3: This event is a slow failure of SW-2602, Generator Hydrogen Temperature Control Valve. to the closed position. A "Hydrogen Panel Trouble" alarm will be the first alarm received, and a field operator will be contacted to investigate the alarm. After investigation, it should be reported back that the local alarm is "Hydrogen Temperature High" (alarm 3-2). Required actions are to:

1) Verify proper operation of SW-2602.
2) If required, throttle open SW-2603 Temperature Control Valve Bypass.
3) GO TO A-EG-43A.

The above 3 items should be provided back to the requesting control room operator. If the control room requests SW-2603 be manually opened, it should be reported that an attempt was made to open the valve but seems to be stuck shut. If inquiry about SW-2602 is made, it should be reported that the valve is slowly going to the closed position. The control room has manual control of SW-2602 available, and this should be utilized to control hydrogen gas temperature.

Event 4: This event is a tube leak in SG A. The initial leakrate is approximately 30 gpm. A-RM-45 and E-0-14 will be utilized for this event. Verification of HS-17-1, Humidification Steam Inlet CV, closure will be requested. The valve should be reported as being shut.

Event 5, 6, 7: Failure of SG A Main Feedwater Control Valve occurs (manual control is NOT an option) and this will cause a reactor trip on low SG level. Following the trip, the main turbine will not trip and will be required to be manually tripped. Also, the initial tube leak in SG A will increase to a full tube rupture. Main Steam Header A Trap 20 inlet and outlet valves, TD-1-20 and TD-3-20, will be requested to be manually closed. They should be reported as being closed after allowing sufficient time to perform task.

Op-Test No: 2002301 Scenario No: 2 Event No: 1 Page 1 of 3

Event Description: **Perform Normal Down-Power (Reactivity Manipulation).**

Time/Notes	Position	Applicant's Actions or Behavior
At the discretion of the lead examiner, the normal up-power brief may be conducted in the classroom prior to entering the simulator.		
	CRS	Brief crew on evolution, including discussion of N-0-03 (Plant Operation Greater Than 35% Power) precautions and limitations, for commencing down-power.
	CRS	Implement actions of N-0-03
	RO	Perform reactivity estimate based on planned load increase.
	CRS	Direct power reduction to < 390 MWe.
	BOP	Reduce load per N-TB-54: • Review applicable Precautions & Limitations. • Determine maximum unloading rate based on turbine operating limits per Figures 2 & 3. • Adjust turbine controls to clear Valve Position Limiter: 1. Lower the setter to ≤ value stated on EH Panel Plaque. 2. Set loading rate to ≤ 5% per minute. 3. Depress GO pushbutton. 4. When VPL light goes out, push the HOLD pushbutton. • Set setter to desired load. • Verify/set unloading rate to 0.25% per min (minimum unloading rate of 0.25% per min is normal plant practice). • Inform Energy Supply & Control of rate and amount of load reduction. • Depress GO pushbutton • Maintain reactive load within the limits of Figure 5, Generator Capability Curve..

Event Description: **Perform Normal Down-Power (Reactivity Manipulation).**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Perform reactivity adjustments: Rod Control (rod motion at 1.5 °F difference Tave-Tref) AND/OR Boron Concentration Control (initiate boration) per N-CVC-35A • Review applicable Precautions & Limitations. • Determine rate and magnitude of boration. • Position Reactor Makeup Mode Selector to BORATE. • Adjust CVC-403/CV-31092, Blender Control BA Flow, to required flow rate. • Set Boric Acid Totalizer to required quantity. • Position Reactor Makeup Control switch to START. • Verify required change has been achieved by monitoring: 1. Rod Position 2. Boron Concentration 3. Tave • When boration is complete: 1. Close CVC-406/CV-31904 BA Blender to VCT. 2. Perform 20 gallon Alternate Dilute 3. Position CVC-406 to AUTO Alternate Dilution actions (to flush lines): • Position Reactor Makeup Mode Selector to ALT DIL. • Adjust MU-1022/CV-31095, Blender Control Rx Mu Flow, to desired flow rate. • Set Rx Make-up Totalizer to 20 gal. • Position Reactor Makeup Control switch to START. • When dilution is complete: • Position Reactor Makeup Mode Selector to AUTO. • Position Reactor Makeup Control switch to START. • Adjust CVC-403/CV-31092, Blender Control BA Flow, to current RCS boron concentration.

Event Description: **Perform Normal Down-Power (Reactivity Manipulation).**

Time/Notes	Position	Applicant's Actions or Behavior
	BOP	Adjust Heater Drain Pump speed as required to maintain equal loading on pumps.

Once power has been raised 5% and/or at the discretion of the Lead Examiner, proceed to the next event (Event #2).

Op-Test No: 2002301 Scenario No: 2 Event No: 2 Page 1 of 3

Event Description: **Controlling pressurizer pressure channel PT-431 fails high causing pressurizer spray valves to open.**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Identify/report failed pressurizer pressure channel PT-431. Available indications: • Annunciator "Pressurizer Pressure 2385" (47041-C). • Annunciator "Pressurizer Control Press Abnormal" (47043-C). • Status Light "Pressurizer 2385 psig" (44907-0307) • Pressurizer pressure indicator PI-431 failing high.
	RO	Refer to above annunciator response procedures, position the Pressurizer Pressure Control Channel Selector to position "2-1" to remove the failed instrument. **NOTE:** Other acceptable actions in lieu of immediately manipulating the Pressurizer Control Channel Selector include either placing both Pressurizer Spray Valve Controllers to manual and shut or placing the Master Pressurizer Pressure Controller in manual and adjusting to control pressure.
	CRS	Direct power decrease be placed on hold.
	CRS	Implement A-MI-87 "Bistable Tripping for Failed Reactor Protection or Safeguards Inst.", to remove PT-431 from service – bistable tripping must be performed within 6 hours per A-MI-87.
	CRS	Direct actions to remove PT-431 from service: • Direct I&C to perform SP 47-316C to check redundant channel bistable contacts for PT-431 removal from service. (NOTE: Communicator will inform Control Room that SP 47-316C is complete.)
	RO	Perform/verify prerequisite lineup of "Removal From Service". • Position/Verify Pressurizer Pressure Control Channel Selector switch to position "2-1" (this places pressurizer channel PT-429 in service as the controlling channel). • Position Pressurizer Pressure Recorder Input Selector switch to position "1".
	CRS	Direct I&C to trip associated bistables for PT-431.

Event Description: **Controlling pressurizer pressure channel PT-431 fails high causing pressurizer spray valves to open.**

Time/Notes	Position	Applicant's Actions or Behavior
NOTE: Simulator Booth Operator will obtain A-MI-87 paperwork from CRS/BOP and perform the bistable tripping when directed. When complete, the applicable pages and steps of A-MI-87 will be returned to the CRS/RO.		
	RO	Complete verification steps of A-MI-87 following bistable tripping: • Ensure the following annunciators/status lights are ON: 1. Annunciator "PZR PRESs SI CHANNEL ALERT" (47041-D) 2. Annunciator "OTΔT High" (47033-C) 3. Annunciator " Pressurizer Pressure 2385" (47041-C) 4. Annunciator " Pressurizer Pressure <1900" (47042-D) 5. Annunciator "OTΔT CHANNEL RNBACK/RDSTP ALERT (47041-R) 6. Status Light "Pressurizer 1815 psig" (44908-0203) 7. Status Light "Pressurizer >2000" (44908-0103) 8. Status Light "Loop B OTΔT" (44907-0507) 9. Status Light "Pressurizer 1900 psig" (44907-0207) 10. Status Light "Pressurizer 2385 psig" (44907-0307) 11. Status Light "Loop B Channel 3 OTΔT" (44904-0202)

Event Description: **Controlling pressurizer pressure channel PT-431 fails high causing pressurizer spray valves to open.**

Time/Notes	Position	Applicant's Actions or Behavior
	CRS	Review Technical Specification 3.5.b & c: • Table 3.5-2: 1. No. 5 – Overtemperature ΔT 2. No. 7 – Low Pressurizer Pressure 3. No. 8 – High Pressurizer Pressure 4. Determines continued operation acceptable (3 channels required operable for No. 5 and 7, 2 channels required operable for No.8.) • Table 3.5-3: 1. No. 1.d – Pressurizer Low Pressure 2. Determine continued operation acceptable (2 channels required operable)
	CRS	Inform I&C to investigate Pressurizer Pressure channel PT-431 failure/status.

At the discretion of the Lead Examiner, proceed to the next event (Event #3).

Op-Test No: 2002301	Scenario No: 2	Event No: 3	Page 1 of 2

Event Description: **Generator Hydrogen Temperature Control Valve SW-2602 drifts closed requiring manual operation (controller failure).**

Time/Notes	Position	Applicant's Actions or Behavior
	BOP	Review annunciator response procedure for "Hydrogen Panel Trouble" (47071-E)
	BOP	Dispatch operator to investigate alarm. Local Alarm Response (H2 Panel 3-2) requires the following actions: • Verify proper operation of SW-2602. • If required, throttle open SW-2603. Temperature Control Valve Bypass, to reduce temperature. • Go to A-EG-43A. **NOTE: At this time, a failure of SW-2602 controller may not be readily apparent due to the slow failure. Manual operation of SW-2603 will not be allowed as an option. Further monitoring of SW-2602 should identify its failure.**
	CRS	Implement A-EG-43A, Main Electric Generator Faults.
	RO/BOP	Check if reactor should remain operating: • Check "Generator Stator Temperature, TLA-13" OFF. • Check max/min slot gas discharge temperature difference < 8 °F using PPCS Group 84 & 85 and Periodic Log 16.
	BOP	Check max/min generator slot temperatures ≤ limits on Figure 1: • Check computer point T0382G.
	BOP	Check Main Generator loading normal: Operating parameters are within bounds of Generator Capability Curve of N-TB-54, Figure 5.

Op-Test No: 2002301	Scenario No: 2	Event No: 3	Page 2 of 2

Event Description: **Generator Hydrogen Temperature Control Valve SW-2602 drifts closed requiring manual operation (controller failure).**

Time/Notes	Position	Applicant's Actions or Behavior
	BOP	Verify Main Generator Cooling Normal: • H_2 Cooler Cold Gas Temp RTDs 86-95 °F (Recorder #42525 points 12,13,16,and 17.) --- NAO may be dispatched to vent the hydrogen coolers. • H_2 Cooler Warm Gas Temp RTDs normal (Recorder #42525 points 14 and 15.) • SW-2602 maintaining cold gas temperature 30-36 °C (86-95 °F). - **NOTE: By this time, the on-going monitoring of SW-2602 position/control signal should indicate abnormal operation to the examinee. Per the Contingency Action, SW-2602 controller should be placed in manual to establish normal cold gas temperatures (Opening of local valve SW-2603 will not be available to the crew due to valve failure).** •

NOTE: The remainder of this procedure (A-EG-43A) provides steps for further diagnostics and monitoring of generator parameters. These steps are not listed here. When SW-2602 controller is placed in manual and adjusted to lower hydrogen temperature, then proceed to the next event (Event #4) at the discretion of the Lead Examiner.

Op-Test No: 2002301 Scenario No: 2 Event No: 4 Page 1 of 2

Event Description: **Steam Generator 'A' Tube leak develops , followed by failure of the 'A' Main Feedwater Control Valve resulting in reactor trip.**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Identify/report elevated readings on Radiation Monitor R-15. Available indications: • Annunciator "Radiation Indication High" (47011-B). • Annunciator "Radiation Indication Alert" (47012-B). • Annunciator "TLA-15 – RMS Above Normal" (47033-35). • Individual radiation monitor reading on rad monitor drawer.
	RO/BOP	Refer to above annunciator response procedures, inform CRS of required actions (GO TO A-RM-45).
	CRS	Implement required actions of A-RM-45, Abnormal Radiation Monitoring System.
	BOP	IMMEDIATE ACTIONS of A-RM-45: • Verify the following automatic actions: 1. AR-6 Air Ejector Disch Vent positions to DUCT. • Verify the following valves close: 2. BT-2A, S/G 'A' Blowdown Isolation A1 3. BT-3A, S/G 'A' Blowdown Isolation A2 4. BT-2B, S/G 'B' Blowdown Isolation B1 5. BT-3B, S/G 'B' Blowdown Isolation B2 6. BT-31A S/G A Sample Isolation 7. BT-32A S/G A Sample Isolation 8. BT-31B S/G B Sample Isolation 9. BT-32B S/G B Sample Isolation 10. HS-17-1, Humidification Steam Inlet CV (Local verification). **NOTE: BT-2A and BT-3A will NOT automatically close and must be closed using their respective control switches.**
	CRS	Transition to E-0-14, Steam Generator Tube Leak.

Event Description: **Steam Generator 'A' Tube leak develops , followed by failure of the 'A' Main Feedwater Control Valve resulting in reactor trip.**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Verify pressurizer level stable or increasing: • Pressurizer will be lowering at this time – the following actions are directed for lowering level. 1. Increase Charging flow to maintain pressurizer level. 2. Operate pressurizer heaters to maintain RCS pressure. 3. Verify Reactor Makeup system operable. • If pressurizer level continues to lower, then letdown is isolated by closing the following valves: 1. LD-2, Letdown Isolation 2. LD-3, Letdown Isolation 3. LD-4A, Letdown Orifice A Isolation 4. LD-4B, Letdown Orifice B Isolation 5. LD-4C, Letdown Orifice C Isolation **NOTE: The tube leak at this time is approximately 50 gpm. A reactor trip is not required by procedure provided charging flow is increased. However, at the discretion of the CRS, a reactor trip may be ordered due to the large leak.**
	CREW	Check if entry into Action Level 3 is required. • Using conversion graph, leakage is in excess of 100 gpd. • R-19 increase is > 5%. **Crew should determine that entry into Action Level 3 IS required.**

NOTE: When crew determines that entry to Action Level 3 is required, at the discretion of the Lead Examiner insert malfunction to fail SG 'B' Main Feedwater Control Valve closed to initiate a reactor trip. When a reactor trip occurs, proceed to the next events (events 5-7).

	BOP	Manual control of the 'B' Main Feedwater Control Valve may be attempted but will be unsuccessful.

Op-Test No: 2002301	Scenario No: 2	Event No: 5,6,7	Page 1 of 9

Event Description: **Tube leak on S/G 'A' increases to rupture following reactor trip with a failure of the main turbine to auto-trip.**

Time/Notes	Position	Applicant's Actions or Behavior
	CRS	Implement E-0 "REACTOR TRIP OR SI"
	RO	Verify reactor trip: • Reactor trip & bypass breakers open • Rod Position Indicators read ZERO • Rod bottom lights LIT • Neutron flux decreasing
	BOP	Verify Turbine Trip: • HP turbine impulse pressure PI-485/486 trending toward ZERO • All turbine STOP VALVES closed **NOTE: Turbine is NOT tripped – a manual turbine trip is required.** Verify power to Emergency AC Buses • Bus 5 energized • Bus 6 energized
	RO	Determine if SI needed/actuated: • Depending on the timing of the crew, SI may not be automatically actuated at this time. However, SI should be manually actuated based on lowering pressurizer level. 1. Annunciator 47021-A "SI TRAIN A ACTUATED lit" 2. Annunciator 47021-B "SI TRAIN B ACTUATED lit"
	BOP	Verify Feedwater Isolation: • FW-7A and FW-7B Main FW Flow Control Valves closed. • FW-10A and FW-10B Main FW Bypass Flow Control Valves closed. • Both Feedwater Pumps off.
	BOP	Make plant announcement for Safety Injection.

Event Description: **Tube leak on S/G 'A' increases to rupture following reactor trip with a failure of the main turbine to auto-trip.**

Time/Notes	Position	Applicant's Actions or Behavior
	BOP	Check Main Steamline Isolation: • Main Steamline isolation is NOT required at this time.
	RO/BOP	Verified Containment Spray NOT required: • Containment Spray is NOT required at this time.
	BOP	Verify Containment Cooling: • Fan Coil Units running. • Verify SW-903A-D CFCU SW Return Isolation valves open. • Verify RBV-150A-D CFCU Emergency Dampers OPEN.
	BOP	Verify Aux Bldg Special Vent running: • Annunciator 47052-G "ZONE SV BNDRY DAMPER NOT CLOSED" not lit. • Verify Zone SV fans running.
	BOP	Verify Service Water Alignment • Verify all Service Water Pumps (A1, A2, B1, B2) running. • Verify SW Header selected on Turbine Bldg selector switch is > 82.5 psig.
	BOP	Verify AFW Pumps running: • Verify Motor Driven AFW Pump 'A' is running. • Since BOTH Motor Driven AFW Pumps are not available, the Turbine Driven AFW Pump is NOT secured at this time.
	RO	Verify Containment and Containment Ventilation Isolation: • Verify all CI Active Status Panel Lights lit.

Event Description: **Tube leak on S/G 'A' increases to rupture following reactor trip with a failure of the main turbine to auto-trip.**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Verify ESF Equipment running: • SI pumps – both should be running. • RHR pumps – RHR Pump 'B' should be running, 'A' is tagged out. • CC Pumps – both should be running, one should be stopped and placed in pullout. • SI Active Status Panel – all lights will be lit with the exception of the previously tagged out equipment.
	RO	Verify SI flow: • SI flow indicated on F925. • RHR flow is not checked due to high RCS pressure.
	BOP	Verify total AFW flow > 200 gpm. • Adequate AFW flow is available
	RO	Check RXCP Seal Cooling: • CC Supply for Thermal Barrier Isolation Valves CC-600, CC-601A(B), CC-610A(B) and CC-612A(B) open • Thermal Barrier temperatures T610 and T614 normal • RXCP Bearing Temperatures T125 and T132 normal

Event Description: **Tube leak on S/G 'A' increases to rupture following reactor trip with a failure of the main turbine to auto-trip.**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Check RCS temperatures: • RCS Average Temperature will be lowering due to SI injection flow and Auxiliary Feedwater flow.
	BOP	Due to lowering RCS temperature, the following actions are required: • Stop dumping steam. • Place the Turbine Driven AFW Pump control switch in pullout since Motor Driven AFW Pump 'A' is running. • If S/G levels are > 4% (15% adverse), then AFW flow should be reduced. • MSIVs and MSIV Bypass Valves may be closed if cooldown continues
	RO	Check Pressurizer PORVs and Spray Valves closed: • Both PORVs closed. • Normal Pressurizer Spray valves closed. • CVC-15 Aux Spray Valve closed.
	RO	Check if RXCPs should be tripped: • RXCPs should not require tripping.
	BOP	Check if Steam Generators are faulted: • There are no indications of any faulted Steam Generators. S/G pressures may be lowering but should be consistent with RCS temperatures.
	CREW	Check that Steam Generator tubes are NOT ruptured. • Multiple indications of S/G tube leakage is available. 1. Air Ejector Exhaust Radiation Monitor R-15. 2. 'A' Main Steamline Radiation Monitor R-31 3. S/G 'A' level rising in an uncontrolled manner.

Event Description: **Tube leak on S/G 'A' increases to rupture following reactor trip with a failure of the main turbine to auto-trip.**

Time/Notes	Position	Applicant's Actions or Behavior
	CRS	Based on indications of a S/G tube leak, transition is made to E-3, Steam Generator Tube Rupture. • Critical Safety Function Status Trees Should be evaluated. • Direct actions of E-3.
	RO	Check if RXCPs should be tripped: • SI flow indicated on FI-925 • RCS subcooling based on CETs < 15 °F RXCPS should NOT require tripping.
	CREW	Identify ruptured SG: • Unexpected rise in level • High radiation on any steamline monitor for S/G A [R-31] or S/G B [R-33] on SPDS • Radiation levels above background indicated on hand-held monitor on S/G Blowdown Ion Exchange Resin Column • Increase in S/G Blowdown cation Conductivity on secondary analytical panel recorder 61438 • High radiation on R-19 when S/Gs aligned for sampling per Attachment A **Identify/report S/G A as the ruptured generator.**
	CREW	Determine one S/G must remain available: • Required for steam supply to T/D AFW Pump • Required for cooldown Determine S/G B is available for RCS cooldown.

Event Description: **Tube leak on S/G 'A' increases to rupture following reactor trip with a failure of the main turbine to auto-trip.**

Time/Notes	Position	Applicant's Actions or Behavior
NOTE: The following step for isolation of S/G 'A' is a critical task.		
	BOP	Isolate the faulted Steam Generator (SG A): • Verify BT-2A and BT3A, SG A Blowdown Isolation Valves, are closed. • Set SD-3A, SG A PORV controller at 1050 psig. • Verify SD-3A, SG A PORV, is closed when SG A pressure is < 1050 psig. • Close MS-100A, SG A Steam Supply to T/D AFW Pump. • Direct operator to locally close Main Steam Header A, Trap 20 inlet and outlet valves TD-1-20 and TD-3-20. • Close SG A MSIV MS-1A and MSIV Bypass Valve MS-2A.

	BOP	Check ruptured S/G level (SG A):
		• Narrow Range (NR) level > 4%.
		  • If not, then maintain feed flow to S/G A until NR level is > 4%, then stop feed.
		  • Feed to SG A is stopped by closing **BOTH** of the following valves:
		  1. AFW Pump 2A Flow Control Valve, AFW-2A
		  2. AFW Train A Crossover Valve, AFW-10A

	BOP	Check S/G A pressure > 200 psig
	RO	Reset SI by depressing both SI RESET pushbuttons.
	CREW	Initiate RCS Cooldown: • Determine required CET temperature based on S/G A pressure. S/G A pressure _____ psig Req CET temp _____ °F

Event Description: **Tube leak on S/G 'A' increases to rupture following reactor trip with a failure of the main turbine to auto-trip.**

Time/Notes	Position	Applicant's Actions or Behavior
	BOP	Dump steam from S/G B: • Select STM PRESS on Main Steam Dump Mode Selector C/S • Dump steam at maximum rate. • When RCS temperature reaches 540 °F, place Steam Dump Interlock Selector C/Ss to BYPASS INTLK. **When the required target CET temperature is reached, then the cooldown is stopped and CET temperature maintained less than the required target temperature.**
	CRS	Continues with actions of E-3 with cooldown in progress.
	BOP	Check intact SG Levels (SG B): • Feed flow is controlled to maintain level 4%-50%. At least 200 gpm must be maintained to SG B until level is > 4%.
	RO	Check Pressurizer PORVs and PORV Block Valves • Both Pressurizer PORVS should be shut and both Block Valves open.
	RO	Isolate Letdown: Control switches for LD-4A, 4B, and 4C Letdown Orifice Isolation Valves placed in CLOSE.
	RO	Reset SI by depressing both SI RESET pushbuttons.
	RO	Reset CI by depressing both CI RESET pushbuttons.
	BOP	Verify Instrument Air to Containment established: • At least one Air Compressor running. • Air header pressure >60 psig. • Instrument Air to Containment Isolation IA-101 open.

Event Description: **Tube leak on S/G 'A' increases to rupture following reactor trip with a failure of the main turbine to auto-trip.**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Check if RHR pumps should be stopped. • Based on RCS pressure, RHR Pump B should be stopped and placed in Auto. (RHR Pump A is tagged out)
	RO	Establish Charging Flow. • Two Charging Pumps should be started and flow maximized. NOTE: This will require aligning Charging to the RWST.
	RO	Check if RCS cooldown should be stopped: • **At this point, the crew must wait until CETs are < required target temperature. Further steps in E-3 CANNOT be performed until this occurs.**
	BOP	Check ruptured Steam Generator pressure stable or increasing. • SG A pressure should be relatively stable (Note: SG pressures lowering due to the cooldown are considered stable).
	RO	Check RCS subcooling based on CETs > 50 °F. Adequate subcooling should be available.
	RO	Depressurize the RCS to minimize break flow and refill the pressurizer: • Pressurizer heaters manually controlled to maintain saturation conditions. • BOTH spray valves fully opened until ONE of the following conditions satisfied, then close the spray valves: 1. Pressurizer level > 74%. 2. RCS subcooling < 30 °F. 3. RCS pressure < Ruptured SG pressure AND pressurizer level > 5%.

Event Description: **Tube leak on S/G 'A' increases to rupture following reactor trip with a failure of the main turbine to auto-trip.**

Time/Notes	Position	Applicant's Actions or Behavior
NOTE: The following step for SI termination is a critical task. SI termination is required PRIOR to SG A Wide Range Level going off-scale high.		
	CREW	Check if SI flow should be terminated: • RCS subcooling based on CETs > 30°F • RCS pressure stable or increasing. • Przr level > 5%. • Secondary heat sink: • Total feed flow to S/Gs > 200 gpm available OR • NR level in S/G B > 4% ***Above conditions should be met and BOTH SI pumps stopped and placed in Auto at this time.***
NOTE: At the discretion of the Lead Examiner, the scenario may be terminated at this point.		

DYNAMIC EXAM SCENARIO ID#: SES-2002301: #3

SIMULATOR SHIFT TURNOVER:

Per Scenario Outline.

SIMULATOR SCENARIO SET UP

STEP COUNTERS ON _____

INIT into IC _____

NTP-6410, Communicator Telephone Log, available _____

NTP 6411, Simulator Setup Checklist, completed _____

NTP-6412, Simulator Book Preparation Checklist, completed _____

NTP-4 Attachment 10, Simulator Scenario Briefing Sheet, completed _____

NTP-4, Attachment 13, KNPP Simulator Security Checklist, completed _____

SCENARIO GUIDE:

1. **Initialize to a 20% Power IC or saved specific SES IC.**
2. **Place RHR Pump A control switch in pullout and place a Hold Card on the switch.**
3. **Place AFW Pump B control switch in pullout and place a Hold Card on the switch.**
4. **Place an "Out of Service" sticker on S/G B Level Indicator LI-472.**
5. **Preload (or verify preloaded) and verify active the following simulator codes:**

TIME	TYPE	DESCRIPTION	RAMP START VALUE	RAMP TIME	DELAY TIME	VALUE*	TRIGGER
Preload	Malfunction	RD11, Reactor Trip Breakers fail to open on trip signal.	----	----	----	----	----
Preload	Malfunction	FW16A, Failure to Auto Start, AFW Pump 1A	----	----	----	----	----
Preload	Malfunction	FW20C, AFW Pump Suction Strainer Plugged (Turb)	----	----	----	100	----
Preload	Meter	MCA, AO-41052-02, LI-472	----	-----	----	0	----
Preload	Remote Function	RP191, 472A, Lo/Lo Level Logic	----	----	----	TRIP	----
Preload	Remote Function	RP192, 472B, Hi Level Logic	----	----	----	TRIP	----
Preload	Remote Function	RP193, 472C, Lo Level Logic	----	----	----	TRIP	----
Preload	Annunciator	47065-F, SER0812, AMSAC in Test	----	----	----	Crywolf	----
Preload	Lights	MVB, DO-47033:0401, TLA-16 AMSAC Channel Abnormal	----	----	----	ON	----

* The input under the "VALUE" column includes Severity Value, Analog Value, Digital Value, Remote Value, and Malfunction Value inputs as appropriate for each action.

Use the Instructor Summary Station to verify the simulator codes in the table below are assigned to the appropriate Trigger with the appropriate value(s).

These events will be input as shown in the guidance following the table.

TIME	TYPE	DESCRIPTION	RAMP START VALUE	RAMP TIME	DELAY TIME	VALUE*	TRIGGER**
Event 2	System Override	RX213, PT-468, MS SG Press	As found	----	----	----	1
Event 2 – (A-MI-87)	Remote Function	RP185, 468A, Lo/Lo SAL	----	----	----	TRIP	2
Event 2 – (A-MI-87)	Remote Function	RP186, 468B, Lo Press	----	----	20	TRIP	2
Event 2 – (A-MI-87)	Remote Function	RP182, 466C, FWF<SF	----	----	40	TRIP	2
Event 2 – (A-MI-87)	Remote Function	RP181, 466B, FWF>SF	----	----	60	TRIP	2
Event 3	System Override	CV203, LT-141, VCT LVL	As found	5	----	100	3
Event 4	System Override	RX212, LT-473, SG LVL	As found	5	----	0	4
Event 5-7	Malfunction	MS02B, Main Steam Line Rupture Inside Containment (1B)	----	----	----	4	5
Event 5-7	Remote Function	RD102, MG Set 1A	----	----	----	STOP	6
Event 5-7	Remote Function	RD103, MG Set 1B	----	----	60	STOP	6

* The input under the "VALUE" column includes Severity Value, Analog Value, Digital Value, Remote Value, and Malfunction Value inputs as appropriate for each action.

** See following page for specific guidance on Trigger activation.

Simulator Operator Guidance:

Trigger 1 – Activate when requested by Lead Examiner to fail PT-468 high.
Trigger 2 – Activate to trip all bistables associated with PT-468 per A-MI-87 (I&C) **Note: All bistables will trip in procedure sequence in 20 sec. intervals.**
Trigger 3 - Activate when requested by Lead Examiner to fail LT-141 high.
Trigger 4 – Activate when requested by Lead Examiner to fail LT-473 low. (Meets Rx trip criteria, however, Rx does not trip).
Trigger 5 – Activate to initiate steam leak when BOP operator is de-energizing Bus 33 and 43 supply breakers.
Trigger 6 – **NOTE: When requested by the control room, remove Malfunction RD11, RX Trip Breakers Fail To Open On Trip Signal, PRIOR to activating Trigger 6.** Activate Trigger 6 when requested by the control room to position the Rod Drive MG Set Control Switches to trip.

ANTICIPATED BOOTH COMMUNICATION/GUIDANCE:

Event 1: This event is a normal up-power. The field operators should be informed of the power escalation, with an acknowledgement by the communicator.

Event 2: This event is a failure of Steam Generator A Pressure Transmitter PT-468 (fails high). This failure will cause the Main Feedwater Regulating valve to open, and also the SG PORV to open. This will require the operator to take manual control of the Main Feedwater Regulating Valve and also the SG PORV. If the PORV is not closed expeditiously, the resulting temperature swings will necessitate placing Rod Control in Manual to stabilize RCS temperature. After stabilizing the plant, A-MI-87 will be utilized to remove the channel from service. The CRS will request SP 47-316A to check redundant channel bistables. The communicator should inform the CRS that SP 47-316A is complete and no redundant channel bistables were found tripped. I&C will also be requested to trip the bistables associated with the pressure channel. The paperwork (A-MI-87) should be obtained from the CRS and the bistables tripped per this simulator guide. After tripping the bistables, the A-MI-87 paperwork should be signed off as appropriate and returned to the control room.

Event 3: This event is a failure of VCT Level Transmitter LT-141 (high). This will cause letdown to divert to the hold-up tanks, effectively resulting in an RCS leak. Implementation of A-CVC-35C is required and manual control of LD-27 is necessary.

Event 4-7: This event begins with a failure of SG B level transmitter LT-473. This will result in the crew manually tripping the reactor since an automatic trip should have occurred but did not. A manual trip is not successful and it will be necessary to de-energize Bus 33 and 43 to trip the reactor. Entry to FR-S.1 is NOT required. A field operator will be requested to locally open the RTBs and locally position the MG set switches (see Trigger 6 directions). Completion of this activity should be reported back to the control room. A manual turbine trip is also required due to the RPS failure. While de-energizing Bus 33 and 43, a fault will develop on SG A inside containment. Motor Driven AFW Pump B will fail to auto start and will need to be manually started. The Turbine Driven AFW pump will start but will not run due to a plugged suction line. If requested to investigate the Turbine AFW pump, report back that everything appears normal.

Op-Test No: 2002301 Scenario No: 3 Event No: 1 Page 1 of 2

Event Description: **Perform Normal Up-Power (Reactivity Manipulation).**

Time/Notes	Position	Applicant's Actions or Behavior
At the discretion of the lead examiner, the normal up-power brief may be conducted in the classroom prior to entering the simulator.		
	CRS	Brief crew on evolution, including discussion of N-0-02 (Plant Startup From Hot Shutdown To 35% Power) precautions and limitations, for commencing up-power.
	CRS	Implement actions of N-0-02.
	RO	Perform reactivity estimate based on planned load increase.
	CRS	Direct increase to 35% power (first hold point for MSR and air ejector alignment).
	BOP	Increase load per N-TB-54: • Review applicable Precautions & Limitations. • Determine maximum loading rate based on fuel performance is 5% per minute when < 35% power (NOTE: Based on turnover information, the ramp rate will lower to 16 MW/hr at 35%). • Determine maximum load rate based on turbine operating limits per Figures 2 & 3. • Adjust turbine controls to clear Valve Position Limiter: 1. Lower the setter to ≤ value stated on EH Panel Plaque. 2. Set loading rate to ≤ 5% per minute. 3. Depress GO pushbutton. 4. When VPL light goes out, push the HOLD pushbutton. • Verify/set Valve Position Limit to 100%. • Set setter to desired load. • Verify/set loading rate to 0.25% per min (minimum loading rate of 0.25% per min is normal plant practice). • Verify loading rate is less than maximum allowable rate. • Inform Energy Supply & Control of rate and amount of load pickup. • Depress GO. • Verify load increases.

Event Description: **Perform Normal Up-Power (Reactivity Manipulation).**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Perform reactivity adjustments: Rod Control (rod motion at 1.5 °F difference Tave-Tref) AND/OR Boron Concentration Control (initiate dilution) per N-CV-35A: • Review applicable Precautions & Limitations • Verify at least one RXCP in operation • Determine rate and magnitude of dilution • Position Reactor Makeup Mode Selector to DILUTE or ALT DIL. • Adjust MU-1022/CV-31095, Blender Control Rx Mu Flow, to required flow rate • Set Rx Make-up Totalizer to required quantity • Position Reactor Makeup Control switch to START • Verify required change has been achieved by monitoring: 1. Rod Position 2. Boron Concentration 3. Tave • When dilution is complete: 1. Position Reactor Makeup Mode Selector to AUTO 2. Position Reactor Makeup Control switch to START 3. Adjust CVC-403/CV-31092, Blender Control BA Flow, to current RCS boron concentration • If RCS boron concentration has been changed by >50 ppm, operate Przr heaters as necessary to equalize RCS and Przr boron.
	BOP	Adjust Heater Drain Pump speed as required to maintain equal loading on pumps.

Once power has been raised 5% and/or at the discretion of the Lead Examiner, proceed to the next event (Event #2).

Op-Test No: 2002301 Scenario No: 3 Event No: 2 Page 1 of 3

Event Description: **Steam Generator 'A' pressure transmitter fails high causing main feedwater transient and S/G PORV to open.**

Time/Notes	Position	Applicant's Actions or Behavior
	BOP	Identify/report failed S/G A pressure channel PT-468. Available indications: **INSERT ANY ALARMS ASSOCIATED WITH PORV – VERIFY ALARMS ALREADY LISTED.** • Annunciator "S/G A Program Level Deviation" (47062-A). • Annunciator "S/G A Bypass CV Level Deviation" (47062-B). • Annunciator "S/G A Level High", (47064-B). • Pressure indicator PI-468 is failed high.
	BOP	Refer to above annunciator response procedures. • Place FW-7A, S/G 'A' Main FW Flow Control Valve to Manual and adjust to restore level to 44%. • Close S/G 'A' PORV by placing its controller in Manual and minimum.
	CRS	Direct power ramp be placed on hold. **NOTE: Depending on the length of time the PORV remains open, it may be necessary to place Rod Control in Manual is order to stabilize the plant.**
	CRS	Implement A-MI-87 "Bistable Tripping for Failed Reactor Protection or Safeguards Inst.", to remove PT-468 from service – bistable tripping must be performed within 6 hours per A-MI-87. **NOTE:** A-FW-05A, Abnormal Feedwater System Operation, may be referenced but no additional actions are required by this procedure.
	CRS	Direct actions to remove PT-468 from service: • Direct I&C to perform SP 47-316A to check redundant channel bistable contacts for PT-468 removal from service. (NOTE: Communicator will inform Control Room that SP 47-316A is complete.)

Event Description: **Steam Generator 'A' pressure transmitter fails high causing main feedwater transient and S/G PORV to open.**

Time/Notes	Position	Applicant's Actions or Behavior
	BOP	Perform/verify prerequisite lineup of "Removal From Service". • Position Steam Flow Channel Selector switch for S/G A to 465/White. • Verify SD-3A, S/G A PORV, is in Manual. NOTE: FW Flow selector switch for S/G A may also be positioned to 467/White
	CRS	Direct I&C to enter Relay Rack RR-109 and trip associated bistables for PT-468.
NOTE: Simulator Booth Operator will obtain A-MI-87 paperwork from CRS/BOP and perform the bistable tripping when directed. When complete, the applicable pages and steps of A-MI-87 will be returned to the CRS/BOP.		
	BOP	Complete verification steps of A-MI-87 following bistable tripping. • Ensure the following annunciators/status lights are ON: 1. Annunciator "Steam Gen Pressure Low" (47064-I) 2. Annunciator "Steam Gen A Low Low Press SI Alert (47061-I) 3. Annunciator "S/G A Feed Flow Excessive" (47061-C) 4. Annunciator "S/G A SF .> FF" (47061-B) 5. Status Light "MS Hdr A Low-Low Press" (44908-0701) 6. Status Light "S/G A SF . FF" (44907-0901)

Event Description: **Steam Generator 'A' pressure transmitter fails high causing main feedwater transient and S/G PORV to open.**

Time/Notes	Position	Applicant's Actions or Behavior
	CRS	Review Technical Specification 3.5.b & c: • Table 3.5-2: 1. No. 16 - Steam Flow/Feedwater Flow Mismatch. 2. Determines continued operation acceptable (1 channel/loop required OPERABLE) • Table 3.5-3: 1. No. 1.c – Low Steam Pressure/Line 2. Determine continued operation acceptable (2 channels/line required OPERABLE)
	CRS	Direct FW-7A, S/G 'A' Main FW Flow Control Valve, be returned to Auto.
	BOP	Place FW-7A, S/G 'A' Main FW Flow Control Valve, to Auto. Note: N-FW-05A, Feedwater System Normal Operation, may be referenced for guidance.
	CRS	Inform I&C to investigate Steam Generator pressure channel PT-468 failure/status.

At the discretion of the Lead Examiner, proceed to the next event (Event #3).

Op-Test No: 2002301 Scenario No: 3 Event No: 3 Page 1 of 2

Event Description: **Volume Control Tank (VCT) level transmitter LT-141 fails high causing letdown to divert to holdup tank.**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Identify/report failure of VCT level transmitter LT-141. Available indications: • Level Indicator LI-141 failed high. • Annunciator "VCT Level High/Low" (47043-L)
	RO	Refer to above annunciator response procedures, inform CRS of required actions (GO TO A-CVC-35C).
	CRS	Implement A-CVC-35C, Abnormal VCT Level.
	RO/CRS	Check at least one VCT level channel operable (Continuous Action Step). VCT level channel LI-112 determined to be operable based on plant conditions.
	RO	Check at least one operable VCT level channel > 5% (Continuous Action Step). • LI-112 is operable and will indicate actual VCT level which is > 5%. **NOTE:** The crew should realize that the automatic swap of charging pump suction to the RWST when VCT level is < 5% will NOT occur with LT-141 failed high.
	RO	Check VCT level channel LI-112 operable – it is operable.
	RO	Check VCT level channel LI-141 operable – it is NOT operable. • Position LD-27, VCT/Holdup Tank Divert Valve, control switch to V.C.Tk. • Manually control LD-27 as necessary to maintain VCT level < 56%.
	RO	Check actual VCT level ≥ 17%. • If < 17%, proper Reactor Make-up operation is verified.

Op-Test No: 2002301	Scenario No: 3	Event No: 3	Page 2 of 2

Event Description: **Volume Control Tank (VCT) level transmitter LT-141 fails high causing letdown to divert to holdup tank.**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Check actual VCT level < 28%. • If ≥ 28%, automatic Reactor Make-up is stopped. • Charging Pump speed adjusted as desired to maintain pressurizer level.
	RO	Check actual VCT level < 56%. • If ≥ 56%, Reactor Make-up is secured, LD-27 is used to divert to the CVC Holdup Tank.
	RO	Check Reactor Make-up control functioning normally. • Proper make-up control is unaffected by failure of LT-141.
	CRS	Return to procedure and step in effect (N-0-02).

At the discretion of the Lead Examiner, proceed to the next event (Event #4).

Event Description: **S/G 'B' level channel LT-473 fails low which should cause an auto trip, but does not. A manual trip is also unsuccessful leading to ATWS conditions with full control rod insertion accomplished by de-energizing the rod drive MG sets. A fault on S/G 'B' also occurs upon manual tripping of the turbine and the 'A' Motor Driven AFW Pump fails to start.**

Time/Notes	Position	Applicant's Actions or Behavior
	BOP	Identify failed level channel as S/G B level transmitter LT-473. Available indications: • LI-473 failing low.
	RO/CRS	Identify an automatic reactor trip should have occurred but did not. • Annunciator "S/G B Low Low Level Reactor Trip" (47031-F)
	CRS	Directs a manual reactor trip and enters E-0, Reactor Trip or Safety Injection.
	RO	Manual Reactor Trip initiated – the reactor does NOT trip.
	BOP	Manual Reactor Trip initiated using second Reactor Trip pushbutton – the reactor does NOT trip.
NOTE: Insertion of negative reactivity via EITHER of the following two steps is a critical task.		
	RO	Manually inserts control rods.
	BOP	Opens Bus 33 and 43 supply breakers to de-energize the rod drive MG sets – this action results in all control rods inserting.
	RO/BOP	Operator dispatched to locally open the reactor trip breakers and locally position the rod drive MG set motor and generator switches to trip..
	BOP	**When** the reactor trip breakers and the MG set breakers are open, **then** Bus 33 and Bus 43 are re-energized (supply breakers closed).

Event Description: **S/G 'B' level channel LT-473 fails low which should cause an auto trip, but does not. A manual trip is also unsuccessful leading to ATWS conditions with full control rod insertion accomplished by de-energizing the rod drive MG sets. A fault on S/G 'B' also occurs upon manual tripping of the turbine and the 'A' Motor Driven AFW Pump fails to start.**

Time/Notes	Position	Applicant's Actions or Behavior
NOTE: S/G 'B' Fault inside containment will be initiated upon manual trip of the turbine.		
	BOP	Verify turbine trip. • A manual turbine trip is required due to the RPS failure – a manual trip will be successful. Verify power to Emergency AC Buses • Bus 5 energized • Bus 6 energized
	RO	Determine if SI needed/actuated: • SI will be actuated due to the steam leak in containment. 1. Annunciator 47021-A "SI TRAIN A ACTUATED lit" 2. Annunciator 47021-B "SI TRAIN B ACTUATED lit"
	BOP	Verify Feedwater Isolation • FW-7B and FW-7B, SG A and B Main Feedwater Flow Control Valves, placed in Manual and closed. • FW-10A and FW-10B, SG A and B Main Feedwater Bypass Flow Control Valves verified closed.
	BOP	Make plant announcement for Safety Injection.
	BOP	Check Main Steamline Isolation: • Main Steamline isolation is required due to high containment pressure – MSIVs and MSIV Bypass Valves should be verified shut.
	RO/BOP	Verify Containment Spray NOT required: • Containment Spray **is** required due to high containment pressure and will be functioning normally.

Event Description: **S/G 'B' level channel LT-473 fails low which should cause an auto trip, but does not. A manual trip is also unsuccessful leading to ATWS conditions with full control rod insertion accomplished by de-energizing the rod drive MG sets. A fault on S/G 'B' also occurs upon manual tripping of the turbine and the 'A' Motor Driven AFW Pump fails to start.**

Time/Notes	Position	Applicant's Actions or Behavior
	BOP	Verify Containment Cooling: • Fan Coil Units running. • Verify SW-903A-D CFCU SW Return Isolation valves open. • Verify RBV-150A-D CFCU Emergency Dampers OPEN.
	BOP	Verify Aux Bldg Special Vent running: • Annunciator 47052-G "ZONE SV BNDRY DAMPER NOT CLOSED" not lit. • Verify Zone SV fans running.
	BOP	Verify Service Water Alignment • Verify all Service Water Pumps (A1, A2, B1, B2) running. • Verify SW Header selected on Turbine Bldg selector switch is > 82.5 psig.
	BOP	Verify Feedwater Isolation: • FW-7A and FW-7B Main FW Flow Control Valves closed. • FW-10A and FW-10B Main FW Bypass Flow Control Valves closed. • Both Feedwater Pumps off.
	BOP	Verify AFW Pumps running: • **Verify Motor Driven AFW Pump 'A' is running ('B' AFW Pump is tagged out) – AFW Pump 'A' will not be running at this time and will be required to be started manually. The Turbine Driven AFW Pump will start but will trip on low suction pressure (debris in suction line).**
	RO	Verify Containment and Containment Ventilation Isolation: • Verify all CI Active Status Panel Lights lit.

Event Description: **S/G 'B' level channel LT-473 fails low which should cause an auto trip, but does not. A manual trip is also unsuccessful leading to ATWS conditions with full control rod insertion accomplished by de-energizing the rod drive MG sets. A fault on S/G 'B' also occurs upon manual tripping of the turbine and the 'A' Motor Driven AFW Pump fails to start.**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Verify ESF Equipment running: • SI pumps – both should be running. • RHR pumps – RHR Pump 'B' is running normally, RHR Pump 'A' is tagged out. • CC Pumps – both should be running, one should be stopped and placed in pullout. • SI Active Status Panel – all lights will be lit with the exception of the previously tagged out equipment.
	RO	Verify SI flow: • SI flow verified on F925 if RCS pressure is < 2100 psig. • RHR flow will not be checked due to RCS pressure > 150 psig.
	BOP	Verify total AFW flow > 200 gpm. • Adequate AFW flow is available
	RO	Check RXCP Seal Cooling: • CC Supply for Thermal Barrier Isolation Valves CC-600, CC-601A(B), CC-610A(B) and CC-612A(B) open • Thermal Barrier temperatures T610 and T614 normal • RXCP Bearing Temperatures T125 and T132 normal
	RO	Check RCS temperatures: • RCS Average Temperature will be lowering due to the faulted S/G.
	BOP	Due to lowering RCS temperature, the following actions are required: • Stop dumping steam. • Place the Turbine Driven AFW Pump control switch in pullout since Motor Driven AFW Pump 'A' is running. • If the 'A' S/G level is > 4% (15% adverse), then AFW flow should be reduced. **AFW flow should be isolated to the 'B' S/G at this time.** • MSIVs and MSIV Bypass valves should be verified shut.

Event Description: **S/G 'B' level channel LT-473 fails low which should cause an auto trip, but does not. A manual trip is also unsuccessful leading to ATWS conditions with full control rod insertion accomplished by de-energizing the rod drive MG sets. A fault on S/G 'B' also occurs upon manual tripping of the turbine and the 'A' Motor Driven AFW Pump fails to start.**

Time/Notes	Position	Applicant's Actions or Behavior
	RO	Check Pressurizer PORVs and Spray Valves closed: • Both PORVs closed. • Normal Pressurizer Spray valves closed. • CVC-15 Aux Spray Valve closed.
	RO	Check if RXCPs should be tripped: • RXCP trip criteria is NOT met.
	BOP	Check if Steam Generators are faulted: • S/G 'B' determined to be faulted due to pressure lowering in an uncontrolled manner.
	CRS	Transition made to E-2, Faulted Steam Generator Isolation.
	BOP	Verify Main Steamline Isolation • Main Steamline isolation is required due to high containment pressure – MSIVs and MSIV Bypass Valves should be verified shut.
	BOP	Check if any steam generator is NOT faulted • S/G 'A' should be determined to be intact and available for cooldown.
	BOP	Identify the faulted S/G. • Based on lowering pressure, S/G 'B' is identified as being faulted.

Event Description: **S/G 'B' level channel LT-473 fails low which should cause an auto trip, but does not. A manual trip is also unsuccessful leading to ATWS conditions with full control rod insertion accomplished by de-energizing the rod drive MG sets. A fault on S/G 'B' also occurs upon manual tripping of the turbine and the 'A' Motor Driven AFW Pump fails to start.**

Time/Notes	Position	Applicant's Actions or Behavior
NOTE: The following step for isolation of S/G 'B' is a critical task.		
	BOP	Isolate the faulted Steam Generator (S/G 'B'): • Verify BT-2B and BT3B, SG B Blowdown Isolation Valves, are closed. • Verify SD-3B, SG B PORV, is closed. • Close AFW-2B, AFWP B Flow Control Valve. • Close MS-100B, SG B Steam Supply to T/D AFW Pump. • Verify BT-31B and BT-32B, SG B Sample Isolation Valves, are closed. • Close FW-12B, SG B Feedwater Isolation Valve. • Close AFW-10B, AFW Train B Crossover Valve.
	BOP	Check CST level > 4%. • Adequate CST level is available.
	RO/BOP	Check secondary radiation normal. There are no indications of increasing radiation levels on any secondary systems.
	BOP	Set steam dump to minimize heatup. • Intact SG MSIV (A) is shut – condenser is NOT available. • SG A PORV must be used but **CANNOT** be placed in auto due to the previous PT-468 failure. SG A PORV should be operated in manual to stabilize RCS temperature.
	CRS	Transition to E-1, Loss of Reactor or Secondary Coolant.
NOTE: At the discretion of the Lead Examiner, the scenario may be terminated at this point		