Facility:	SHEARON-HARRIS	Scenario No.:	1	Op Test No.:	05000400
Examiners:		Operators:			

Initial Conditions:
- IC-19, MOL, 100% power
- 'B' RHR Pump out of service due to electrical fault
- 4 GPD tube leak on 'B' Steam Generator

Turnover:
- Plant is lowering power IAW GP-006, Normal Plant Shutdown, in preparation for Turbine Valve Testing (<90%)

Critical Task:
- Shut 'A' MSIV prior to exiting EPP-014, Faulted Steam Generator Isolation
- Isolate AFW flow to 'A' Steam Generator prior to exiting EPP-014

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP, SRO R – RO	Lower Power
2	RMS007, MFZCR744	I – BOP, SRO TS – SRO	Radiation Monitor high alarm, Containment Purge fails to isolate automatically
3	CRF003	C – RO, SRO TS - SRO	Dropped Control Rod (D-12)
4	PT:444	I – RO, SRO TS – SRO	Controlling PZR Pressure Channel (PT-444) fails high
5	EPS02	C – BOP, SRO TS – SRO	Loss of Instrument Bus S-III
6	MSS01	M – ALL	'A' Steam Generator faulted inside Containment
7	ZRPK504A, ZRPK504B	C – BOP, SRO	Automatic MSLI fails
8	ZRPK615A, ZRPK615B	C – BOP, SRO	AFW automatic isolation fails
9	XA2I127	C – RO, SRO	CSIP 'B' fails to start from Load Sequencer

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

Scenario Summary:

The plant is at 100% power in middle of life. The 'B' RHR Pump is out of service for breaker inspection and there is a 4 GPD tube leak on the 'B' Steam Generator. The crew has been directed to lower power using GP-006, Normal Plant Shutdown, to <90% power in preparation for OPT-1014, Turbine Valve Test, Semi-Annual Interval Modes 1-5.

The first event is the power reduction. For this reactivity manipulation it is expected that the SRO will conduct a reactivity brief, the RO will borate per the reactivity plan and the BOP will operate the DEH Controls as necessary to lower power.

The second event, a failure of REM-01LT-3502ASA, Cnmt RCS Leak Detection Radiation Monitor, can be inserted once the power reduction has been observed to the extent necessary. This failure will cause the output to immediately fail high and the RM-11 will go into high alarm. The automatic response to isolate Normal Containment Purge fails to occur due to a failed relay. The crew should respond to the alarms and enter AOP-005, Radiation Monitoring. Attachment 1 of AOP-005 will direct verifying that the automatic response for this alarm has occurred (other procedure options are available and detailed in exercise guide). This will also require the SRO to evaluate Tech Spec 3.4.6.1, Leakage Detection Systems.

The third event, a dropped control rod, is inserted once Normal Containment Purge has been isolated. Control Rod D-12 will drop to the bottom of the core. The crew should diagnose the event in progress and enter AOP-001, Malfunction of Rod Control and Indication System. The RO should place Rod Control in Manual as an immediate action of AOP-001. Once the crew's response has been observed to the extent necessary and the Negative Rate Alarms at the NI Panels have been cleared then the next event can occur. (NOTE: If these alarms are not cleared then the fifth event in this scenario will cause a reactor trip.) This event will also require the SRO to evaluate Tech Spec 3.1.3.1, Moveable Control Assemblies, for the dropped control rod.

The fourth event, the controlling Pressurizer Pressure Channel (PT-444) failing high, can be inserted once the Negative Rate Alarms at the NI Panels have been cleared. The crew should respond to multiple alarms and enter AOP-019, Malfunction of RCS Pressure Control. The RO should complete the immediate actions by closing the open Pressurizer PORV (PCV-444B) and gaining control of the Pressurizer Spray Valves. Depending on crew response time, a short OTΔT turbine runback may occur. RCS pressure may drop below the DNB limit depending on how fast the operator responds to the failure. If so, the SRO should evaluate Tech Spec 3.2.5, DNB Parameters. The crew should be allowed to complete AOP-019 to stabilize the plant, but the channel does not have to be removed from service to continue the scenario.

The fifth event, a loss of Instrument Bus S-III, can be inserted once plant pressure has been restored and stabilized. The loss will occur due to a blown fuse on the 7.5kVA Inverter. This

will require entry into AOP-024, Loss of Uninterruptible Power Supply. This procedure has immediate actions. The RO should verify Rod Control in Manual (already done due to previous AOP-001 entry) and the BOP should take manual control of all three Main FW Regulating Valves. This malfunction will also cause an auto start of the 'A' ESW pump due to a loss of PT-9101A and a loss of the running ESCWS Chiller due to loss of FT-9209A. The instrument bus can be restored by transferring to the alternate power supply. SRO should evaluate Tech Specs 3.7.4 (Emergency Service Water), 3.7.13 (Essential Services Chilled Water System), and 3.8.1.1 (AC Sources – Operating).

Once power has been restored to Instrument Bus S-III via the alternate power supply, a Main Steam Line Break inside Containment on the 'A' SG will occur and progressively worsen over the next five minutes. The crew should enter and carry out actions of PATH-1. The crew should diagnose that there is no LOCA in progress and transition to EPP-014, Faulted Steam Generator Isolation.

The automatic Main Steam Line Isolation signal (which should occur at 3 psig in Containment) is failed. The crew will have to manually isolate the Main Steam Isolation Valves (MSIVs). Once the crew has manually shut the MSIVs, it will be identifiable that the 'A' Steam Generator is faulted inside Containment.

The AFW Auto Isolation will not occur and the crew will have to manually isolate AFW flow to the 'A' Steam Generator. In addition, the 'B' CSIP will fail to start automatically from the 'B' Sequencer. The pump can be started by the operator. The scenario ends when Safety Injection has been terminated and the crew transitions to EPP-008, SI Termination.

SIMULATOR SETUP

SPECIAL INSTRUCTIONS

- Provide a Reactivity Plan to candidates for lowering power to <90%

INITIAL CONDITIONS:

- IC-19, MOL, 100% power
- Place CIT on 'B' RHR Pump and Protected Train Placard on 'A' RHR Pump switch
- Place OWP-RH-02 in OWP book
- Place appropriate coding on lit annunciators

PRE-LOAD:

- Automatic MSLI failure (imf zrpk504a FAIL_ASIS, imf zrpk504b FAIL_ASIS)
- Automatic 'A' AFW Isolation failure (imf zrpk615a FAIL_ASIS, imf zrpk615b FAIL_ASIS)
- 'B' CSIP fails to start automatically (imf dsg04a 2 2)
- 'B' RHR pump Out of Service (irf rhr023 RACK_OUT)

TRIGGERS:

- ET-2: irf rms007 (3 00:00:00 00:00:00) 7.29 00:00:00)

  imf zcr744 (3 00:00:00 00:00:00) FAIL_ASIS)

  RMS and Interlock failure
- ET-3: Control Rod D12 drops

  imf crf03a (4 00:00:00 00:00:00) 2 38)

- ET-4: imf pt:444 (2 00:00:00 00:00:00) 2500.0 00:00:10)

  PT-444 Fails HIGH

- ET-5: imf eps02 (5 00:00:00 00:00:00) 1A-SIII

  Loss of Instrument Bus III

- ET-6: (imf mss01a (6 00:00:00 00:00:00) 4.2e+006 00:05:00 0)

  MSL Break Inside Containment on 'A' SG, ramps in over 5 min

CAEP

!Description of NRC1CAEP

!IC-19, MOL, 100% power

!'B' RHR pump is Out of Service

!4 GPD tube leak on 'B' Steam Generator

!Preloads

! Automatic MSLI failure

imf zrpk504a (n 00:00:00 00:00:00) FAIL_ASIS

imf zrpk504b (n 00:00:00 00:00:00) FAIL_ASIS

! Automatic 'A' AFW Isolation failure

imf zrpk615a (n 00:00:00 00:00:00) FAIL_ASIS

imf zrpk615b (n 00:00:00 00:00:00) FAIL_ASIS

! 'B' CSIP fails to start automatically

imf dsg04a (n 00:00:00 00:00:00) 2 2

! 'B' RHR pump Out of Service for Oil Replacement

irf rhr023 (n 00:00:00 00:00:00) RACK_OUT

!Event Triggers

!Event 1, Lower power to <90% for Turbine Valve Testing

! Reactivity - RO

!Event 2, RMS and Interlock failure

! Component - BOP

irf rms007 (3 00:00:00 00:00:00) 7.29 00:00:00

imf zcr744 (3 00:00:00 00:00:00) FAIL_ASIS

!Event 3, Control Rod D12 drops

! Component - RO

imf crf03a (4 00:00:00 00:00:00) 2 38

!Event 4, PT-444 Fails HIGH

! Instrument - RO

imf pt:444 (2 00:00:00 00:00:00) 2500.0 00:00:10

!Event 5, Loss of Instrument Bus III

! Instrument - BOP

imf eps02 (5 00:00:00 00:00:00) 1A-SIII

!Event 6, MSL Break Inside Containment, ramps in over 5 min

! Major - ALL

imf mss01a (6 00:00:00 00:00:00) 4.2e+006 00:05:00 0

Op Test No.: NRC Scenario # 1 Event # 1 Page 8 of 44		
Event Description: Lower Power		
Time	Position	Applicant's Actions or Behavior

LEAD EVALUATOR:		**Cue Event 2 (Radiation Monitor Failure) when the evaluating team has completed their evaluation of the power change. It is not necessary to reach 90% power to continue the scenario.**
EVALUATOR NOTE:		**The crew has been directed to lower power using GP-006, Normal Plant Shutdown, to <90% power in preparation for Turbine Valve Testing.**
EVALUATOR NOTE:		**The crew may elect to manually crack open a PRZ Spray Valve to establish PRZ Surge line flow and thereby maintain PRZ/RCS boron concentrations within limits.**
	SRO	GP-006, Step 5.2.4.
PROCEDURE NOTE:		**When PRZ backup heaters are energized in manual, PK-444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows:** • **PORV PCV-444B will open at a lower than expected pressure.** • **ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure.** • **Increased probability for exceeding Tech Spec DNB limit for RCS pressure.**

Op Test No.: NRC Scenario # 1 Event # 1 Page 9 of 44		
Event Description: Lower Power		
Time	Position	Applicant's Actions or Behavior
	RO	ENERGIZE all available Pressurizer Backup Heaters.
PROCEDURE NOTE:		**Routine load changes should be coordinated with the Load Dispatcher to meet system load demands.**
	SRO	INFORMS Load Dispatcher that a load reduction to 90% will begin. (N/A, per Initial Conditions)
PROCEDURE CAUTION:		**A failure of the Vidar in the DEH computer has resulted in a plant trip in the past. This failure would affect operation in Operator Auto, and can be detected in either of the following ways:** • **If OSI-PI is available, the process book PLANTSTATUS.PIW, DEH Trends function of the Plant Process Computer: DEH (menu) contains a point for DEH MEGAWATTS. With a failure of the Vidar, this point will not be updating.** • **If OSI-PI is NOT available, accessing the ANALOG INPUTS screen on the Graphics display computer (in the Termination Cabinet room near the ATWS panel) will show several points, most of which should be updating if the Vidar is functioning properly.**
EVALUATOR NOTE:		**There is no procedural guidance directing when the boration to lower power is required. The crew may elect to perform the boration prior to place the Turbine in GO. The boration steps are located on page 11 of this guide.**

Op Test No.: NRC	Scenario # 1	Event # 1	Page 10 of 44
Event Description: Lower Power			

Time	Position	Applicant's Actions or Behavior
	SRO	DIRECTS BOP to start power reduction at 4 DEH Units/Min. May direct initiation of a boration before the power reduction begins.
	BOP	Requests PEER check prior to manipulations of DEH Control
	BOP	DEPRESS the LOAD RATE MW/MIN push-button.
	BOP	ENTER the desired rate, **NOT** to exceed 5 MW/MIN, in the DEMAND display. (4 DEH Units/minute)
	BOP	DEPRESS the ENTER push-button.
	BOP	DEPRESS the REF push-button.
	BOP	ENTER the desired load (800-850MW per SCO) in the DEMAND display.
	BOP	DEPRESS the ENTER push-button. The HOLD push-button should illuminate.
PROCEDURE NOTE:		**The unloading of the unit can be stopped at any time by depressing the HOLD push-button. The HOLD lamp will illuminate and the GO lamp will extinguish. The load reduction can be resumed by depressing the GO push-button. The HOLD lamp will extinguish and the GO lamp will illuminate.**

Op Test No.: NRC Scenario # 1 Event # 1 Page 11 of 44		
Event Description: Lower Power		
Time	Position	Applicant's Actions or Behavior
	BOP	DEPRESS the GO push-button to start the load reduction and inform crew through 'Shift Update' Turbine in 'GO'.
	BOP	VERIFY the number in the REFERENCE display decreases.
	BOP	VERIFY Generator load is decreasing.
	BOP	WHEN Turbine load is less than 95%, THEN VERIFY the 3A and 3B Feedwater Vents have been opened per OP-136, Section 7.2.
BOOTH OPERATOR:		**Acknowledge direction. No simulator response actions are required.**
	RO	MONITORS primary systems response.
	RO	INITIATES boration, as necessary (with SRO concurrence) per OP-107.01.
	RO	OP-107.01, Section 5.3 and then 5.1
	RO	DETERMINE the reactor coolant boron concentration from chemistry OR the Main Control Room status board.

Op Test No.: NRC Scenario # 1 Event # 1 Page 12 of 44 Event Description: Lower Power		
Time	Position	Applicant's Actions or Behavior
	RO	DETERMINE the magnitude of boron concentration increase required.
	RO	DETERMINE the volume of boric acid to be added using the reactivity plan associated with the IC.
EVALUATOR NOTE:		**FIS-113, BORIC ACID BATCH COUNTER, has a tenths position.**
PROCEDURE CAUTION:		**If the translucent covers associated with the Boric Acid and Total Makeup Batch counters FIS-113 and FIS-114, located on the MCB, are not closed, the system will not automatically stop at the preset value.**
	RO	SET FIS-113, BORIC ACID BATCH COUNTER, to obtain the desired quantity.
PROCEDURE NOTE:		**Boration of the RCS will be dependent on charging and letdown flow rate. Placing additional letdown orifices in service will increase the boric acid delivery rate to the RCS.**
	RO	SET controller 1CS-283, FK-113 BORIC ACID FLOW, for the desired flow rate.
	RO	VERIFY the RMW CONTROL switch has been placed in the STOP position.

Op Test No.: NRC Scenario # 1 Event # 1 Page 13 of 44 Event Description: Lower Power		
Time	Position	Applicant's Actions or Behavior
	RO	VERIFY the RMW CONTROL switch green light is lit.
	RO	PLACE control switch RMW MODE SELECTOR to the BOR position.
PROCEDURE NOTE:		**When PRZ backup heaters are energized in manual, PK 444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows:** • **PORV PCV-444B will open at a lower than expected pressure.** • **ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure.** • **Increased probability for exceeding Tech Spec DNB limit for RCS pressure.**
	RO	OPERATE the pressurizer backup heaters as required to limit the difference between the pressurizer and RCS boron concentration to less than 10 ppm.
		• MAKE boron concentration adjustments as dictated from sample results.
PROCEDURE NOTE:		**Boration may be manually stopped at any time by turning control switch RMW CONTROL to STOP.**
	RO	START the makeup system as follows:

Op Test No.: NRC	Scenario # 1	Event # 1	Page 14 of 44
Event Description: Lower Power			

Time	Position	Applicant's Actions or Behavior
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the RED indicator light is LIT.
PROCEDURE CAUTION:		**The operation should be stopped if an unanticipated reactivity effect is seen. Do not resume the operation until the cause has been corrected.**
	RO	VERIFY Tavg responds as desired.
	RO	IF rod control is in AUTO, THEN VERIFY the control rods are stepping out to the desired height.
	RO	VERIFY boration automatically terminates when the desired quantity of boron has been added.
	RO	PLACE Reactor Makeup in Auto per Section 5.1.
EVALUATOR NOTE:		**Additional steps are included in section 5.1 but none will be applicable since the system just came out of Automatic. The only steps included here are the ones with verifiable action.**
	RO	VERIFY the RMW CONTROL switch:
		• Is in the STOP position.
		• The GREEN light is LIT.

Op Test No.: NRC Scenario # 1 Event # 1 Page 15 of 44 Event Description: Lower Power		
Time	Position	Applicant's Actions or Behavior
	RO	PLACE the RMW MODE SELECTOR to AUTO.
	RO	START the makeup system as follows:
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the RED indicator light is LIT.
LEAD EVALUATOR:		**Once the power reductions have been observed to the extent necessary, Cue Event 2 (Radiation Monitor High Alarm, Containment Purge fails to Isolate Automatically).**

Op Test No.: NRC	Scenario # 1	Event # 2	Page 16 of 44
Event Description:	Radiation Monitor high alarm, Containment Purge fails to isolate		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**Actuate Trigger 2 (Radiation Monitor high alarm, Containment Purge fails to isolate) on cue from the Lead Evaluator.**
Indications Available: • **ALB-10-4-5, RAD MONITOR SYSTEM TROUBLE**		
	RO	Responds to ALB-10-4-5, RAD MONITOR SYSTEM TROUBLE.
	CREW	CONFIRM alarm using: • RM-23, Radiation Monitoring Panel
BOOTH OPERATOR:		**If HP contacted to validate alarm wait one minute and then report that the monitor has failed.** **If someone other than HP is dispatched to investigate, wait three minutes and then report REM-3502 Gas Channel failed – no power, no indication.**
EVALUATOR NOTE:		**There are automatic actions associated with the failed channel that have been blocked by malfunction. The BOP may take the actions to place equipment in the interlock position from directions in AOP-005 or do so in accordance with the OWP. The scenario guide is written as if it will be done in the OWP which provides more actions.**
	BOP	VERIFY Automatic Functions: • Automatic Actions are dependent upon which RM-23 Radiation Monitor is in ALARM

Op Test No.: NRC	Scenario # 1	Event # 2	Page 17 of 44
Event Description:	Radiation Monitor high alarm, Containment Purge fails to isolate		

Time	Position	Applicant's Actions or Behavior
	CREW	PERFORM Corrective Actions:
		• IF the alarm is a Fuel Handling Building High Radiation alarm, THEN MANUALLY START the Spent Fuel Pool Purification System, using OP-116.01, Fuel Pool Cooling Purification System.
	SRO	• IF the alarm is RM-21AV-3509-1SA or an Area Monitor in the vicinity of the VCT Valve Gallery and air is being purge from the VCT to the plant vent per OP-120.07, THEN MANUALLY SECURE the air purge from the VCT to the plant vent per OP-120.07.
	SRO	• IF any radiation monitor is in alarm condition, THEN GO TO AOP-005, Radiation Monitoring System.
	SRO	• IF maintenance is to be performed, THEN REFER TO OWP-RM, Radiation Monitoring.
	SRO	Diagnoses as a failure of Channel 3502A
	SRO	Implement OWP-RM-03, CONTAINMENT LEAK DETECTION RADIATION MONITORS.
	SRO	Enters TS 3.3.3.1, Action b Table 3.3.3-6: Action 26 - Must satisfy the ACTION requirement for Specification 3.4.6.1 and; Action 27 - With less than the Minimum Channels OPERABLE requirement, operation may continue provided the containment purge makeup and exhaust isolation valves are maintained closed).

Op Test No.: NRC Scenario # 1 Event # 2 Page 18 of 44		
Event Description: Radiation Monitor high alarm, Containment Purge fails to isolate		
Time	Position	Applicant's Actions or Behavior
	SRO	Enters TS 3.4.6.1, Action a - With a. and c. of the above required Leakage Detection Systems inoperable:
		• Restore either Monitoring System (a. or c . 1 t o OPERABLE status within 30 days and
		• Obtain and analyze a grab sample of the containment atmosphere for gaseous and particulate radioactivity at least once per 24 hours
		Otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
	BOP	Performs OWP-RM component lineup.
PROCEDURE CAUTION:		**The control switches for AH-82A and AH-82B must be taken to STOP momentarily to ensure they will not AUTO start.**
	BOP	• Places AH-82A, Normal Containment Supply Fan, in STOP and releases.
		• Places AH-82B, Normal Containment Supply Fan, in STOP and releases.
		• Verifies 1CP-6, Normal Purge Inlet – CLOSED.
		• Verifies 1CP-9, Normal Purge Inlet – CLOSED.
		• Verifies 1CP-3, Normal Purge Discharge – CLOSED.
		• Verifies 1CP-5, Normal Purge Discharge – CLOSED.
		• Contact AO to place 1D21-2B, AH-82 (1A-NNS) Normal Containment Purge Makeup Air Handler breaker in OFF
		• Contact AO to place 1E21-2F, AH-82 (1B-NNS) Normal Containment Purge Makeup Air Handler breaker in OFF

Op Test No.: NRC	Scenario # 1	Event # 2	Page 19 of 44
Event Description:	Radiation Monitor high alarm, Containment Purge fails to isolate		

Time	Position	Applicant's Actions or Behavior
	SRO	Completes an Equipment Problem Checklist and contacts WCC for assistance.
EVALUATOR NOTE:		**The Lead Evaluator can cue Event 3 (Dropped Control Rod, D-12) after the TS entries and the OWP has been completed.**

Op Test No.: NRC	Scenario # 1	Event # 3	Page 20 of 44
Event Description: Dropped Control Rod (D-12)			

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**Actuate Trigger-3 (Dropped Control Rod, D-12) on cue from the Lead Evaluator.**
Indications Available: • **ALB-13-8-5, COMPUTER ALARM ROD DEV/SEQ NIS PWR RANGE TILTS** • **Multiple Rod Control Alarms - ALB-13-4-2, 4-5, 7-4, 8-5**		
	SRO	Enters AOP-001, MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM.
	RO	Perform AOP-001 Immediate Actions.
Immediate Action	RO	CHECK that LESS THAN TWO control rods are dropped (YES)
Immediate Action	RO	POSITION Rod Bank Selector Switch to MAN.
Immediate Action	RO	CHECK Control Bank motion STOPPED. (YES)
PROCEDURE NOTE:		**Throughout this procedure, "Westinghouse Rod Control System Troubleshooting Guidelines" refers to Section 6.0 of EPRI document TR-108152, Rod Control System Maintenance – Westinghouse PWRs.**
	SRO	GO TO Section 3.1, Dropped Control Rod
	SRO	RECORD the time at which the rod dropped:

Op Test No.: NRC	Scenario # 1	Event # 3	Page 21 of 44
Event Description: Dropped Control Rod (D-12)			

Time	Position	Applicant's Actions or Behavior
	BOP/RO	ADJUST ONE of the following to equalize Tavg with Tref: • Turbine load • Boron concentration
	CREW	CHECK ALL Rod Control Power and Logic Cabinets for normal operation, as follows: • NO blown fuses • NO other visible malfunctions
BOOTH OPERATOR:		**If dispatched to investigate, wait three minutes and then report a blown fuse indication for Rod D-12.**
	SRO	DETERMINE if the Westinghouse Rod Control System Troubleshooting Guidelines should be initiated. (Priority E Work Request is required) (YES)
PROCEDURE CAUTION:		**If ALB-13-7-1, ROD CONTROL URGENT ALARM, is alarming due to a logic error, resetting the alarm before correcting the cause could result in dropping rods supplied from the affected power cabinet.**
	RO	CHECK that ALB-13-7-1, ROD CONTROL URGENT ALARM, is CLEARED. (YES)

Op Test No.: NRC	Scenario # 1	Event # 3	Page 22 of 44
Event Description: Dropped Control Rod (D-12)			

Time	Position	Applicant's Actions or Behavior
		PROCEDURE NOTE: • **Surveillance requirement 4.1.1.1.1.a requires performing a shutdown margin calculation upon detecting an inoperable control rod. [C.1]** • **Technical Specification 3.1.3.1 Action d.3.d) will be limiting if there is any chance that the dropped rod cannot be recovered within 6 hours of event initiation. This Action Statement also requires a power reduction to 75% within two hours of event initiation.** • **If ALB 13-7-1, ROD CONTROL URGENT ALARM, is causing multiple control rods to be inoperable, Tech Spec 3.1.3.1 Action c is applicable.**
	SRO	REVIEW Technical Specifications: 3.1.1.1 – 1 hour action to determine shutdown margin 3.1.3.1.d.3 – 2 hour action from initiation to be <75% power (12 hour, 72 hour, and 5 day actions also apply)
	SRO	NOTIFY the following: • Manager – Operations • Reactor Engineering
	SRO	Completes an Equipment Problem Checklist and contacts WCC for assistance.
	RO	CHECK Reactor Power AT OR ABOVE P-10 (10%) [C.3] (YES)
	RO	CHECK ALL negative rate trip alarms at the NIS cabinets CLEARED. (NO)

Op Test No.: NRC	Scenario # 1	Event # 3	Page 23 of 44
Event Description: Dropped Control Rod (D-12)			

Time	Position	Applicant's Actions or Behavior
	RO	RESET the negative rate trip alarms at the NIS cabinets.
LEAD EVALUATOR:		**Cue Event 4 (Controlling PZR Pressure Channel (PT-444) Fails High) Booth Operator when rate trips are reset.** **NOTE THAT IF THESE TRIPS ARE NOT RESET THEN EVENT 5 WILL CAUSE A REACTOR TRIP.**

Op Test No.: NRC	Scenario # 1	Event # 4	Page 24 of 44
Event Description: Controlling PZR Pressure Channel (PT-444) Fails High			

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**Actuate Trigger 4 (Controlling PZR Pressure Channel, PT-444, fails HIGH).**
Indications Available: • **ALB-09-3-2 PRESSURIZER HIGH PRESS DEVIATION CONTROL** • **ALB-09-5-1 PRESSURIZER HIGH-LOW PRESS** • **ALB-09-8-1 PRESSURIZER RELIEF TANK HIGH-LOW LEVEL PRESS OR TEMP** • **ALB-09-8-2 PRESSURIZER RELIEF DISCHARGE HIGH TEMP**		
	RO	Responds to ALB-09 alarms.
	RO	Reports channel failure or malfunction of RCS Pressure control.
	SRO	Enters AOP-019, MALFUNCTION OF RCS PRESSURE CONTROL.
	RO	Perform AOP-019 Immediate Actions.
Immediate Action	RO	CHECK that a bubble exists in the PRZ. (YES)
Immediate Action	RO	VERIFY ALL PRZ PORVs AND associated block valves properly positioned for current PRZ pressure and plant conditions. (NO)
Immediate Action		IF ANY PRZ PORV will NOT shut when required, THEN SHUT its associated block valve.

Op Test No.: NRC	Scenario # 1	Event # 4	Page 25 of 44
Event Description: Controlling PZR Pressure Channel (PT-444) Fails High			

Time	Position	Applicant's Actions or Behavior
Immediate Action	RO	CHECK Both PRZ spray valves properly positioned for current PRZ pressure and plant conditions. (NO)
Immediate Action	RO	CONTROL PRZ spray valves in MANUAL using ONE of the following (listed in order of preference): • PK-444A, Master Pressure Controller OR • Both individual spray valve controllers
	SRO	GO TO Section 3.1, Pressure Control Malfunctions While Operating With a Pressurizer Bubble.
EVALUATOR NOTE:		**Dependent on crew response time, the PRT rupture disk may fail causing containment radiation monitor alarms.**
	SRO	Inform SSO to REFER to PEP-110, Emergency Classification and Protective Action Recommendations, AND ENTER the EAL Network at entry point X.
	RO	MONITOR PRZ pressure by observing other reliable indication.
	SRO	CHECK plant in MODE 1 OR 2. (YES)
	RO	CHECK PRZ pressure CONTROLLED. (YES)
	RO	CHECK PRZ pressure 2335 PSIG OR LESS. (YES)

Op Test No.: NRC	Scenario # 1	Event # 4	Page 26 of 44
Event Description: Controlling PZR Pressure Channel (PT-444) Fails High			

Time	Position	Applicant's Actions or Behavior
	RO	CHECK ALL of the following PRZ PORV block valves OPEN: • 1RC-117 (for PCV-445A SA) (YES) • 1RC-115 (for PCV-445B) (YES) • 1RC-113 (for PCV-44B SB) (YES)
	RO	CHECK that a malfunction of one or more of the following has occurred: • PT-444 (YES) • PK-444A (NO) • PRZ heater(s) (NO) • PRZ spray valve(s) or controller(s) (NO)
	RO	CHECK PK-444A controlling properly in AUTO. (NO)
	RO	PERFORM the following: • VERIFY PK-444A in MANUAL • ADJUST PK-444A output as necessary, to attempt to restore and maintain PRZ pressure.
	RO	CONTROL PRZ pressure as follows:
PROCEDURE NOTE:		**If individual spray valve controllers are already in MAN, do NOT return to AUTO.**
	RO	CHECK BOTH PRZ spray valve controllers in AUTO AND BOTH spray valves operating as desired. (YES)

Op Test No.: NRC	Scenario # 1	Event # 4	Page 27 of 44
Event Description: Controlling PZR Pressure Channel (PT-444) Fails High			

Time	Position	Applicant's Actions or Behavior
	RO	CHECK ALL PRZ heaters operating as desired. (YES)
		• Manually OPERATE control switches for heater groups as necessary to control PRZ pressure. (N/A)
	RO	CHECK at least one of the following conditions present: • PRZ pressure is UNCONTROLLED (NO) • Status of a normal spray valve or a PRZ heater bank is UNCONTROLLED (NO)
	SRO	REFER TO Tech Spec 3.2.5 (DNB Parameters) AND IMPLEMENT action where appropriate. (Limit is 2185 psig – restore within 2 hours)
	SRO	Completes an Equipment Failure Checklist and contacts WCC for assistance.
EVALUATOR'S NOTE:		**The Lead Evaluator can cue Event 5 (Loss of Instrument Bus S-III) after the negative rate trip alarms have been reset. DO NOT INITIATE NEXT EVENT UNTIL THESE ALARMS ARE RESET OR A REACTOR TRIP WILL OCCUR.**

Op Test No.: NRC	Scenario # 1	Event # 5	Page 28 of 44
Event Description: Loss of Instrument Bus S-III			

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**VERIFY NEGATIVE RATE TRIP ALARMS ARE CLEAR PRIOR TO INITIATION OF THIS EVENT.**
BOOTH OPERATOR:		**Actuate Trigger 5 (Loss of Uninterruptible Power Supply S-III) on cue from the Lead Evaluator.**
Indications Available:		**Multiple alarms associated with Loss of Instrument Bus S-III.** • **Key Indicator is Row 3 of TSLB LIT**
	SRO	ENTERS AOP-024, LOSS OF UNINTERRUPTIBLE POWER SUPPLY
Immediate Action	RO	PLACE Rod Control in MANUAL.
Immediate Action	BOP	CHECK Instrument Bus SIII ENERGIZED. (NO)
Immediate Action	BOP	PERFORM the following: • PLACE Main FW Regulator Valves in MANUAL. • VERIFY Main FW Regulator Bypass Valves in MANUAL. • CONTROL SG levels between 52% and 62% (OMM-001 Att. 13 trip limits 30% and 73%)
PROCEDURE NOTE:		**Loss of electrical power may require initiation of the SHNPP Emergency Plan.**

Op Test No.: NRC	Scenario # 1	Event # 5	Page 29 of 44
Event Description: Loss of Instrument Bus S-III			

Time	Position	Applicant's Actions or Behavior
	SRO	REFER TO PEP-110, Emergency Classification and Protective Action Recommendations, AND ENTER the EAL Network at entry point X.
	SRO	DETERMINE the affected bus (S-III) and GO TO appropriate section (Section 3.1)
	RO	PLACE the affected NI Rod Stop Bypass switch to BYPASS at the Detector Current Comparator Drawer.
	RO	RESTORE Tavg as necessary.
	SRO	CHECK the plant in Modes 1 through 4. (YES)
PROCEDURE NOTE:		**SG PORVs may be controlled locally if needed.**
	CREW	Manually CONTROL the following based on the Instrument Bus lost: (for S-III) • Rod Control • 'C' SG PORV • Main FW Reg Valves • Main FW Reg Bypass Valves
	SRO	GO TO the applicable step based on the Instrument Bus lost. (step 7)
	RO	VERIFY PRZ Level Controller Selector Switch in CHAN 459/460. (YES)

Op Test No.: NRC	Scenario # 1	Event # 5	Page 30 of 44
Event Description: Loss of Instrument Bus S-III			

Time	Position	Applicant's Actions or Behavior
PROCEDURE NOTE:		**If power is lost to instrument bus SIII (A Train), the associated ESW header pressure instrument will read low and the ESW pump will start on sensed low pressure. ESW Screen Wash will be inoperable due to loss of the ESW Screen Wash Pump discharge header pressure permissive for starting the screen, causing the associated EDG to be inoperable. Tech Specs 3.7.4 and 3.8.1.1 will apply.**
EVALUATOR NOTE:		This event will also cause an ESW Pump to start. This start will increase the cooling to containment and likely cause an alarm due to low pressure in containment.
	SRO	REFER TO the following Tech Specs: • 3.7.4, Emergency Service Water • 3.8.1.1, AC Sources – Operating
	CREW	PERFORM OST-1023, Offsite Power Availability Verification Weekly Interval Modes 1 - 6.
	SRO	GO TO Step 9.
	RO	CHECK Letdown in service. (YES)
	RO	CHECK ALL PRZ heaters in service. (YES)
	BOP	CHECK ANY WC-2 Essential Chiller RUNNING. (NO)

Op Test No.: NRC	Scenario # 1	Event # 5	Page 31 of 44
Event Description: Loss of Instrument Bus S-III			

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**The crew may decide to NOT start the standby Chiller based on getting alternate power restored to S-III which will cause the 'A' Chiller to automatically start.**
	BOP	START the standby chiller per OP-148, Essential Services Chilled Water System.
	CREW	CONTACT Maintenance to perform the following: • CHECK the inverter and vital bus for indications of grounds or other faults. • CORRECT ANY problems found.
	CREW	DISPATCH an operator to perform the following: • CHECK the affected instrument inverter (7.5 KVA UPS PANEL SIII for ANY of the following: o Red OVERCURRENT I-IL light LIT (NOTE: I-IL stands for Current indicating light) o Obvious signs of damage
BOOTH OPERATOR:		**When dispatched to investigate UPS Panel SIII, wait 2 minutes and then report that the Red OVERCURRENT I-IL light is LIT and there is a faint acrid odor in the area.**
	CREW	Direct the TRANSFER of Instrument Bus to the alternate power supply per OP-156.02, Section 8.7, AC Electrical Distribution.

Op Test No.: NRC	Scenario # 1	Event # 5	Page 32 of 44
Event Description: Loss of Instrument Bus S-III			

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Main Control Room to transfer Instrument Bus III to its alternate power supply, run APP eps INSTR_BUS_UPS_III_ALT. This APP takes approximately 3 minutes to complete. Once the APP is complete, report transfer complete to the MCR.**
EVALUATOR NOTE:		**Once the transfer to the alternate power supply is performed the tripped WC-2 Essential Chiller will automatically restart.**
PROCEDURE NOTE:		**Loss of power to PIC CAB-4 (fed from Instrument Bus SIV) will result in bistables P-476B, P-486B and P-496B (differential pressure bistables used in AFW isolation logic) being inoperable. Tech Spec Table 3.3-3, Action 19, requires the associated channels to be placed in a tripped conditions within six hours. These bistables are energized to trip. If power is not restored within six hours, Action 19 cannot be carried out and Tech Spec 3.0.3 will be applicable.**
	SRO	REFER to Tech Specs
	RO	CHECK the affected Instrument Bus ENERGIZED. (YES)
LEAD EVALUATOR:		**Lead Evaluator can cue Event 6 (MSLB on 'A' SG Inside Containment) after alternate power has been restored to Instrument Bus S-III.**

Op Test No.: NRC	Scenario # 1	Event # 6,7,8,9	Page 33 of 44

Event Description: MSLB on 'A' SG Inside Containment
Automatic MSLI fails
AFW Automatic Isolation fails
CSIP 'B' fails to start from Load Sequencer

Time	Position	Applicant's Actions or Behavior

EVALUATOR NOTE:	**A Main Steam Line Break inside Containment will occur and progressively worsen over the next five minutes. The crew should enter and carry out actions of PATH-1. The crew should diagnose that there is no LOCA in progress and transition to EPP-014, Faulted Steam Generator Isolation.** **The automatic Main Steam Line Isolation signal (which should occur at 3 psig in Containment) is failed. The crew will have to manually isolate the Main Steam Isolation Valves (MSIVs). Once the crew has manually shut the MSIVs, it will be identifiable that the 'A' Steam Generator is faulted inside Containment.** **The AFW Auto Isolation will not occur and the crew will have to manually isolate AFW flow to the 'A' Steam Generator. In addition, the 'B' CSIP will fail to start automatically from the 'B' Sequencer. The pump can be started by the operator. The scenario ends when Safety Injection has been terminated and the crew transitions to EPP-008, SI Termination**
BOOTH OPERATOR:	**On cue from the Lead Evaluator, insert Trigger 6 (MSLB on 'A' SG Inside Containment)**
Indications Available: • **ALB-028-5-1 CONTAINMENT AIR HIGH VACUUM will unexpectedly clear (in due to earlier ESW Pump start)** • **ALB-028-8-5 COMPUTER ALARM VENTILATION SYSTEM** • **Rising pressure in containment** • **Rising temperature in containment**	

Op Test No.: NRC	Scenario # 1	Event # 6,7,8,9	Page 34 of 44
Event Description:	MSLB on 'A' SG Inside Containment Automatic MSLI fails AFW Automatic Isolation fails CSIP 'B' fails to start from Load Sequencer		

Time	Position	Applicant's Actions or Behavior
	SRO	Enters PATH-1
	RO	VERIFY Reactor Trip:
		• AUTO or MANUAL Reactor Trip successful:
		• CHECK for any of the following:
		• Trip breakers RTA and BYA OPEN (YES)
		• Trip breakers RTB and BYB OPEN (YES)
		• ROD Bottom lights LIT (YES)
		• NEUTRON flux decreasing (YES)
	BOP	VERIFY Turbine Trip:
		• CHECK for any of the following:
		• ALL turbine throttle valves – SHUT (YES)
		• ALL turbine governor valves – SHUT (YES)
	BOP	VERIFY power to AC Emergency Buses
		• 1A-SA AND 1B-SB Buses energized by off-site power or EDG's. (YES)

Op Test No.: NRC	Scenario # 1	Event # 6,7,8,9	Page 35 of 44
Event Description:	MSLB on 'A' SG Inside Containment Automatic MSLI fails AFW Automatic Isolation fails CSIP 'B' fails to start from Load Sequencer		

Time	Position	Applicant's Actions or Behavior
	RO	CHECK SI Actuation:
		CHECK for any of the following – LIT • SI Actuated bypass permissive light (NO) • ALB-11-2-2 (NO) • ALB-11-5-1 (NO) • ALB-11-5-3 (NO) • ALB-12-1-4 (NO)
	RO	CHECK SI Actuation criteria: • CNMT pressure - GREATER THAN 3.0 PSIG (YES) • PRZ pressure – LESS THAN 1850 PSIG (NO) • Steam pressure – LESS THAN 601 PSIG (NO)
	RO	SI Actuation – REQUIRED (YES)
	RO	Verifies SI auto actuation
	SRO	Perform the following:
		• Initiate monitoring the Critical Safety Function Status Trees.
		• Evaluate EAL Network using entry point X.
	CREW	Foldout A Applies.

Op Test No.: NRC	Scenario # 1	Event # 6,7,8,9	Page 36 of 44

Event Description: MSLB on 'A' SG Inside Containment
Automatic MSLI fails
AFW Automatic Isolation fails
CSIP 'B' fails to start from Load Sequencer

Time	Position	Applicant's Actions or Behavior
	RO	Verify All CSIPs AND RHR pumps – RUNNING (NO)
	RO	START 'B' CSIP
	RO	Check SI Flow:
		• SI flow - GREATER THAN 200 GPM (YES)
		• RCS pressure - LESS THAN 230 PSIG (NO)
	BOP	Check Main Steam Isolation:
		Main Steam Isolation – ACTUATED (NO)
		Check Main Steam Isolation actuation criteria: • Steam line pressure - LESS THAN 601 PSIG (YES/NO) • CNMT pressure - GREATER THAN 3.0 PSIG (YES) • Manual closure of all MSIVs AND bypass valves is desired.
	BOP	Main Steam Isolation – REQUIRED (YES)
	BOP	Verify all MSIVs and bypass valves - SHUT

Op Test No.: NRC	Scenario # 1	Event # 6,7,8,9	Page 37 of 44
Event Description:	MSLB on 'A' SG Inside Containment Automatic MSLI fails AFW Automatic Isolation fails CSIP 'B' fails to start from Load Sequencer		

Time	Position	Applicant's Actions or Behavior
	RO	Check CNMT Pressure – HAS REMAINED LESS THAN 10 PSIG (NO) **NOTE: Crew may set an early manual actuation setpoint and manually align spray prior to an auto actuation set point being reached.** • Verify Containment Spray actuated • Secure RCP's (based on Phase B or RCS Press <1400 psig and SI flow > 200 gpm)
	CREW	Identifies Containment Adverse Conditions
	BOP	Check AFW Status:
		• AFW flow - AT LEAST 210 KPPH AVAILABLE
	BOP	Verify Alignment Of Components From Actuation of ESFAS Signals Using Attachment 6, Safeguards Actuation Verification, While Continuing With This Procedure.
	RO/BOP	Control RCS Temperature:
		• Stabilize AND maintain temperature between 555°F AND 559°F using Table 1.
	RO/BOP	Check PRZ PORVs AND Spray Valves:
		• Verify AC buses 1A1 AND 1B1 - ENERGIZED
		• Check PRZ PORVs - SHUT

Op Test No.: NRC	Scenario # 1	Event # 6,7,8,9	Page 38 of 44
Event Description:	MSLB on 'A' SG Inside Containment Automatic MSLI fails AFW Automatic Isolation fails CSIP 'B' fails to start from Load Sequencer		

Time	Position	Applicant's Actions or Behavior
		• Check block valves – AT LEAST ONE OPEN
		• PRZ spray valves - SHUT
	RO/BOP	Identify Any Faulted SG:
		Check for any of the following: • Any SG pressures - DECREASING IN AN UNCONTROLLED MANNER (YES) • Any SG – COMPLETELY DEPRESSURIZED (NO)
	SRO	GO TO EPP-014, FAULTED STEAM GENERATOR ISOLATION, Step 1
		EPP-014, FAULTED STEAM GENERATOR ISOLATION
PROCEDURE CAUTION: • At least one SG must be maintained available for RCS cooldown. • Any faulted SG OR secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown.		
	SRO	Implement Function Restoration Procedures As Required.
	BOP/RO	Check MSIVs AND Bypass Valves:
		• Verify all MSIVs – SHUT (YES)
		• Verify all MSIV bypass valves – SHUT (YES)

Op Test No.: NRC	Scenario # 1	Event # 6,7,8,9	Page 39 of 44
Event Description:	MSLB on 'A' SG Inside Containment Automatic MSLI fails AFW Automatic Isolation fails CSIP 'B' fails to start from Load Sequencer		

Time	Position	Applicant's Actions or Behavior
	BOP/RO	Check Any SG NOT Faulted:
		• Any SG pressure - STABLE OR INCREASING (YES)
	BOP/RO	Identify Any Faulted SG:

		• Check for any of the following:
		  • Any SG pressure - DECREASING IN AN UNCONTROLLED MANNER
		  • Any SG - COMPLETELY DEPRESSURIZED

	BOP/RO	Isolate Faulted SG(s):
		• Verify faulted SG(s) PORV - SHUT
		• Verify main FW isolation valves - SHUT
		• Verify MDAFW AND TDAFW pump isolation valves to faulted SG(s) - SHUT

		• Shut faulted SG(s) steam supply valve to TDAFW pump – SHUT
		  • SG B: 1MS-70
		  • SG C: 1MS-72

		• Verify main steam drain isolation(s) before MSIVs - SHUT:
		  • SG A: 1MS-231
		  • SG B: 1MS-266
		  • SG C: 1MS-301

		• Verify SG blowdown isolation valves - SHUT

Op Test No.: NRC	Scenario # 1	Event # 6,7,8,9	Page 40 of 44

Event Description: MSLB on 'A' SG Inside Containment
Automatic MSLI fails
AFW Automatic Isolation fails
CSIP 'B' fails to start from Load Sequencer

Time	Position	Applicant's Actions or Behavior
		• Verify main steam analyzer isolation valves - SHUT
	BOP/RO	Check CST Level - GREATER THAN 10%
PROCEDURE NOTE:		**A SG may be suspected to be ruptured if it fails to dry out following isolation of feed flow. Local checks for radiation can be used to confirm primary-to-secondary leakage.**
	BOP/RO	Check Secondary Radiation:

		• Check for all of the following:
		  • SG blowdown radiation – NORMAL
		  • Main steamline radiation - NORMAL

	BOP/RO	Check SG Levels:
		• Any level - INCREASING IN AN UNCONTROLLED MANNER (NO)
	BOP/RO	Check If SI Has Been Terminated:
		• SI flow - GREATER THAN 200 GPM
EVALUATOR NOTE:		**Adverse values apply since containment pressure has exceeded 3 psig. Adverse values are in brackets and bolded where applicable.**

Op Test No.: NRC Scenario # 1 Event # 6,7,8,9 Page 41 of 44		
Event Description: MSLB on 'A' SG Inside Containment Automatic MSLI fails AFW Automatic Isolation fails CSIP 'B' fails to start from Load Sequencer		
Time	Position	Applicant's Actions or Behavior
	BOP/RO	Check SI Termination Criteria:
		• Check Subcooling - GREATER THAN 10°F [**40°F**] - C 20°F [**50°F**] – M (YES) Note the 'C' and 'M' above refers to how subcooling is calculated. 'C' is by the Computer, 'M' is Manual
		Check secondary heat sink by observing any of the following: • Level in at least one intact SG – GREATER THAN 25% [**40%**] (YES) • Total feed flow to SGs - GREATER THAN 210 KPPH (YES)
		• RCS pressure - STABLE OR INCREASING (YES)
		• PRZ level - GREATER THAN 10% [**30%**] (YES)
	BOP/RO	Reset SI.
	CREW	Manually Realign Safeguards Equipment Following A Loss Of Offsite Power. (Refer to PATH-1 GUIDE, Attachment 2.)
	BOP/RO	Reset Phase A AND Phase B Isolation Signals.

Op Test No.: NRC	Scenario # 1	Event # 6,7,8,9	Page 42 of 44
Event Description:	MSLB on 'A' SG Inside Containment Automatic MSLI fails AFW Automatic Isolation fails CSIP 'B' fails to start from Load Sequencer		

Time	Position	Applicant's Actions or Behavior
	BOP/RO	Establish Instrument Air AND Nitrogen To CNMT:

		• Open the following valves:
		  • 1IA-819
		  • 1SI-287

	BOP/RO	Stop All But One CSIP.
	BOP/RO	Check RCS Pressure - STABLE OR INCREASING (YES)
	BOP/RO	Isolate High Head SI Flow:
		• Check CSIP suction - ALIGNED TO RWST (YES)

		• Open normal miniflow isolation valves:
		  • 1CS-182
		  • 1CS-196
		  • 1CS-210
		  • 1CS-214

		• Shut BIT outlet valves:
		  • 1SI-3
		  • 1SI-4

		• Verify cold leg AND hot leg injection valves - SHUT
		  • 1SI-52
		  • 1SI-86
		  • 1SI-107

		• ~~Observe CAUTION prior to Step 21 AND GO TO Step 21.~~

Op Test No.: NRC	Scenario # 1	Event # 6,7,8,9	Page 43 of 44
Event Description:	MSLB on 'A' SG Inside Containment Automatic MSLI fails AFW Automatic Isolation fails CSIP 'B' fails to start from Load Sequencer		

Time	Position	Applicant's Actions or Behavior
PROCEDURE CAUTION:		**High head SI flow should be isolated before continuing.**
	BOP/RO	Establish Charging Lineup:
		• Shut charging flow control valve: FK-122.1
		Open charging line isolation valves: • 1CS-235 • 1CS-238
PROCEDURE NOTE:		**RCS temperature must be stabilized to allow evaluation of PRZ level trend.**
	BOP/RO	Monitor RCS Hot Leg Temperature:
		• Check RCS hot leg temperature – STABLE (YES)
PROCEDURE CAUTION:		**Charging flow should NOT exceed 150 GPM to prevent damage to the regenerative heat exchanger.**
	BOP/RO	Control Charging Flow To Maintain PRZ Level:
		• Control charging using charging flow control valve: • FK-122.1
		• Maintain charging flow less than 150 GPM.

Op Test No.: NRC	Scenario # 1	Event # 6,7,8,9	Page 44 of 44

Event Description: MSLB on 'A' SG Inside Containment
Automatic MSLI fails
AFW Automatic Isolation fails
CSIP 'B' fails to start from Load Sequencer

Time	Position	Applicant's Actions or Behavior
		• PRZ Level - CAN BE MAINTAINED STABLE OR INCREASING
	BOP/RO	GO TO EPP-008, SI TERMINATION, Step 1.
TERMINATE THE SCENARIO		

Facility:	SHEARON-HARRIS	Scenario No.:	2	Op Test No.:	05000400
Examiners:		Operators:			

Initial Conditions:	• IC-28, MOL, 39% power
	• 'B' RHR Pump Out of Service for inspection
	• 'B' Containment Spray Pump out of service to replace its motor
	• 4 GPD tube leak on 'B' Steam Generator
Turnover:	• Normal shutdown is in progress IAW with GP-006, Normal Plant Shutdown, due to elevated vibrations on Main Turbine at 100% power. Vibrations have subsided but Shutdown is to continue to perform inspection on Turbine. Currently in progress on Step 15 of GP-006 with Step 16 completed.
Critical Task:	• Trip RCPs once RCP Trip Foldout Criteria is met and prior to exiting PATH-1
	• Align 'A' Containment Spray System for operation prior to containment pressure exceeding 35 psig
	• Start 'B' RHR Pump prior to exiting EPP-012, Loss of Emergency Coolant Recirculation

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N - BOP, SRO R – RO	Lower Power
2	HVA04	C – BOP, SRO TS-SRO	Trip of the running ESCWS Chiller (WC-2 A-SA)
3	TT:144, JTB143B	I – RO, SRO	Letdown TT-144 fails low and the Letdown Divert Valve, TCV-144, fails to operate automatically
4	LT:476	I – BOP, SRO TS – SRO	SG 'A' Controlling Level Transmitter fails high
5	RCS14C	C – RO, SRO TS – SRO	RCP 'C' #1 Seal fails
6	RCS18A	M – ALL	SBLOCA inside containment (100% severity)
7	RHR01A	C – RO, SRO	'A' RHR Pump trips on overcurrent on start
8	ZRPK645A	C – RO, SRO	Cnmt Spray Pump 'A' Discharge Valve, 1CS-50, and CSAT Additive Valve, 1CS-12, fail to OPEN automatically on a CSAS

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

Scenario Summary:
The plant is at 39% power in middle of life. The crew is lowering power in accordance with GP-006, Normal Plant Shutdown, due to elevated vibrations observed on the Main Turbine at 100% power. Vibrations have subsided since power has been reduced, but shutdown is to continue so that an inspection of the Main Turbine can be performed. Currently the 'B' RHR pump is out of service, the 'B' Containment Spray Pump is out of service, and there is a 4 GPD tube leak on 'B' Steam Generator.

The first event is for the crew to continue lowering power in accordance with their turnover. It is expected that the SRO will conduct a reactivity brief, the RO will borate as necessary to lower power, and the BOP will operate the DEH controls as necessary to reduce turbine load.

The second event, a trip of the running A-SA ESCWS Chiller, can be inserted once the downpower has been observed to the extent necessary. The crew will respond to various alarms, diagnose the event, and enter AOP-026, Loss of Essential Chill Water System. This will direct starting the 'B' Train ESCWS Chiller. The SRO should evaluate Tech Spec 3.7.13, Essential Services Chilled Water System. Note that the 'A' Chiller will be inoperable for the remainder of the scenario and this will impact plant response during the Major Event in that this failure will prevent Load Block 9 from energizing.

The third event, a failure of the Letdown Temperature Transmitter, TT-144, can be inserted once the 'B' ESCWS Chiller has been started and ventilation properly aligned. The transmitter fails low which causes the system to attempt to increase temperature by reducing Component Cooling Water flow. As cooling flow reduces, actual temperature will increase. The automatic divert to protect the demineralizers fails to operate. Operators should take action to restore temperature and divert letdown around the demins. From the initiation of the trigger it takes ~2.5 minutes to cause an alarm.

The fourth event is the 'A' Steam Generator Controlling Level Transmitter, LT-476, failing high and can be inserted once the crew has control of letdown temperature. This will require operator action to take manual control of 'A' Main Feedwater Regulating Valve and stabilize level. The SRO should evaluate Tech Specs 3.3.1, Reactor Trip Instrumentation, and 3.3.2, ESF Instrumentation.

The fifth event, a failure of the 'C' RCP #1 Seal, can be inserted once 'A' Steam Generator Level has stabilized and is under control of the crew. The crew should enter AOP-018, Reactor Coolant Pump Abnormal Conditions, and evaluate the seal malfunction. The crew should identify the 'C' RCP #1 seal as failed. Since power is less than 49%, they should stop the 'C' RCP and shut 1CS-437, 'C' RCP #1 Seal Water Return valve, between three and five minutes after securing the RCP. Once the RCP is stopped and its seal water return valve is shut, then the major event will be initiated. The SRO should evaluate Tech Spec 3.4.1.1, Reactor Coolant Loops and Coolant Circulation.

The major event is a SBLOCA (100% severity) from the 'A' Loop. The crew should carry out immediate actions of PATH-1. The earlier failure of A-SA ESCWS Chiller will prevent the 'A' Sequencer from reaching Load Block 9. The BOP should manually actuate the MAN PERM switch to enable manual loading on the A-SA bus (due to the earlier trip of the A-SA ESCWS Chiller). Shortly after entering PATH-1, the crew should recognize that the Foldout Criteria for

securing all RCPs has been met and carry out that action. Pressure in containment will continue to rise due to the LOCA and a Containment Spray Actuation will be required.

The 'A' Cnmt Spray Pump will start automatically, but 1CS-50, 'A' Cnmt Spray Pump Discharge valve, and 1CS-12, Cnmt Spray Additive valve, will fail to open automatically. The crew should identify this failure and manually open both valves. Since 'B' Cnmt Spray Pump is under clearance, there will be no spray flow to containment until the 'A' Cnmt Spray Pump Discharge valve is manually opened.

The 'A' RHR Pump will start automatically from the sequencer and then immediately trip on overcurrent. The RO should identify this failure but the pump cannot be manually started. The loss of RHR will result in the crew exiting PATH-1 and going to EPP-012, Loss of Emergency Coolant Recirculation, to address the loss of RHR capability. The 'B' RHR Pump is under clearance for routine maintenance and can be made available by the booth operator once the crew has entered EPP-012 and the request has been made to restore 'B' RHR Pump to service. Terminate the scenario once the crew starts 'B' RHR pump or exits EPP-012.

SIMULATOR SETUP

SPECIAL INSTRUCTIONS

- Ensure GP-006 is marked up as appropriate for downpower.
- Provide Reactivity Plan for downpower

INITIAL CONDITIONS:

- IC-28, MOL, 39% power
- 'B' RHR pump has a CIT installed
- 'B' CT pump has a CIT installed

PRE-LOAD:

- irf cns008 RACK_OUT ('B' Cnmt Spray Pump Out Of Service
- imf zrpk645a FAIL_ASIS ('A' Cnmt Spray Pump Discharge and Spray Additive Valves fail to open automatically)
- irf rhr023 RACK_OUT ('B' RHR Pump Out of Service for Oil Replacement due to contaminants)
- imf rhr01a TRUE ('A' RHR Pump trips on overcurrent immediately upon start)

TRIGGERS:

- ET-2: imf hva04 (2 00:00:00 00:00:00) Train_A
  Trip of the Running Chiller

- ET-3: imf tt:144 (3 00:00:00 00:00:00) 50.0 00:00:00
  imf jtb143b (3 00:00:00 00:00:00) FAIL_ASIS
  Event 2, Letdown Temp Transmitter fails high, Auto divert fails (takes ~2.5 min to show)

- ET-4: imf lt:476 (4 00:00:00 00:00:00) 100.0 00:00:00
  SG 'A' Controlling Level Transmitter fails High

- ET-5: imf rcs14c (5 00:00:00 00:00:00) 15 00:00:00 0
  RCP 'C' Number 1 Seal Failed

- ET-6: imf rcs18a (6 0 0) 100
  SBLOCA

CAEP

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!Description of NRC2CAEP
!IC-28, MOL, 39% power
!'B' RHR pump is Out of Service
!4 gpd tube leak on 'B' Steam Generator

!Preloads

!  'B' Cnmt Spray Pump Out Of Service
        irf cns008 (n 00:00:00 00:00:00) RACK_OUT

!  'A' Cnmt Spray Pump Discharge and Spray Additive Valves fail to open automatically
        imf zrpk645a (n 00:00:00 00:00:00) FAIL_ASIS

!  'B' RHR Pump Out of Service for Oil Replacement due to contaminants
        irf rhr023 (n 00:00:00 00:00:00) RACK_OUT

!  'A' RHR Pump trips on overcurrent immediately upon start
        imf rhr01a (n 00:00:00 00:00:00) TRUE

!Event Triggers

!Event 2, Trip of the Running Chiller
!  Note that this failure will prevent Load Block 9 from energizing later in scenario
!  Component - BOP
!  Tech Spec - SRO
        imf hva04 (2 00:00:00 00:00:00) Train_A

!Event 3, Letdown Temp Transmitter fails high, Auto divert fails (takes ~2.5 min to show)
!  Instrument - RO
        imf tt:144 (3 00:00:00 00:00:00) 50.0 00:00:00
        imf jtb143b (3 00:00:00 00:00:00) FAIL_ASIS

!Event 4, SG 'A' Controlling Level Transmitter fails High
!  Instrument - BOP
        imf lt:476 (4 00:00:00 00:00:00) 100.0 00:00:00

!Event 5, RCP 'C' Number 1 Seal Failed
!  Component - RO
        imf rcs14c (5 00:00:00 00:00:00) 15 00:00:00 0

!Event 6, SBLOCA
!  Major - ALL
        imf rcs18a (6 0 0) 100

!Event 7, Enter EPP-012 due to loss of RHR capability
!  EOP Contingency Procedure
```

Op Test No.: NRC Scenario # 2 Event # 1 Page 6 of 29

Event Description: Lower Power

Time	Position	Applicant's Actions or Behavior
LEAD EVALUATOR:		**Cue Event 2 (trip of A-SA ESCWS Chiller) when downpower has been observed to the extent necessary.**
EVALUATOR NOTE:		**The crew has been directed to lower power using GP-006, Normal Plant Shutdown, due to elevated vibrations on the Main Turbine earlier.**
		GP-006, step 15 in progress (step 16 completed)
	SRO	DIRECTS BOP to start power reduction at the specified rate. May direct initiation of a Boration before the power reduction begins
EVALUATOR NOTE:		**The following steps have already been completed because the shutdown is in progress but the BOP should verify the setup.**
	BOP	DEPRESS the LOAD RATE MW/MIN push-button.
	BOP	VERIFY the desired rate, **NOT** to exceed 5 MW/MIN, in the DEMAND display. (4 DEH Units/minute)
	BOP	DEPRESS the REF push-button.
	BOP	VERIFY the desired load (120 MW if shutting down) in the DEMAND display.
	BOP	The HOLD push-button should illuminate.
	BOP	DEPRESS the GO push-button to start the load reduction.

Op Test No.: NRC Scenario # 2 Event # 1 Page 7 of 29

Event Description: Lower Power

Time	Position	Applicant's Actions or Behavior
	BOP	VERIFY the number in the REFERENCE display decreases.
	BOP	VERIFY Generator load is decreasing.
	RO	MONITORS primary systems response.
	RO	INITIATES boration, per OP-107.01 Section 5.3 as necessary (with SRO concurrence).
		OP-107.01 Section 5.3
	RO	DETERMINE the reactor coolant boron concentration from chemistry OR the Main Control Room status board.
	RO	DETERMINE the magnitude of boron concentration increase required.
	RO	DETERMINE the volume of boric acid to be added using the reactivity plan associated with the IC.
PROCEDURE NOTE:		**FIS-113, BORIC ACID BATCH COUNTER, has a tenths position.**
PROCEDURE CAUTION:		**If the translucent covers associated with the Boric Acid and Total Makeup Batch counters FIS-113 and FIS-114, located on the MCB, are not closed, the system will not automatically stop at the preset value.**
	RO	SET FIS-113, BORIC ACID BATCH COUNTER, to obtain the desired quantity.

Op Test No.: NRC	Scenario # 2	Event # 1	Page 8 of 29
Event Description: Lower Power			

Time	Position	Applicant's Actions or Behavior
PROCEDURE NOTE:		**Boration of the RCS will be dependent on charging and letdown flow rate. Placing additional letdown orifices in service will increase the boric acid delivery rate to the RCS.**
	RO	SET controller 1CS-283, FK-113 BORIC ACID FLOW, for the desired flow rate.
	RO	VERIFY the RMW CONTROL switch has been placed in the STOP position.
	RO	VERIFY the RMW CONTROL switch green light is lit.
	RO	PLACE control switch RMW MODE SELECTOR to the BOR position.
PROCEDURE NOTE:		**When PRZ backup heaters are energized in manual, PK 444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows:** • **PORV PCV-444B will open at a lower than expected pressure.** • **ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure.** • **Increased probability for exceeding Tech Spec DNB limit for RCS pressure.**
	RO	OPERATE the pressurizer backup heaters as required to limit the difference between the pressurizer and RCS boron concentration to less than 10 ppm.

Op Test No.: NRC	Scenario # 2	Event # 1	Page 9 of 29
Event Description: Lower Power			

Time	Position	Applicant's Actions or Behavior
	SRO/RO	FOR large boron changes, PERFORM the following:
		• DIRECT Chemistry to sample the RCS for boron concentration.
		• MAKE boron concentration adjustments as dictated from sample results.
PROCEDURE NOTE:		**Boration may be manually stopped at any time by turning control switch RMW CONTROL to STOP.**
	RO	START the makeup system as follows:
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the RED indicator light is LIT.
PROCEDURE CAUTION:		**The operation should be stopped if an unanticipated reactivity effect is seen. Do not resume the operation until the cause has been corrected.**
	RO	VERIFY Tavg responds as desired.
	RO	PLACE Reactor Makeup in Auto per Section 5.1.
	RO	VERIFY the RMW CONTROL switch:
		• Is in the STOP position.
		• The GREEN light is LIT.
	RO	PLACE the RMW MODE SELECTOR to AUTO.

Op Test No.: NRC	Scenario # 2	Event # 1	Page 10 of 29
Event Description:	Lower Power		

Time	Position	Applicant's Actions or Behavior
	RO	START the makeup system as follows:
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the RED indicator light is LIT.
LEAD EVALUATOR:		**Once the power reductions have been observed to the extent necessary, cue Event 2 (trip of A-SA ESCWS Chiller).**

Op Test No.: NRC	Scenario # 2	Event # 2	Page 11 of 29
Event Description:	Trip of the running ESCWS Chiller (WC-2 A-SA)		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**Actuate ET-2 (Trip of the running ESCWS Chiller WC-2 A-SA)**
Indications Available:		**ALB-23-1-18 CHILLER WC2-A TROUBLE**
	BOP	RESPONDS to alarm on ALB-23 (1-18).
	BOP	REPORTS WC-2A-SA tripped.
	SRO	ENTERS AOP-026, LOSS OF ESSENTIAL SERVICE CHILLED WATER SYSTEM
PROCEDURE NOTE:		**This procedure contains no immediate actions.**
	BOP	CHECK the in-service chiller RUNNING. (NO)
	CREW	DISPATCH field operators to determine the cause of the chiller trip.
BOOTH OPERATOR:		**When contacted, wait 4 minutes and then report that the breaker for the chiller has tripped on overcurrent and that there are no visible problems locally at the chiller.**
	BOP	PERFORM the following using OP-148, Essential Service Chilled Water System: START the Standby chiller. (Start P-4B and 'B' Chiller)
	CREW	CONTACT Maintenance as necessary for troubleshooting and appropriate corrective actions.
	BOP	CHECK EITHER chiller STARTED. (YES)
	BOP	VERIFY the following AH units for the operating train chiller are

Op Test No.: NRC	Scenario # 2	Event # 2	Page 12 of 29
Event Description:	Trip of the running ESCWS Chiller (WC-2 A-SA)		

Time	Position	Applicant's Actions or Behavior
		RUNNING:
		• AH-15, Control Room Normal Supply
		• AH-17, Fuel Vent FP Pump Room Fan Cooler
		• AH-16, Elec Equip Prot Rm Supply
	BOP	VERIFY the following alarm is CLEAR for the running chiller
		• ALB-23-1-20, Expansion TK A LO-LO Level
		• ALB-23-2-20, Expansion TK B LO-LO Level
	SRO	REFER TO Tech Spec 3.7.13.
	SRO	EXIT this procedure.
EVALUATOR NOTE:		**Initiate Trigger for Event 3 (TT-144 fails low and TCV-144 fails to operate automatically) once ESCWS Chiller is running.**

Op Test No.: NRC	Scenario # 2	Event # 3	Page 13 of 29
Event Description:	Letdown TT-144 fails low and the Letdown Divert Valve, TCV-144, fails to operate automatically		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**Actuate ET-3 (TT-144 fails low and TCV-144 fails to operate automatically) on cue from the Lead Evaluator.**
Indications Available:		**ALB-07-3-2, DEMIN FLOW DIVERSION HIGH TEMP.**
	RO	RESPONDS to alarm and ENTERS APP-ALB-07-3-2.
	RO	CONFIRM alarm using TI-143, LP Letdown Temperature.
	RO	VERIFY Automatic Functions:
		• Manually positions 1CS-50, Letdown to VCT/Demin, to divert flow to the VCT.
	RO	PERFORM Corrective actions:
		• VERIFY that 1CS-50 diverts flow to the VCT, bypassing the BTRS and Purification Demineralizers.
		• PERFORM the following as needed to lower letdown temperature:
		• VERIFY proper charging flow is established. (YES)
		• LOWER letdown flow. (N/A – CCW Problem)
		• IF CCW flow to the Letdown Heat Exchanger appears low, THEN:
		• TAKE manual control of TK-144.
		• OPEN 1CC-337, to raise CCW flow.
	SRO	Contacts Work Control and/or System Engineer for assistance.
BOOTH OPERATOR:		**If contacted as WCC or System Engineer: "maintain flow bypassing the demineralizers until a resin damage assessment is completed".**

Op Test No.: NRC	Scenario # 2	Event # 4	Page 14 of 29
Event Description:	SG 'A' Controlling Level Transmitter (LT-476) fails high		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**Actuate ET-4 (SG 'A' Controlling Level Transmitter (LT-476) fails high) on cue from the Lead Evaluator.**
Indications Available:		**ALB-14-1-1B SG A NR LVL/SP HI/LO DEV and ALB-14-4-3B STEAM GEN A HIGH-HIGH LVL**
	BOP	RESPONDS to alarms and ENTERS ALB-014-1-1B and 4-3B.
Evaluator's Note:		**The APP-ALB-014-1-B and 4-3B actions are similar.** **In accordance with OMM-001, the operator may take MANUAL control of a malfunctioning controller before being directed by a procedure.**
	BOP	CONFIRM alarm using LI-474 SA, LI-475 SB, or LI-476 SA, Steam Generator A level indicators. Reports LI-476 reading or failed high.
	BOP	VERIFY Automatic Functions: NONE
	BOP	PERFORM Corrective Actions:
		• CHECK Steam Flow (FI-474, FI-475) AND Feed Flow (FI-476, 477) for deviation. (YES)
		• IF FCV-478, SG A auto level controller, is NOT sufficiently correcting level, THEN: (YES)
		• SWITCH to MANUAL.
		• RESTORE level to normal (57% NR).
	SRO	**The SRO may enter AOP-010 based on the flow transient. If so, the outcome will be the same – the associated FRV in MANUAL.**
	SRO	Refer to OWP-RP-05 to remove channel from service.

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Event Description: SG 'A' Controlling Level Transmitter (LT-476) fails high

Time	Position	Applicant's Actions or Behavior
	SRO	Contacts I&C to have channel removed from service.
Evaluator's Note:		**Channel does NOT have to be removed from service to continue the scenario. Cue Event 5 (RCP 'C' #1 Seal fails) after SG level is under control and the TS has been identified.**
	SRO	Enters Instrumentation TS 3.3.1 Action 6 and 3.3.2 Action 19.

Op Test No.: NRC	Scenario # 2	Event # 5	Page 16 of 29
Event Description: RCP 'C' #1 Seal fails			

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**Actuate ET-5 (RCP 'C' #1 Seal fails).**
Indications Available:		**ALB-08-5-3 RCP-C SEAL #1 LEAKOFF HIGH LOW FLOW**
	RO	RESPONDS to alarm on ALB-08-5-3
	CREW	CONFIRM alarm using ERFIS GD AOP-018 or FR-154A
	SRO	ENTERS AOP-018, REACTOR COOLANT PUMP ABNORMAL CONDITIONS
PROCEDURE NOTE:		**Step 1 is an immediate action.**
Immediate Action	RO	CHECK ANY CSIP RUNNING. (YES)
	SRO	REFER TO PEP-110, Emergency Classification And Protective Action Recommendations, AND ENTER the EAL Network at entry point X.
PROCEDURE NOTE:		**Minimum allowable flow for a CSIP is 60 gpm which is provided by normal miniflow during normal operation and alternate miniflow during safety injection. Maintaining CSIP flow greater than or equal to 60 gpm also satisfies this requirement.**
	SRO	EVALUATE plant conditions AND GO TO the appropriate section:
		• Reactor Coolant Pump Seal Malfunction, SECTION 3.3 PAGE 12
	CREW	CHECK ANY of the following conditions exist:
		• ANY RCP #1 Seal FAILS as defined in Attachment 2 (Page 29) (YES)

Op Test No.: NRC	Scenario # 2	Event # 5	Page 17 of 29
Event Description: RCP 'C' #1 Seal fails			

Time	Position	Applicant's Actions or Behavior
	RO	CHECK Rx power greater than P-8 (49%). (NO)
	RO	CHECK more than ONE RCP affected. (NO)
	RO	STOP the affected ('C') RCP.
	CREW	REFER TO Attachment 7, Operation With Two RCPs.
	RO	SHUT the affected RCP Seal Water Return Valve(s) between three and five minutes after securing the RCP:
		• 1CS-437, RCP C #1 Seal Water Return
	RO	CHECK all RCPs RUNNING. (NO)
	BOP	VERIFY SG levels being maintained between 52% and 62%.
	RO	MONITOR rod insertion limits (Refer to Section F curve from Curve Book).
	SRO	INITIATE a plant shutdown using ONE of the following:
		• GP-006, Normal Plant Shutdown from Power Operation to Hot Standby
		• AOP-038, Rapid Downpower
Evaluator's Note:		**Crew may elect to continue in AOP-018 or pursue the plant shutdown using the appropriate procedure. The scenario may continue at this time by cueing Event 6 (LOCA inside containment). Tech Specs for 'C' RCP may be asked as a follow up question.**

Op Test No.: NRC	Scenario # 2	Event # 6	Page 18 of 29
Event Description: LOCA inside containment			

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**Actuate ET-6 (LOCA inside containment).**
Indications Available:		**RCS Low Pressure alarms/Rapidly Decreasing RCS Pressure and Pressurizer Level**
EVALUATOR NOTE:		**Crew may attempt to enter and implement AOP-016, however the transient in progress will not allow any significant progress in that procedure before an automatic trip occurs. Crew may manually Trip the Reactor and Actuate Safety Injection if a setpoint is approached using guidance contained in OMM-001.**
	SRO	ENTERS AOP-016, EXCESSIVE PRIMARY PLANT LEAKAGE
PROCEDURE NOTE:		**This procedure contains no immediate actions.**
	RO	CHECK RHR in operation. (NO)
	SRO	REFER TO PEP-110, Emergency Classification And Protective Action Recommendations, AND ENTER the EAL Network at entry point X.
PROCEDURE NOTE:		**This step is a qualitative check for leakage obviously in excess of Make Up capability. Isolation of letdown may be necessary. A formal calculation to determine the leakrate is performed in Step 16.**
	RO	CHECK RCS leakage within VCT makeup capability. (NO)
	RO	TRIP the Reactor
	RO	MANUALLY INITIATE Safety Injection.
	SRO	ENTERS PATH-1

Op Test No.: NRC Scenario # 2 Event # 6 Page 19 of 29

Event Description: LOCA inside containment

Time	Position	Applicant's Actions or Behavior
PROCEDURE NOTE:		**Steps 1 through 4 are immediate action steps.**
	RO	VERIFY Reactor Trip:
		• AUTO or MANUAL Reactor Trip successful:
		• CHECK for any of the following:
		• Trip breakers RTA and BYA OPEN (YES)
		• Trip breakers RTB and BYB OPEN (YES)
		• ROD Bottom lights LIT (YES)
		• NEUTRON flux decreasing (YES)
	BOP	VERIFY Turbine Trip:
		• CHECK for any of the following:
		• ALL turbine throttle valves – SHUT (YES)
		• ALL turbine governor valves – SHUT (YES)
	BOP	VERIFY power to AC Emergency Buses
		• 1A-SA AND 1B-SB Buses energized by off-site power or EDG's. (YES)
	RO	CHECK SI Actuation:
		• CHECK for any of the following – LIT: (YES)
		• SI Actuated bypass permissive light
		• ALB-11-2-2
		• ALB-11-5-1
		• ALB-11-5-3
		• ALB-12-1-4

Op Test No.: NRC Scenario # 2 Event # 6 Page 20 of 29

Event Description: LOCA inside containment

Time	Position	Applicant's Actions or Behavior
	SRO	PERFORM The Following:
		• INITIATE monitoring the Critical Safety Function Status Trees.
		• EVALUATE EAL Network using entry point X. (Refer to PEP-110)
	SRO	INFORMS Crew Foldout A applies.
EVALUATOR NOTE:		**The crew should use Adverse Values when Containment Pressure exceeds 3 PSIG.**
EVALUATOR NOTE:		**The following actions should be taken in accordance with FOLDOUT A criteria during the scenario:** • **Verify Alternate Miniflow Isolation Valves or Miniflow Block Valves CLOSE when RCS Pressure lowers to less than 1800 PSIG.** • **Trip RCPs when RCS pressure is less than 1400 PSIG with SI flow is greater than 200 GPM.**
Critical Task	RO	SECURES RCPs on RCP Trip Criteria
	RO	VERIFY ALL CSIPs AND RHR pumps – RUNNING.
		• REPORTS both CSIPs running but 'A' RHR has tripped and 'B' RHR is under clearance
BOOTH OPERATOR:		**'A' RHR Pump Breaker has overcurrent flags dropped. Nothing is visibly wrong locally at the pump. WCC will contact maintenance and work toward lifting the clearance on the 'B' RHR Pump.**
	CREW	DISPATCH operators to investigate trip of 'A' RHR
	SRO	CONTACTS WCC to have 'B' RHR restored

Op Test No.: NRC Scenario # 2 Event # 6 Page 21 of 29

Event Description: LOCA inside containment

Time	Position	Applicant's Actions or Behavior
	RO	CHECK SI Flow:
	RO	SI flow – GREATER THAN 200 GPM. (YES)
	RO	RCS pressure – GREATER THAN 230 PSIG. (YES)
	BOP	ACTUATE manual load permissive switch for 'A' Sequencer (MAN PERM)
	BOP	CHECK Main Steam Isolation:
		Main Steam Isolation – ACTUATED. (YES)
	BOP	VERIFY all MSIVs and bypass valves – SHUT (YES)
EVALUATOR NOTE:		**The crew may have manually initiated Containment Spray because Containment Pressure is rising towards the automatic setpoint.**
EVALUATOR NOTE:		**The automatic alignment of 'A' Containment Spray will fail. The 'A' Containment Spray Pump will start automatically but 1CT-50 and 1CT-12 will not open from the signal. 1CT-50 and 1CT-12 and be opened from the MCB switches. Operator action will be required.**
	RO/BOP	CHECK CNMT Pressure – HAS REMAINED LESS THAN 10 PSIG. (NO)
		• VERIFY CNMT spray - ACTUATED
		• STOP all RCPs. (Previously completed as Foldout Criteria)
Critical Task		• RO OPENS 1CT-50 and 1CT-12 from MCB switches.

Op Test No.: NRC	Scenario # 2	Event # 6	Page 22 of 29
Event Description:	LOCA inside containment		

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Depending on the crews pace, the crew may alternately use FRP-J.1 to address 'A' Containment Spray malfunction if FRPs have been directed to be implemented.**
	BOP	CHECK AFW Status:
		AFW flow – AT LEAST 210 KPPH AVAILABLE. (YES)
EVALUATOR NOTE:		**The RO will perform all board actions until the BOP completes Attachment 6. The BOP is permitted to properly align plant equipment in accordance with Attachment 6 without SRO approval. The Scenario Guide still identifies tasks by board position because the time frame for completion of Attachment 6 is not predictable.**
	BOP	VERIFY Alignment of Components From Actuation of ESFAS Signals Using Attachment 6, Safeguards Actuation Verification, While Continuing with this Procedure.
EVALUATOR NOTE:		**At some point during the scenario the crew should recognize that 'A' Sequencer has not reached Load Block 9 due to the earlier failure of the A-SA ESCWS Chiller. At the point the BOP should actuate manual load permissive by taking the permissive switch to MAN PERM. This action will only work if performed >150 seconds after the sequencer initiation signal.**
	RO	CONTROL RCS Temperature:
		CONTROL feed flow and steam dump to stabilize RCS temperature between 555°F AND 559°F using Table 1.
	BOP/RO	ENERGIZE AC buses 1A1 AND 1B1.
	RO	CHECK PRZ PORVs – SHUT (YES)

Op Test No.: NRC Scenario # 2 Event # 6 Page 23 of 29

Event Description: LOCA inside containment

Time	Position	Applicant's Actions or Behavior
	RO	CHECK PZR PORV block valves – AT LEAST ONE OPEN. (YES)
	RO	PRZ spray valves – SHUT. (YES)
	RO/BOP	IDENTIFY any faulted SG:
		CHECK for any of the following:
		• Any SG pressures – DECREASING IN AN UNCONTROLLED MANNER (NO)
		• Any SG – COMPLETELY DEPRESSURIZED. (NO)
		•
	CREW	CHECK Secondary Radiation:
		CHECK for all of the following:
		• Condenser Vacuum Pump Effluent radiation – NORMAL. (YES)
		• SG Blowdown radiation – NORMAL. (YES)
		• Main Steamline radiation – NORMAL. (YES)
	BOP/RO	Any SG with an uncontrolled level increase (NO)
	CREW	CHECK RCS Intact:
		CHECK for all of the following:
		• CNMT pressure – NORMAL. (NO)
		Proceeds TO Step 44. (Entry Point C)
	SRO	CONTINUOUS ACTION: Implement Function Restoration Procedures As Required. (None required)

Op Test No.: NRC	Scenario # 2	Event # 6	Page 24 of 29
Event Description: LOCA inside containment			

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**The crew may review foldout criteria. Foldout A actions should be complete. No Foldout B actions apply.**
	RO	MAINTAIN RCP Seal Injection flow between 8 GPM AND 13 GPM.
	BOP	CHECK Intact SG Levels:
		• Any level – GREATER THAN 25% [40%]. (YES)
	BOP	CONTROL feed flow to maintain all intact levels between 25% AND 50% [40% AND 50%].
	BOP	VERIFY AC buses 1A1 AND 1B1 – ENERGIZED. (YES)
	RO	CHECK PRZ PORVs – SHUT. (YES)
	RO	CHECK PZR PORV block valves – AT LEAST ONE OPEN. (YES)
	RO	CONTINUOUS ACTION: IF a PRZ PORV opens on high pressure, THEN verify it shuts after pressure decreases to less than opening setpoint.
	RO	CHECK SI Termination Criteria:
		RCS subcooling – GREATER THAN (NO)
	SRO	WHEN the SI termination criteria are met, THEN GO TO EPP-008, "SI TERMINATION", Step 1.
	RO	CHECK CNMT Spray Status:
		CHECK any CNMT Spray Pump – RUNNING. (YES)

Op Test No.: NRC Scenario # 2 Event # 6 Page 25 of 29

Event Description: LOCA inside containment

Time	Position	Applicant's Actions or Behavior
	SRO	CONSULT plant operations staff to determine if CNMT spray should be placed in standby.
		WHEN plant operations staff directs CNMT spray be placed in standby, THEN do Steps 51d, e AND f.
	RO	CHECK Source Range Detector Status:
		Intermediate range flux – LESS THAN $5x10^{-11}$ AMPS.
		• Verify source range detectors – ENERGIZED.
		• Transfer nuclear recorder to source range scale.
	RO	CHECK RHR Pump status:
		• RCS Pressure greater than 230 PSIG (YES)
		• RCS pressure – STABLE OR INCREASING. (YES)
		• Stop RHR pumps. (NO RHR Pumps Available)
	RO	CHECK for both of the following:
	BOP/RO	• All SG Pressures – STABLE OR INCREASING. (YES)
	RO	• RCS pressure – STABLE OR DECREASING. (YES)
	RO	ESTABLISH CCW Flow To The RHR Heat Exchangers:
		VERIFY both CCW Pumps running (YES)
		OPEN the following valves: (CCW Return From RHR HX Trains "A" and "B") • 1CC-147 • 1CC-167

Op Test No.: NRC Scenario # 2 Event # 6 Page 26 of 29

Event Description: LOCA inside containment

Time	Position	Applicant's Actions or Behavior
	RO	VERIFY CCW flow to the RHR Heat Exchangers (YES)
		PERFORM one of the following to establish two independent CCW systems:
		SHUT train A CCW non-essential supply AND return valves: • 1CC-99 • 1CC-128
		SHUT train B CCW non-essential supply AND return valves: • 1CC-113 • 1CC-127
	BOP	CHECK EDG status:
		CHECK AC emergency buses 1A-SA AND 1B-SB – ENERGIZED BY OFFSITE POWER (YES)
		• CHECK Bus voltages (Normal)
		• VERIFY breakers 105 and 125 closed (YES)
	RO	RESET SI
	BOP	Shutdown any unloaded EDGs using OP-155, Diesel Generator Emergency Power System, Section 7.0.
	CREW	RHR system – CAPABLE OF COLD LEG RECIRCULATION. (NO)
	SRO	ENTERS EPP-012, LOSS OF EMERGENCY COOLANT RECIRCULATION
EVALUATOR NOTE:		**'B' RHR Pump can be returned to the crew at the discretion of the Lead Evaluator.**
BOOTH OPERATOR:		**Restore the 'B' RHR Pump and inform the crew at the discretion of the Lead Evaluator**

Op Test No.: NRC	Scenario # 2	Event # 6	Page 27 of 29
Event Description: LOCA inside containment			

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**The Crew should start the 'B' RHR Pump and exit EPP-012 based on Foldout Criteria when available.**
	SRO	INFORMS Crew that Foldouts apply
	SRO	RESTORE Emergency Coolant Recirculation Equipment.
	RO	RESET SI. (SI previously reset in PATH-1)
PROCEDURE NOTE:		**Resetting the SI suction auto switchover signal also defeats the automatic open and shut signals to the CSIP alternate miniflow isolation valves.**
	RO	RESET SI Suction Auto Switchover.
	BOP	Add Makeup To RWST Using OP-107.01, "CVCS BORATION, DILUTION, AND CHEMISTRY CONTROL", Section 8.4.
	BOP	CHECK Intact SG Levels:
		• Any level - GREATER THAN 25% [40%] (YES)
		• CONTROL feed flow to maintain all intact levels between 25% and 50% [40% and 50%].
PROCEDURE NOTE:		**After the low steam pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.**
	RO	CHECK PRZ Pressure:
		• Pressure - LESS THAN 2000 PSIG (YES)
		• BLOCK low steam pressure SI.

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Event Description: LOCA inside containment

Time	Position	Applicant's Actions or Behavior
PROCEDURE CAUTION:		**The RCS cooldown should be performed as quickly as possible to minimize potential offsite releases.**
	RO/BOP	INITIATE RCS Cooldown To Cold Shutdown:
		• MAINTAIN RCS cooldown rate less than 100°F/HR.
		• CHECK SGs - AT LEAST ONE INTACT SG AVAILABLE (YES)
		• CHECK if steam dump to condenser - AVAILABLE:
		• CHECK any intact SG MSIV – OPEN (NO)
	BOP	Dump steam from intact SGs using any of the following (listed in order of preference): 1) SG PORVs (YES)
	SRO	MONITOR Shutdown Margin While Continuing RCS Cooldown:
	BOP	VERIFY CNMT Fan Coolers – ONE FAN PER UNIT RUNNING IN SLOW SPEED (YES)
	RO	CHECK RWST Level - GREATER THAN 3% (Empty alarm) (YES)
	SRO	DETERMINE CNMT Spray Requirements:
	RO	• Spray pump suction - ALIGNED TO RWST (YES)
	SRO	• DETERMINE required number of CNMT spray pumps from Table 1: (ZERO)
	SRO	• VERIFY spray pumps - REQUIRED NUMBER RUNNING
	RO	• RESET CNMT spray signal.
		• ALIGN CNMT spray pump(s) stopped in Step 12c for standby operation:

Op Test No.: NRC Scenario # 2 Event # 6 Page 29 of 29

Event Description: LOCA inside containment

Time	Position	Applicant's Actions or Behavior
		• SHUT CNMT spray pump discharge valve(s): 1CT-50 (A CT Pump)
		• SHUT chemical addition valve(s): 1CT-12 (A CT Pump)
Evaluator Note:		**Terminate the scenario at the discretion of the Lead Evaluator**

Facility:	SHEARON-HARRIS	Scenario No.:	3	Op Test No.:	05000400
Examiners:		Operators:			

Initial Conditions:
- IC-11, MOL, 89% power
- Restore power to 100%
- 'B' RHR Pump is out of service for breaker inspection
- 4 GPD tube leak on 'B' Steam Generator

Turnover:
- Return to 100% power in accordance with GP-005, Power Operation, step 137.

Critical Task:
- Isolate ruptured 'B' Steam Generator from the intact Steam Generators prior to commencing the cooldown
- Isolate AFW flow to the ruptured 'B' Steam Generator prior to commencing the cooldown

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP, SRO R – RO	Raise power
2	PT:308A	I – BOP, SRO TS – SRO	SG PORV Pressure Instrument fails high
3	CCW01A CCW047	C – RO, SRO TS – SRO	Trip of running CCW Pump ('A'), Standby CCW pump ('B') fails to Auto Start
4	HVA009	C-BOP, SRO TS – SRO	Trip of running AH-85A fan, standby fails to Auto Start
5	PT:446	I – RO, SRO TS –SRO	Turbine First Stage Pressure Transmitter Failure
6	SGN05B	M – ALL	'B' Steam Generator tube rupture (420 gpm)
7	MSS11	M – ALL	Main Steam Header break outside Containment (downstream of MSIVs)
8	MSS05B	C – BOP, SRO	'B' MSIV fails to shut

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

Scenario Summary:
The plant is at 89% power in middle of life. The 'B' RHR pump is out of service for inspection and there is a 4 GPD tube leak on 'B' Steam Generator. The crew has been directed to raise power to 100% using GP-005, Power Operation, following startup. Once the power increase has been observed to the extent desired the next event can be inserted.

The first event is a Steam Generator PORV Pressure Instrument failing high. This will require the BOP to take manual control of the PORV to shut it. The SRO should evaluate Tech Specs 3.3.3.5, Remote Shutdown System, and 3.6.3, Containment Isolation Valves.

The second event is a trip of the running 'A' CCW Pump, which can be inserted once the plant has stabilized. The standby 'B' CCW Pump fails to Auto Start due to a pressure transmitter failure. The 'B' CCW will start manually when operated from the MCB. The crew should recognize the loss and enter AOP-014, Loss of Component Cooling Water. AOP-014 will direct the restoration of the CCW system. The SRO should also evaluate Tech Spec 3.7.3, Component Cooling Water System.

The third event, a trip of the running AH-85A fan, can be inserted once CCW has been restored and AOP-014 exited. This trip will provide alarms at the MCB and the crew will enter the appropriate APP. This trip should auto start the standby AH-85 fan, however the auto start has failed. The standby fan can be started manually from the MCB. The SRO should evaluate Tech Specs 3.8.1.1, AC Sources – Operating, and 3.3.3.5b, Remote Shutdown System.

The fourth event, a failure of the controlling Main Turbine First Stage Pressure Transmitter, PT-446, is inserted once the standby AH-85 fan has been placed in service. PT-446 fails low causing the Rod Control circuitry to believe power is lowering. Rods will begin to step in to reduce temperature down to no-load Tavg. The crew should recognize that rod motion is not required and enter AOP-001, Malfunction of Rod Control and Instrumentation System. The crew should carry out the immediate actions of AOP-001 and place Rod Control in Manual. The SRO should evaluate Tech Spec 3.3.1, Reactor Trip System Instrumentation.

The first major event is a tube rupture in the 'B' Steam Generator (SGTR) at 420 gpm. The crew should recognize the presence of a large leak in the primary. After determining that this leak is greater than makeup capability they should trip the reactor, manually initiate safety injection, and carry out actions per PATH-1. Once the reactor is tripped a main steam line break on the main steam header outside containment will occur. It is expected that the crew transition from PATH-1 to PATH-2 to address the ruptured steam generator. At some point the faulted steam generator will become apparent and the crew may use the Secondary Integrity Foldout Criteria to address the faulted 'B' Steam Generator using EPP-014, Faulted Steam Generator Isolation, if not already isolated by PATH-2. If so, EPP-014 will direct isolating the 'B' Steam Generator and then return the crew back to PATH-2.

'B' MSIV fails to operate due to the automatically generated Main Steam Line Isolation Signal (MSIS) and will not shut due to a manual MSIS. 'B' MSIV cannot be shut manually from the Main Control Board by the operators. Terminate the scenario once the crew enters EPP-020, SGTR with Loss of Reactor Coolant: Subcooled Recovery and initiates the RCS Cooldown.

SIMULATOR SETUP

SPECIAL INSTRUCTIONS

- Ensure reactivity plan is available for downpower to 88% power

INITIAL CONDITIONS:

- IC-11, MOL, 89% power

PRE-LOAD:

- irf rhr023 RACK_OUT ('B' RHR pump out of service for Oil replacement)
- imf mss05b 2 3600 ('B' MSIV fails to shut)

TRIGGERS:

- ET-2: imf pt:308a (2 00:00:00 00:00:00) 1300.0 00:00:00
  SG PORV Pressure Instrument fails HIGH

- ET-3: irf ccw047 (3 00:00:00 00:00:00) 0
  imf ccw01a (3 00:00:00 00:00:00) TRUE
  Trip of running CCW Pump, Standby CCW pump fails to Auto Start

- ET-4: irf hva009 (4 00:00:00 00:00:00) BKR_OFF
  Trip running of AH-85 fan, standby fails to Auto Start

- ET-5: imf pt:446 (5 00:00:00 00:00:00) 0.0 00:00:10
  First stage pressure transmitter PT:446 fails low

- ET-6: imf sgn05b (6 00:00:00 00:00:00) 420
  'B' Steam Generator ruptured

- ET-7: imf mss11 (7 00:00:00 00:00:00) 400000
  On trip, a main steam line rupture occurs; 'B' MSIV fails to shut automatically

CAEP:

```
!Description of NRC3CAEP
!IC-11, MOL, 89% power
!'B' RHR pump is Out of Service
!4 gpd tube leak on 'B' Steam Generator

!Preloads
!  'B' RHR pump out of service for Oil replacement
        irf rhr023 (n 00:00:00 00:00:00) RACK_OUT

!  'B' MSIV fails to shut
        imf mss05b (n 00:00:00 00:00:00) 2 3600

!Event Triggers
!Event 1:  Raise power back to 100% following TV Testing
!   Reactivity – RO

!Event 2:  SG PORV Pressure Instrument fails HIGH
!   Instrument - BOP
        imf pt:308a (2 00:00:00 00:00:00) 1300.0 00:00:00

!Event 3:  Trip of running CCW Pump, Standby CCW pump fails to Auto Start
!   Component - RO
!   Tech Spec - SRO
        irf ccw047 (3 00:00:00 00:00:00) 0
        imf ccw01a (3 00:00:00 00:00:00) TRUE

!Event 4:  Trip running of AH-85 fan, standby fails to Auto Start
!   Component - BOP
!   Tech Spec - SRO
        irf hva009 (4 00:00:00 00:00:00) BKR_OFF

!Event 5:  First stage pressure transmitter PT:446 fails low
!   Instrument - RO
!   Tech Spec - SRO
        imf pt:446 (5 00:00:00 00:00:00) 0.0 00:00:10

!Event 6:  'B' Steam Generator ruptured
!   MAJOR - ALL
        imf sgn05b (6 00:00:00 00:00:00) 420

!Event 7:  On trip, a main steam line rupture occurs, 'B' MSIV fails to shut
!   EOP Contingency Procedure
        imf mss11 (7 00:00:00 00:00:00) 400000
```

Op Test No.: NRC	Scenario # 3	Event # 1	Page 5 of 28
Event Description: Raise Power			

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**The crew has been directed to raise power to 100% using GP-005, Power Operation, following startup. Once the power increase has been observed to the extent desired the next event can be inserted.**
PROCEDURE NOTE:		
	SRO	Provides direction per GP-005, Step 137 d. - CONTINUE with the load increase by depressing the GO pushbutton.
	BOP	Informs RO/SRO that turbine load increase is being initiated.
	BOP	Depresses GO pushbutton.
	BOP	Monitors turbine and feedwater system response.
EVALUATOR'S NOTE:		**The crew may elect to start a dilution before the power change is initiated.**
		OP-107.01, Section 5.3, Blender Dilution (Alternate Dilution) Operation (This is a CONTINUOUS USE procedure.)
	RO	DETERMINE the volume of makeup water to be added. This may be done by experience or via the reactivity plan associated with the Simulator IC.
	RO	SETS FIS-114, TOTAL MAKEUP WTR BATCH COUNTER, to obtain the desired quantity.
	RO	SET total makeup flow as follows:
		• IF performing DIL in Step 8, THEN SET controller 1CS-151, FK-114 RWMU FLOW, for less than or equal to 90 gpm.
		• IF performing ALT DIL in Step 8, THEN SET controller 1CS-151, FK-114 RWMU FLOW, for the desired flow rate.

Op Test No.: NRC	Scenario # 3	Event # 1	Page 6 of 28
Event Description: Raise Power			

Time	Position	Applicant's Actions or Behavior
	RO	VERIFY the RMW CONTROL switch has been placed in the STOP position.
	RO	VERIFY the RMW CONTROL switch green light is lit.
	RO	PLACE the control switch RMW MODE SELECTOR to the DIL OR the ALT DIL position.
PROCEDURE NOTE:		**When PRZ backup heaters are energized in manual, PK-444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows:** • **PORV PCV-444B will open at a lower than expected pressure.** • **ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure.** • **Increased probability for exceeding Tech Spec DNB limit for RCS pressure.**
	RO	OPERATE the pressurizer backup heaters as required to limit the difference between the pressurizer and the RCS boron concentration to less than 10 ppm.
	RO	START the makeup system as follows:
		• TURN control switch RMW CONTROL to START momentarily
		• VERIFY the red indicator light is lit.
	RO	VERIFY dilution automatically terminates when the desired quantity has been added.
PROCEDURE CAUTION:		**The operation should be stopped if an unanticipated reactivity effect is seen. Do not resume the operation until the cause has been corrected**
	RO	VERIFY Tavg and rod motion responds as desired.

Op Test No.: NRC	Scenario # 3	Event # 1	Page 7 of 28
Event Description: Raise Power			

Time	Position	Applicant's Actions or Behavior
	RO	PLACE Reactor Makeup in Auto per Section 5.1.
	RO	VERIFY the RMW CONTROL switch:
		• Is in the STOP position.
		• The green light is lit.
	RO	PLACE the RMW MODE SELECTOR to AUTO.
	RO	START the makeup system as follows:
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the red indicator light is lit.
EVALUATOR NOTE:		**Once the power change has been observed to the extent desired the Lead Evaluator can cue Event 2, SG PORV Pressure Instrument fails high)**

Op Test No.: NRC	Scenario # 3	Event # 2	Page 8 of 28
Event Description:	SG PORV Pressure Instrument Fails High		

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**This event is a Steam Generator PORV Pressure Instrument failing high. This will require the BOP to take manual control of the PORV to shut it. The SRO should evaluate Tech Specs 3.3.3.5, Remote Shutdown System, and 3.6.3, Containment Isolation Valves.**
BOOTH OPERATOR:		**On cue from the Lead Evaluator, insert ET-2 (SG PORV Pressure Instrument, PT-308, fails HIGH).**
Available Indications: • **ALB-014-8-5, Computer Alarm Steam Generators**		
	SRO	ENTERS APP-ALB-014-8-5
	BOP	IDENTIFIES 'A' SG PORV is OPEN
	BOP	DEPRESS Manual Pushbutton for PK-308 to take manual control of 'A' SG PORV
	BOP	LOWER output for PK-308 to SHUT 'A' SG PORV
	SRO	REFER to Tech Specs for failure of 'A' SG PORV • T.S. 3.3.3.5, Remote Shutdown System • T.S. 3.6.3, Containment Isolation Valves
LEAD EVALUATOR:		**Once the plant has stabilized and Tech Specs have been evaluated, cue Event 3, (Trip of Running CCW Pump, 'A')**

Op Test No.: NRC	Scenario # 3	Event # 3	Page 9 of 28
Event Description: Trip of Running 'A' CCW Pump			

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**This event is a trip of the running 'A' CCW Pump. The standby 'B' CCW Pump fails to Auto Start due to a pressure transmitter failure. The 'B' CCW will start manually when operated from the MCB. The crew should recognize the loss and enter AOP-014, Loss of Component Cooling Water. AOP-014 will direct the restoration of the CCW system. The SRO should also evaluate Tech Spec 3.7.3, Component Cooling Water System.**
BOOTH OPERATOR:		**On cue from the Lead Evaluator insert ET-3 (Trip of the Running CCW Pump, 'A')**
Available Indications: • **Multiple CCW alarms on ALB-005**		
	SRO	ENTER AOP-014, Loss of Component Cooling Water
PROCEDURE NOTE:		**This procedure contains no immediate actions. Loss of CCW may require implementation of the SHNPP Emergency Plan.**
	SRO	REFER TO PEP-110, Emergency Classification And Protective Action Recommendations, AND ENTER the EAL Network at entry point X.
	SRO	EVALUATE plant conditions AND GO TO the appropriate section. (Section 3.3, Loss of a CCW Pump)
PROCEDURE NOTE:		**The standby CCW pump starts at 52 psig discharge pressure.**
	RO	CHECK the standby CCW pump has STARTED. (NO)
BOOTH OPERATOR:		**If dispatched to the field to investigate report that 'A' CCW Pump breaker is tripped on overcurrent.**
	RO	START the standby CCW pump.
	RO	CHECK CCW header pressure greater than 52 psig. (YES)

Op Test No.: NRC	Scenario # 3	Event # 3	Page 10 of 28
Event Description: Trip of Running 'A' CCW Pump			

Time	Position	Applicant's Actions or Behavior
	RO	VERIFY adequate ESW cooling water flow to the associated CCW heat exchanger. (YES)
	RO	CHECK RHR operating. (NO)
	SRO	REFER TO Technical Specification 3.7.3. (72 hour action)
	SRO	CONTACT Maintenance to determine the cause of the CCW pump failure, AND INITIATE corrective action.
	SRO	CHECK with Operations Staff to determine the desirability of using the swing CCW pump.
	SRO	CHECK CCW flow RESTORED to the affected train.
	SRO	DOCUMENT component manipulations per OPS-NGGC-1308, Plant Status Control.
EVALUATOR NOTE:		**Crew may implement OWP-CC at this point. This OWP will have the crew verify the ESF Status Light Boxes.**
	SRO	EXIT this procedure.
LEAD EVALUATOR:		**Once the plant has stabilized and Tech Specs have been evaluated, cue Event 4, (Trip of Running AH-85A Fan)**

Op Test No.: NRC	Scenario # 3	Event # 4	Page 11 of 28
Event Description:	Trip of running AH-85A fan, standby fails to Auto Start		

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**This event is a trip of the running AH-85A fan. This trip will provide alarms at the MCB and the crew will enter the appropriate APP. This trip should auto start the standby AH-85 fan, however the auto start has failed. The standby fan will have to be started manually from the MCB. The SRO should evaluate Tech Specs 3.8.1.1, AC Sources – Operating, and 3.3.3.5b, Remote Shutdown System**
BOOTH OPERATOR:		**On cue from the Lead Evaluator, insert ET-4 (Trip of the Running AH-85A Fan).**
	BOP	ENTERS APP-ALB-027-1-4
	BOP	IDENTIFIES the tripped fan, AH-85A
	BOP	REPORTS failure of the AH-85B standby fan to start
	BOP	STARTS standby AH-85B
	SRO	REFER to Tech Specs (and possibly OWP-HVAC) • T.S 3.8.1.1, AC Sources – Operating (Perform OST-1023, Offsite Power Verification within one hour) • T.S. 3.3.35b, Remote Shutdown System
LEAD EVALUATOR:		**Once the plant has stabilized and Tech Specs have been evaluated, cue Event 5, (PT-446, First Stage Pressure Transmitter, fails LOW)**

Op Test No.: NRC	Scenario # 3	Event # 5	Page 12 of 28
Event Description:	PT-446, First Stage Pressure Transmitter, fails LOW		

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**PT-446 fails low causing the Rod Control circuitry to believe power is lowering. Rods will begin to step in to reduce temperature down to no-load Tavg. The crew should recognize that rod motion is not required and enter AOP-001, Malfunction of Rod Control and Instrumentation System. The crew should carry out the immediate actions of AOP-001 and place Rod Control in Manual. The SRO should evaluate Tech Spec 3.3.1, Reactor Trip System Instrumentation.**
BOOTH OPERATOR:		**On cue from the Lead Evaluator, insert ET-5 (PT-446, First Stage Pressure Transmitter, fails LOW)**
Available Indications: • **Rods begin to step** • **Tavg/Tref mismatch off-scale high**		
	RO	REPORTS rods stepping in
	CREW	IDENTIFIES that rod motion is due to an instrument malfunction
	SRO	ENTERS AOP-001, Malfunction of Rod Control and Instrumentation System
Immediate Action	RO	CHECK that LESS THAN TWO control rods are dropped. (YES)
Immediate Action	RO	POSITION Rod Bank Selector Switch to MAN.
Immediate Action	RO	CHECK Control Bank motion STOPPED. (YES)
	RO	GO TO Section 3.2, Continuous Spurious Control Rod Motion
	RO	CHECK that instrument channel failure has NOT OCCURRED by observing the following: • RCS Tavg • RCS Tref

Op Test No.: NRC Scenario # 3 Event # 5 Page 13 of 28

Event Description: PT-446, First Stage Pressure Transmitter, fails LOW

Time	Position	Applicant's Actions or Behavior
		• Power Range NI channels • Turbine first stage pressure
	RO	PERFORM the following:
		IF a power supply is lost, THEN GO TO AOP-024, Loss of Uninterruptible Power Supply. (NO)
		IF an individual instrument failed, THEN MAINTAIN manual rod control until corrective action is complete. (YES)
		IF a Power Range NI Channel failed, THEN BYPASS the failed channel using OWP-RP. (NO)
	RO	Manually OPERATE affected control bank to restore the following:
		Equilibrium power and temperature conditions
		Rods above the insertion limits of Tech Spec 3.1.3.6 and PLP-106, Technical Specification Equipment List Program and Core Operating Limits Report.
	RO	VERIFY proper operation of the following: CVCS demineralizers BTRS Reactor Makeup Control System
	RO	CHECK that this section was entered due to control banks MOVING OUT. (NO)
	RO	CHECK that NEITHER of the following OCCURRED: (YES) Unexplained RCS boration Unplanned RCS dilution
	RO	CHECK that an automatic Rod Control malfunction OCCURRED. (NO)
	RO	EXIT this procedure.

~~EVALUATOR NOTE:~~ **Crew should implement OWP-RP-11. This will place PT-447 as the selected channel.**

Op Test No.: NRC Scenario # 3 Event # 5 Page 14 of 28

Event Description: PT-446, First Stage Pressure Transmitter, fails LOW

Time	Position	Applicant's Actions or Behavior
	RO	REFER to Tech Spec 3.3.1, Reactor Trip System Instrumentation (Within one hour check interlock)
EVALUATOR NOTE:		**Once the plant has stabilized then Lead Evaluator may cue Event 6 (Ruptured Faulted Steam Generator, 'B' SG at 420 gpm, fault occurs on trip)**

Op Test No.: NRC	Scenario # 3	Event # 6, 7	Page 15 of 28
Event Description:	Ruptured Faulted Steam Generator ('B' SG at 420 gpm, fault occurs on trip)		

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**This is the first major event, a tube rupture in the 'B' Steam Generator (SGTR) at 420 gpm. The crew should recognize the presence of a large leak in the primary. After determining that this leak is greater than makeup capability they should trip the reactor, manually initiate safety injection, and carry out actions per PATH-1.** **Once the reactor is tripped a main steam line break on the main steam header outside containment will occur. It is expected that the crew will transition from PATH-1 to PATH-2 to address the ruptured steam generator. At some point the faulted steam generator will become apparent and the crew is expected to isolate the 'B' Steam Generator in PATH-2.** **It is possible depending on crew's pace through the procedure that they may isolate the 'B' Steam Generator prior to entering PATH-2. The Scenario Guide is written to support either implementation.**
BOOTH OPERATOR:		**On cue from the Lead Evaluator, initiate ET-6 (SGTR on 'B' SG at 420 gpm)**
Available Indications: • **Charging Flow increasing** • **VCT Level decreasing** • **Pressurizer Level decreasing** • **'B' MSL Rad monitor**		
	SRO	ENTERS AOP-016, Excessive Primary Plant Leakage
PROCEDURE NOTE: • **This procedure contains no immediate actions.** • **Throughout this procedure, as well as all AOPs, actions are based on valid alarms and instrumentation. Actions based on invalid indication are not applicable.** • **When possible (except in the cases of rapidly propagating leaks and leaks approaching Action Level 3), leakage should be qualitatively confirmed prior to declaration of an action level. Leakage is qualitatively confirmed when two different indications (such as grab samples or radiation monitors) trend in the same direction with the same approximate order of magnitude.**		
	RO	CHECK RHR in operation. (NO)

Op Test No.: NRC Scenario # 3 Event # 6, 7 Page 16 of 28

Event Description: Ruptured Faulted Steam Generator ('B' SG at 420 gpm, fault occurs on trip)

Time	Position	Applicant's Actions or Behavior
	SRO	REFER TO PEP-110, Emergency Classification And Protective Action Recommendations, AND ENTER the EAL Network at entry point X.
	RO	CHECK RCS leakage within VCT makeup capability. (NO)
EVALUATOR NOTE:		**The Reactor Trip will automatically insert ET-7, Main Steam Line Break Outside of Containment.**
	CREW	PERFORM the following:
		TRIP the Reactor, AND GO TO EOP PATH-1. (Perform RNO substeps 4.b. and 4.c as time permits)
PROCEDURE NOTE:		**If SI Actuation is required, the Reactor and Turbine should be verified tripped in PATH-1 before manually actuating SI.**
	RO	MANUALLY INITIATE Safety Injection.
		EXIT this procedure.
	SRO	Enters PATH-1
		PATH-1
	RO	VERIFY Reactor Trip:
		• AUTO or MANUAL Reactor Trip successful:
		• CHECK for any of the following:
		• Trip breakers RTA and BYA OPEN (YES)
		• Trip breakers RTB and BYB OPEN (YES)
		• ROD Bottom lights LIT (YES)
		• NEUTRON flux decreasing (YES)
	BOP	VERIFY Turbine Trip:
		• CHECK for any of the following:

Op Test No.: NRC Scenario # 3 Event # 6, 7 Page 17 of 28

Event Description: Ruptured Faulted Steam Generator ('B' SG at 420 gpm, fault occurs on trip)

Time	Position	Applicant's Actions or Behavior
		• ALL turbine throttle valves – SHUT (YES)
		• ALL turbine governor valves – SHUT (YES)
	BOP	VERIFY power to AC Emergency Buses
		• 1A-SA AND 1B-SB Buses energized by off-site power or EDG's. (YES)
	RO	CHECK SI Actuation:
		CHECK for any of the following – LIT • SI Actuated bypass permissive light (YES)
	SRO	Perform the following:
		• Initiate monitoring the Critical Safety Function Status Trees.
		• Evaluate EAL Network using entry point X.
	CREW	Foldout A Applies.
	RO	Verify All CSIPs AND RHR pumps – RUNNING (YES)
	RO	Check SI Flow:
		• SI flow - GREATER THAN 200 GPM (YES)
		• RCS pressure - LESS THAN 230 PSIG (NO)
	BOP	Check Main Steam Isolation:
		Main Steam Isolation – ACTUATED (NO)
		Check Main Steam Isolation actuation criteria: • Steam line pressure - LESS THAN 601 PSIG (YES/NO) • CNMT pressure - GREATER THAN 3.0 PSIG (YES) • Manual closure of all MSIVs AND bypass valves is desired.

Op Test No.: NRC	Scenario # 3	Event # 6, 7	Page 18 of 28
Event Description:	Ruptured Faulted Steam Generator ('B' SG at 420 gpm, fault occurs on trip)		

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**It is possible that the crew may identify the presence of a steam line break, however during validation the indications of the break were not yet apparent. If the break is identified at this point then a Main Steam Isolation would be appropriate based on OMM-001, Conduct of Operations guidance.**
	BOP	Main Steam Isolation – REQUIRED (NO)
	RO	Check CNMT Pressure – HAS REMAINED LESS THAN 10 PSIG (YES)
	BOP	Check AFW Status:
		• AFW flow - AT LEAST 210 KPPH AVAILABLE (YES)
	BOP	Verify Alignment Of Components From Actuation of ESFAS Signals Using Attachment 6, "Safeguards Actuation Verification", While Continuing With This Procedure.
	RO/BOP	Control RCS Temperature:
		• Stabilize AND maintain temperature between 555°F AND 559°F using Table 1.
PROCEDURE NOTE:		**If PRZ pressure is below 2260 PSIG AND increasing, PRZ spray valves may be OPEN due to controller demand. (With the spray valve controllers and master PRZ pressure controller in AUTOMATIC, this response is the result of the PRZ master controller being a proportional-integral controller.)**
	RO/BOP	Check PRZ PORVs AND Spray Valves:
		• Verify AC buses 1A1 AND 1B1 - ENERGIZED
		• Check PRZ PORVs – SHUT (YES)
		• Check block valves – AT LEAST ONE OPEN (YES)
		• PRZ spray valves – SHUT (YES)

Op Test No.: NRC Scenario # 3 Event # 6, 7 Page 19 of 28

Event Description: Ruptured Faulted Steam Generator ('B' SG at 420 gpm, fault occurs on trip)

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**During validation it was found that the LOCA, reactor trip, and safety injection were masking the indications for the steam line break. If the crew identifies the fault at this point then they will transition to EPP-014 now to isolate 'B' SG. If not then Foldout Criteria in PATH-2 will send them to EPP-014 eventually. Those steps are included on page 21 of this Guide. Guide is written in the order that they were implemented by the Validation Crew.**
	RO/BOP	Identify Any Faulted SG:
		Check for any of the following: • Any SG pressures - DECREASING IN AN UNCONTROLLED MANNER (NO) • Any SG – COMPLETELY DEPRESSURIZED (NO)
	RO/BOP	Identify Any Ruptured SG:
		• Check for all of the following:
		• Condenser vacuum pump effluent radiation - NORMAL
		• SG blowdown radiation - NORMAL
		• Main steamline radiation – NORMAL (NO)
	SRO	Ruptured SG – IDENTIFIED (YES, 'B')
	RO/BOP	Ruptured SG level - GREATER THAN 25% [40%] (YES)
	RO/BOP	Stop feed flow by shutting the MDAFW AND TDAFW isolation valves to ruptured SG. ('B' SG)
	SRO	GO TO PATH-2 GUIDE, Step 1.
		PATH-2
	SRO	Foldout C Applies. (Attached to back of guide)
	SRO	Evaluate EAL Network Using Entry Point U.

Op Test No.: NRC Scenario # 3 Event # 6, 7 Page 20 of 28

Event Description: Ruptured Faulted Steam Generator ('B' SG at 420 gpm, fault occurs on trip)

Time	Position	Applicant's Actions or Behavior
	SRO	Implement Function Restoration Procedures As Required.
NOTE: The RCP Trip Criteria is in effect until an RCS cooldown is initiated.		
	RO	Check RCP Trip Criteria:
		• Any RCP – RUNNING (YES)
		Check all of the following:
		• SI flow – GREATER THAN 200 GPM (YES)
		• Check RCS pressure – LESS THAN 1400 PSIG (NO)
	BOP	Identify Any Ruptured SG:
		Check for any of the following:
		• SG level - INCREASING IN AN UNCONTROLLED MANNER (YES)
		• SG activity sample - HIGH RADIATION
		• Main steamline radiation - HIGH RADIATION (YES)
PROCEDURE CAUTION: • **At least one SG must be maintained available for RCS cooldown.** • **If the TDAFW pump is the only available source of feed flow, one steam supply valve from an intact SG must be maintained open.**		
	BOP	Isolate Flow From Ruptured SG:
		Adjust ruptured SG PORV controller setpoint to 88% (1145 PSIG) AND place in auto.
		Check ruptured SG PORV – SHUT (YES)
		Shut ruptured SG steam supply valve to TDAFW pump: • SG B: 1MS-70 • SG C: 1MS-72
		Verify blowdown isolation valves from ruptured SG - SHUT

Op Test No.: NRC Scenario # 3 Event # 6, 7 Page 21 of 28

Event Description: Ruptured Faulted Steam Generator ('B' SG at 420 gpm, fault occurs on trip)

Time	Position	Applicant's Actions or Behavior
		Shut ruptured SG main steam drain isolation before MSIV: • SG A: 1MS-231 • SG B: 1MS-266 • SG C: 1MS-301
		Shut ruptured SG MSIV AND bypass valve. (NO, 'B' MSIV fails to SHUT)
EVALUATOR NOTE:		**At this point indications of the Main Steamline Break should be identifiable and the crew should transition to EPP-014 using Foldout C, Secondary Integrity Criteria. PATH-2 continues on page 23 of this guide.**
		EPP-014, Step 1
PROCEDURE CAUTION: • **At least one SG must be maintained available for RCS cooldown.** • **Any faulted SG OR secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown.**		
	SRO	Implement Function Restoration Procedures As Required.
	BOP/RO	Check MSIVs AND Bypass Valves:
		• Verify all MSIVs – SHUT (NO)
		Perform the following:
		• Locally shut instrument air supply to RAB 261: 1IA-814 (north of AH-19 1A-SA)
		• Locally remove cap AND open drain valve: 1IA-1876 (located in corridor outside VCT valve gallery)
	BOP/RO	Verify all MSIV bypass valves – SHUT (YES)
	BOP/RO	Check Any SG NOT Faulted:
		• Any SG pressure - STABLE OR INCREASING (YES)

Op Test No.: NRC Scenario # 3 Event # 6, 7 Page 22 of 28

Event Description: Ruptured Faulted Steam Generator ('B' SG at 420 gpm, fault occurs on trip)

Time	Position	Applicant's Actions or Behavior
	BOP/RO	Identify Any Faulted SG:

		• Check for any of the following:
		  • Any SG pressure - DECREASING IN AN UNCONTROLLED MANNER (YES)
		  • Any SG - COMPLETELY DEPRESSURIZED (NO)

	BOP/RO	Isolate Faulted SG(s):
		• Verify faulted SG(s) PORV - SHUT
		• Verify main FW isolation valves - SHUT
		• Verify MDAFW AND TDAFW pump isolation valves to faulted SG(s) – SHUT

		• Shut faulted SG(s) steam supply valve to TDAFW pump – SHUT
		  • SG B: 1MS-70 (SHUT)
		  • SG C: 1MS-72 (SHUT)

		• Verify main steam drain isolation(s) before MSIVs - SHUT:
		  • SG A: 1MS-231 (SHUT)
		  • SG B: 1MS-266 (SHUT)
		  • SG C: 1MS-301 (SHUT)

		• Verify SG blowdown isolation valves - SHUT
		• Verify main steam analyzer isolation valves - SHUT
	BOP/RO	Check CST Level - GREATER THAN 10% (YES)
PROCEDURE CAUTION:		**A SG may be suspected to be ruptured if it fails to dry out following isolation of feed flow. Local checks for radiation can be used to confirm primary-to-secondary eakage.**
	BOP/RO	Check Secondary Radiation:
		Check for all of the following:
		• SG blowdown radiation – NORMAL (NO)
		• Main steamline radiation – NORMAL (NO)

Op Test No.: NRC Scenario # 3 Event # 6, 7 Page 23 of 28

Event Description: Ruptured Faulted Steam Generator ('B' SG at 420 gpm, fault occurs on trip)

Time	Position	Applicant's Actions or Behavior
	SRO	GO TO PATH-2, entry point J.
		PATH-2, Entry Point J
	SRO	Foldout C Applies. (Attached to back of guide)
	SRO	Evaluate EAL Network Using Entry Point U.
	SRO	Implement Function Restoration Procedures As Required.
NOTE:	**The RCP Trip Criteria is in effect until an RCS cooldown is initiated.**	
	RO	CHECK RCP Trip Criteria:
		• Any RCP – RUNNING (YES)
		CHECK all of the following:
		• SI flow – GREATER THAN 200 GPM (YES)
		• CHECK RCS pressure – LESS THAN 1400 PSIG (NO)
	BOP	IDENTIFY Any Ruptured SG:
		CHECK for any of the following:
		• SG level - INCREASING IN AN UNCONTROLLED MANNER (YES)
		• SG activity sample - HIGH RADIATION
		• Main steamline radiation - HIGH RADIATION (YES)
PROCEDURE CAUTION: • **At least one SG must be maintained available for RCS cooldown.** • **If the TDAFW pump is the only available source of feed flow, one steam supply valve from an intact SG must be maintained open.**		
	BOP	ISOLATE Flow From Ruptured SG:

Op Test No.: NRC Scenario # 3 Event # 6, 7 Page 24 of 28

Event Description: Ruptured Faulted Steam Generator ('B' SG at 420 gpm, fault occurs on trip)

Time	Position	Applicant's Actions or Behavior
		ADJUST ruptured SG PORV controller setpoint to 88% (1145 PSIG) AND place in auto.
	BOP	CHECK ruptured SG PORV – SHUT (YES)
		SHUT ruptured SG steam supply valve to TDAFW pump: • SG B: 1MS-70 • SG C: 1MS-72
	BOP	VERIFY blowdown isolation valves from ruptured SG - SHUT
	BOP	Shut ruptured SG main steam drain isolation before MSIV: • SG A: 1MS-231 • SG B: 1MS-266 • SG C: 1MS-301
		Shut ruptured SG MSIV AND bypass valve. (NO, 'B' MSIV fails to SHUT)
	BOP	Isolate Intact SG(s) From Ruptured SG AND Minimize Steam Flow From Ruptured SG:
		• Shut all remaining MSIV AND bypass valves.
		• Place both steam dump interlock bypass switches to OFF/RESET.
		• Use intact SG(s) PORV for all further steam dumping.
		• Isolate steam release path from ruptured SG using Attachment 1.
		• Any intact SG MSIV AND bypass valve – SHUT (YES)
PROCEDURE CAUTION:		**IF ruptured SG is faulted AND is NOT need for RCS cooldown, THEN feed flow to that SG should remain isolated.**
	BOP	Monitor Ruptured SG Level:
		• Ruptured SG – FAULTED (YES)
		• Ruptured SG - NEED FOR RCS COOLDOWN (NO)
		• Level - GREATER THAN 25% [40%] (YES)

Op Test No.: NRC Scenario # 3 Event # 6, 7 Page 25 of 28

Event Description: Ruptured Faulted Steam Generator ('B' SG at 420 gpm, fault occurs on trip)

Time	Position	Applicant's Actions or Behavior
		Stop feed flow by shutting the MDAFW AND TDAFW isolation valves to ruptured SG.
PROCEDURE CAUTION:		**The steam supply valve from the ruptured SG to the TDAFW pump should be shut OR isolated before continuing.**
	BOP	Check Ruptured SG(s) Pressure - GREATER THAN 260 PSIG [350 PSIG] (NO/YES) If NO, then got EPP-020.
EVALUATOR NOTE:		**Depending on the crew's pace through the procedures 'B' SG pressure may not be less than 260 psig at this point. If that's the case then the crew will continue in PATH-2 until step 23 and THEN transition to EPP-020.**
		EPP-020, SGTR WITH LOSS OF REACTOR COOLANT SUBCOOLED RECOVERY, Step 1
	SRO	Foldout applies (see attached)
	RO	Reset SI.
	BOP	Manually Realign Safeguards Equipment Following A Loss Of Offsite Power. (Refer to PATH-1 GUIDE, Attachment 2.)
	RO	Reset Phase A AND Phase B Isolation Signals.
	RO	Establish Instrument Air AND Nitrogen To CNMT:
		Open the following valves: • 1IA-819 • 1SI-287
	BOP	Monitor AC Buses:

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Event Description: Ruptured Faulted Steam Generator ('B' SG at 420 gpm, fault occurs on trip)

Time	Position	Applicant's Actions or Behavior
		Check AC emergency buses 1A-SA AND 1B-SB – ENERGIZED BY OFFSITE POWER: • Check bus voltages • Check breakers 105 AND 125 - CLOSED
	BOP	Check all non-emergency AC buses – ENERGIZED (YES)
	BOP	Check Ruptured SG(s) Level - LESS THAN 78% [60%] (High-High alarm) (YES)
PROCEDURE CAUTION:		**PRZ heaters should NOT be energized until PRZ water level indicates greater than minimum recommended by plant operations staff to ensure heaters are covered.**
	RO	Secure PRZ Heaters:
		• Place backup heaters in the OFF position.
		• Verify control heaters - OFF
		• Consult plant operations staff for a recommended minimum indicated PRZ water level that will ensure heaters are covered. (Refer to USER'S GUIDE, "USER'S GUIDE", Attachment 2, Evaluating Pressurizer Water Level Indication.)
	RO	Check CNMT Spray Status:
		• Check any CNMT spray pump – RUNNING (NO)
PROCEDURE CAUTION:		**IF ruptured SG is faulted AND is NOT need for RCS cooldown, THEN feed flow to that SG should remain isolated.**
	BOP	Monitor Ruptured SG Level:
		• Ruptured SG – FAULTED (YES)
		• Ruptured SG - NEEDED FOR RCS COOLDOWN (NO)
	RO	Check RHR Pump Status:
		• RCS pressure - GREATER THAN 230 PSIG (YES)

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Event Description: Ruptured Faulted Steam Generator ('B' SG at 420 gpm, fault occurs on trip)

Time	Position	Applicant's Actions or Behavior
		• RCS pressure - STABLE OR INCREASING (YES)
		• Check RHR pump suction - ALIGNED TO RWST
		• Stop RHR pumps.
	SRO	Coordinate With Plant Operations Staff AND Chemistry To Perform The Following To Obtain Primary And Secondary Samples:
		Operate the primary AND secondary sample panels.
	RO	Open CCW to sample HX valves: • 1CC-114 • 1CC-115
	RO	Open CCW to GFFD valves: • 1CC-304 • 1CC-305
	RO	Align AND obtain activity, hydrogen AND boron samples of the following: • RCS hot legs • PRZ liquid space • All SGs
	SRO	Initiate Evaluation Of Plant Status:
		Check auxiliary building radiation - NORMAL
PROCEDURE NOTE:		**When SG level decreases to 25%, AFW actuation occurs and the AFW flow control valves receive a full open signal.**
	BOP	Check Intact SG Levels: Any Level - GREATER THAN 25% [40%]
		AFW flow - AT LEAST 210 KPPH AVAILABLE
		Control feed flow to maintain intact SG levels between 30% and 50% [40% and 50%]
	RO	Check PRZ Pressure:
		• Pressure - LESS THAN 2000 PSIG
		• Block low steam pressure SI.

Op Test No.: NRC	Scenario # 3	Event # 6, 7	Page 28 of 28
Event Description:	Ruptured Faulted Steam Generator ('B' SG at 420 gpm, fault occurs on trip)		

Time	Position	Applicant's Actions or Behavior
PROCEDURE CAUTION:		**If all RCPs are stopped, steps to depressurize the RCS and terminate SI should be performed as quickly as possible after the cooldown has started to minimize potential pressurized thermal shock of the reactor vessel.**
	BOP	Initiate RCS Cooldown To Cold Shutdown:
		• Maintain RCS cooldown rate less than 100°F/HR.
		• Check RHR system - OPERATING IN SHUTDOWN COOLING MODE (NO)
	BOP	Check if steam dump to condenser – AVAILABLE (NO)
	BOP	Check SG Status For Cooldown:
		• Check SGs - AT LEAST ONE INTACT SG AVAILABLE (YES)
		Dump steam from intact SGs using any of the following (listed in order of preference): • Condenser steam dump (Not Available) • SG PORVs
Terminate the scenario once the cooldown has been observed to the extent desired.		

Facility:	SHEARON-HARRIS	Scenario No.: 4	Op Test No.: 05000400
Examiners:		Operators:	

Initial Conditions:
- IC-27, EOL, 4% power
- Plant startup to full power in progress IAW GP-005, Power Operation, step 95
- 4 GPD tube leak on 'B' Steam Generator

Turnover:
- The previous shift continued a plant startup following a short maintenance outage. GP-005 is in progress with Step 94 completed. Continue the startup.

Critical Task:
- Trip the Turbine within 30 seconds of initiation of ATWS (WOG Basis Doc page 76)
- Initiate insertion of negative reactivity to bring reactor subcritical (emergency boration or manual rod insertion) prior to exiting FRP-S.1

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP, SRO R – RO	Shift to the Main Feedwater Regulating Valves Raise Power
2	PT:455	TS – SRO	Pressurizer Pressure Channel I, PT-455, fails high
3	PRS14A	C – RO, SRO	Pressurizer Spray Valve fails OPEN (AUTO failure only)
4	LT:459	I – RO, SRO	Controlling Pressurizer Level Channel, LT-459, fails high
5	LT:476	I – BOP, SRO TS – SRO	Controlling 'A' Steam Generator Level Transmitter, LT-476, fails low
6	TURMT1	C – BOP, SRO TS – SRO	High Vibration on Turbine (increases to trip setpoint over 2 min)
7	CRF003A CRF003B	M – ALL	2 Control Rods drop requiring a Reactor Trip
8	RPS01B	C – RO, SRO	ATWS
9	EPS01A,	M – ALL	Loss of Offsite Power
10	DG05A, DG06B	C – BOP, SRO	EDG 'A' failure leaves Emergency Bus 1A-SA de-energized EDG 'B' breaker fails to shut automatically (can eventually be restored by operator)

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

Scenario Summary:
The plant is at 5% power in end of life. There is a 4 GPD tube leak on the 'B' Steam Generator. A plant startup is in progress IAW GP-005, Power Operation. The first priority will be to raise power from 4% to 7% - 9% so that they can transfer control from Feedwater Regulating Valve Bypass FCVs to the Main Feedwater Regulating Valves. Once the first Main Feedwater Regulating Valve is placed in service then the scenario will proceed to the next event. They will continue to work at placing FRV's in auto during the scenario.

Once the increase in power has been observed to the extent necessary and 'A' Main FRV is in auto, then event #2 can be inserted. This event is Pressurizer Pressure Channel I, PT-455, failing high. This will cause a MCB annunciator to alarm. The RO will report that PT-455 pressure indication is high and the crew will implement OWP-RP-02 to remove the failed channel from service. The SRO should evaluate Tech Specs 3.3.1 (Reactor Trip Instrumentation), 3.3.2 (ESF Instrumentation), and 3.3.3.5.a (Remote Shutdown System), for the failed channel and request assistance from the WCC.

Event #3, Pressurizer Spray Valve PCV-444C failing open, can be initiated once Tech Specs for PT-455 have been evaluated. Pressurizer pressure will decease and all pressurizer heaters will energize. Annunciators for pressurizer low pressure will alarm. The crew should respond by entering AOP-019, Malfunction of RCS Pressure Control, and place the malfunctioning spray valve in manual per the immediate actions. RCS pressure may drop below the DNB limit depending on how fast the operator responds to the failure. If so, the SRO should evaluate Tech Spec 3.2.5, DNB Parameters.

Event #4 is initiated once RCS pressure has recovered. It is the Controlling Pressurizer Level Instrument, LT-459, failing high. The crew should respond in accordance with alarm response procedure APP-ALB-009. The crew should take Charging FCV-122 to Manual and maintain pressurizer level within the control band and shift level control to an alternate channel.

Event #5 is the Controlling Steam Generator Level Channel on SG 'A', LT-476, failing low. The BOP should respond to multiple 'A' Steam Generator alarms on ALB-014 and take manual control of the 'A' FRV in accordance with the alarm response procedures and OMM-001, Conduct of Operations. The SRO should evaluate Tech Specs 3.3.1 (Reactor Trip Instrumentation), 3.3.2 (ESF Instrumentation), and 3.3.3.6 (Accident Monitoring Instrumentation). The OWP is not required to be implemented in order to continue with the scenario.

Event #6 is High Vibration on the Main Turbine. Vibrations will continue to rise over two minutes to the point that a Turbine Trip is required. Since power is <P-7 the crew trip the turbine only and continue on in AOP-006, Turbine Generator Trouble. Crew should continue on in the procedure to the point that they isolate and break vacuum. Once this action has been performed continue on with Event 7.

Event #7 is the dropping of two control rods. The RO should report the two dropped control rods. The crew will enter AOP-001 and the first immediate action will direct a Reactor Trip. The crew should recognize that the reactor has failed to trip and enter FRP-S.1, Response to Nuclear Power Generation/ATWS. The Reactor Trip breakers will be opened locally four minutes after a field operator has been dispatched to perform those actions. Once the crew has initiated the emergency boration in FRP-S.1, they should exit FRP-S.1 and return to PATH-1.

Once the crew has entered PATH-1, the Lead Examiner can cue the loss of off-site power. The 'A' EDG will fail to start and the 'B' EDG Output Breaker will fail to shut automatically. The crew should enter EPP-001, Loss of AC Power to 1A-SA and 1B-SB Buses. Manual operation of the 'B' EDG Output breaker is available and the crew should restore power to the 'B' Safety Bus using the 'B' EDG. Terminate the scenario when the crew transitions out of EPP-001. (Note there is no exit available from EPP-001 without restoring power to at least one of the Safety Buses.)

SIMULATOR SETUP

SPECIAL INSTRUCTIONS

- Initiate from IC-27. Adjust boron concentration up by 12 ppm over 1 minute to lower power to 4%. Allow ~4 minutes for plant to stabilize at new power.

INITIAL CONDITIONS:

- From IC-27, adjust to < 5 % power
- No equipment OOS
- GP-005 completed through Step 94
- Reactivity Plan for intended evolution (Raise power for placing Main Turbine on line)
- Turnover Sheet

CAEP:

```
!Description of NRCCAEP4

!Preloads
                imf rps01b (n 00:00:00 00:00:00) 3 3
                imf dsg05a (n 00:00:00 00:00:00) true
                imf dsg06b (n 00:00:00 00:00:00) true

!Triggers
                imf pt:455 (2 00:00:00 00:00:00) 2500.0
                imf lt:496 (3 00:00:00 00:00:00) 0.0
                imf prs14a (4 00:00:00 00:00:00) 100
                imf lt:459 (5 00:00:00 00:00:00) 100.0
                imf turmt1 (6 00:00:00 00:00:00) 16 120.0
                imf crf03a (7 00:00:00 00:00:00) 2 7
                imf crf03b (7 00:00:00 00:00:00) 2 50
                imf eps01 (9 00:00:00 00:00:00) W/O_DELAY

!Reduce power to ~4% (700 gal dilution and 2 rod steps will raise to 9%)
0.5             run
1.0             imf rcs05 (n 00:00:00 00:00:00) 1588.5 00:00:60 -
1.0              run
80.0            dmf rcs05
360.0           frz
```

Op Test No.: NRC	Scenario # 4	Event # 1	Page 4 of 31
Event Description:	Shift to the Main Feedwater Regulating Valves / Raise Power		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**Actuate ET-2 (Pressurizer Pressure Channel I, PT-455, fails High) on cue from the Lead Evaluator.**
EVALUATOR NOTE:		**Do not proceed to Event 3 (Pressurizer Spray Valve fails OPEN) until the shift of 'A' Feedwater Regulator Valve to AUTO is complete.**
	SRO	Directs BOP to perform Step 95, PREPARE to place the Main Feedwater Regulating valves in service.
	BOP	PREPARE to place the Main Feedwater Regulating valves in service as follows:
		VERIFY the following Main Feedwater Regulating valves are shut with the flow controllers in manual with zero (0 or minimum) controller output:
		• 1FW-133, MAIN FW A REGULATOR (FK-478)
		• 1FW-249, MAIN FW B REGULATOR (FK-488)
		• 1FW-191, MAIN FW C REGULATOR (FK-498)
	BOP	VERIFY SHUT the following Main Feed Regulating Block valves:
		• 1FW-130, MAIN FW A BLOCK VLV
		• 1FW-246, MAIN FW B BLOCK VLV
		• 1FW-188, MAIN FW C BLOCK VLV
BOOTH OPERATOR:		**In the following step, report smooth operation of each FCV.** **When requested to verify: report 1FW-136, 1FW-252, 1FW-194 (Main Feed Reg Valve Outlet Isolation Valves) all OPEN.**
	BOP	~~CYCLE the following controllers to open then shut the flow~~ control valves, while monitoring locally for smooth operation:

Op Test No.: NRC Scenario # 4 Event # 1 Page 5 of 31

Event Description: Shift to the Main Feedwater Regulating Valves / Raise Power

Time	Position	Applicant's Actions or Behavior
		• 1FW-133, MAIN FW A REGULATOR (FK-478)
		• 1FW-249, MAIN FW B REGULATOR (FK-488)
		• 1FW-191, MAIN FW C REGULATOR (FK-498)
	BOP	VERIFY OPEN the following Main Feed Regulating Isolation Valves:
		• 1FW-130, MAIN FW A BLOCK VLV
		• 1FW-246, MAIN FW B BLOCK VLV
		• 1FW-188, MAIN FW C BLOCK VLV
		• 1FW-136, MAIN FEED REG VALVE A OUTLET ISOL
		• 1FW-252, MAIN FEED REG VALVE B OUTLET ISOL
		• 1FW-194, MAIN FEED REG VALVE C OUTLET ISOL

Op Test No.: NRC	Scenario # 4	Event # 1	Page 6 of 31
Event Description:	Shift to the Main Feedwater Regulating Valves / Raise Power		

Time	Position	Applicant's Actions or Behavior
EVALUATOR'S NOTE:		**The RO should adjust RCS boron and move rods while maintaining Tavg-Tref within 5 °F and power ≤ 10 %. The RO should request permission and a peer check from the SRO before making a reactivity change.**
	RO	INITIATES dilution, as necessary.
EVALUATOR'S NOTE:		**OP-107.01 is a "Continuous Use" procedure for the dilution.**
	RO	DETERMINE the volume of makeup water to be added. This may be done by experience or via the reactivity plan associated with the Simulator IC.
	RO	SETS FIS-114, TOTAL MAKEUP WTR BATCH COUNTER, to obtain the desired quantity.
	RO	SET total makeup flow as follows:
		• IF performing DIL in Step 8, **THEN SET** controller 1CS-151, FK-114 RWMU FLOW, for less than or equal to 90 gpm.
		• IF performing ALT DIL in Step 8, **THEN SET** controller 1CS-151, FK-114 RWMU FLOW, for the desired flow rate.
	RO	VERIFY the RMW CONTROL switch has been placed in the STOP position.
	RO	VERIFY the RMW CONTROL switch green light is lit.
	RO	PLACE the control switch RMW MODE SELECTOR to the DIL **OR** the ALT DIL position.

Op Test No.: NRC	Scenario # 4	Event # 1	Page 7 of 31
Event Description:	Shift to the Main Feedwater Regulating Valves / Raise Power		

Time	Position	Applicant's Actions or Behavior
PROCEDURE NOTE:		**When PRZ backup heaters are energized in manual, PK 444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows:** • **PORV PCV-444B will open at a lower than expected pressure** • **ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure**
		• **Increased probability for exceeding Tech Spec DNB limit for RCS pressure**
PROCEDURE NOTE:		**SRO concurrence should be obtained prior to energizing the BUH in MANUAL.**
	RO	OPERATE the pressurizer backup heaters as required to limit the difference between the pressurizer and RCS boron concentration to less than 10 ppm.
	RO	START the makeup system as follows:
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the RED indicator light is LIT.
PROCEDURE CAUTION:		**The operation should be stopped if an unanticipated reactivity effect is seen. Do not resume the operation until the cause has been corrected.**
	RO	VERIFY Tavg responds as desired.
EVALUATOR NOTE:		**For this plant condition, rod control will be in MANUAL.**

Op Test No.: NRC	Scenario # 4	Event # 1	Page 8 of 31
Event Description:	Shift to the Main Feedwater Regulating Valves / Raise Power		

Time	Position	Applicant's Actions or Behavior
	RO	IF rod control is in AUTO, THEN VERIFY the control rods are stepping out to the desired height.
	RO	VERIFY dilution automatically terminates when the desired quantity has been added.
	RO	PLACE Reactor Makeup in Auto per Section 5.1.
	RO	VERIFY the RMW CONTROL switch:
		• Is in the STOP position.
		• The GREEN light is LIT.
	RO	PLACE the RMW MODE SELECTOR to AUTO.
	RO	START the makeup system as follows:
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the RED indicator light is LIT.

Op Test No.: NRC Scenario # 4 Event # 1 Page 9 of 31

Event Description: Shift to the Main Feedwater Regulating Valves / Raise Power

Time	Position	Applicant's Actions or Behavior
	BOP	WHEN Feedwater Regulating Bypass Valve FCV Controller demand is between 70% and 80%, OR when Reactor Power is between 7 and 9%, THEN TRANSFER SG level control to the Main Feedwater Regulating valves as follows:
		PLACE the following Feedwater Regulating Valve Bypass FCV Controllers in MAN:
		• 1FW-140, MN FW A REG BYP FK-479.1
		• 1FW-256, MN FW B REG BYP FK-489.1
		• 1FW-198, MN FW C REG BYP FK-499.1
	BOP	PLACE the Main FW Regulating Valve Controllers in AUTO:
		• 1FW-133, MAIN FW A REGULATOR FK-478
		• 1FW-249, MAIN FW B REGULATOR FK-488
		• 1FW-191, MAIN FW C REGULATOR FK-498
PROCEDURE NOTE:		**The following Steps verify the Feed Regulating valves will respond prior to fully closing the Feedwater Regulating Valve Bypass FCVs.**
	BOP	LOWER the output of the following Feedwater Regulating Valve Bypass FCV Controllers to a position 10% lower than the current output:
		• 1FW-140, MN FW A REG BYP FK-479.1
		• 1FW-256, MN FW B REG BYP FK-489.1
		• 1FW-198, MN FW C REG BYP FK-499.1
PROCEDURE NOTE:		**If the demand signal reaches a value of 10% with no response from the Feedwater Regulating Valves, it may be necessary to return the FRV controller to MAN to cancel any integrated signal and assess the situation before continuing.**

Op Test No.: NRC	Scenario # 4	Event # 1	Page 10 of 31
Event Description: Shift to the Main Feedwater Regulating Valves / Raise Power			

Time	Position	Applicant's Actions or Behavior
	BOP	WHEN Feedwater Regulating Valves indicate BOTH of the following responses:
		• Controller output increasing
		• SG level returning to normal
		THEN LOWER output of the following Feedwater Regulating Valve Bypass FCV Controllers to 0% (Minimum output):
		• 1FW-140, MN FW A REG BYP FK-479.1
		• 1FW-256, MN FW B REG BYP FK-489.1
		• 1FW-198, MN FW C REG BYP FK-499.1
	BOP	At STATUS LIGHT BOX 1, VERIFY SHUT the following Feedwater Regulating Valve Bypass FCVs:
		• A BYP FW-140 (Window 4-1)
		• B BYP FW-256 (Window 4-2)
		• C BYP FW-198 (Window 4-3)
LEAD EVALUATOR:		**Cue Event 2 when the power increase has been observed to the extent desired.**

Op Test No.: NRC	Scenario # 4	Event # 2	Page 11 of 31
Event Description: Pressurizer Pressure Channel I, PT-455, fails high			

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Event #2 is Pressurizer Pressure Channel I, PT-455, failing high. This will cause a MCB annunciator to alarm. The RO will report that PT-455 pressure indication is high and the crew will implement OWP-RP-02 to remove the failed channel from service. The SRO should evaluate Tech Specs 3.3.1 (Reactor Trip Instrumentation), 3.3.2 (ESF Instrumentation), and 3.3.3.5.a (Remote Shutdown System), for the failed channel and request assistance from the WCC.**
BOOTH OPERATOR:		**Insert ET-2 (Pressurizer Pressure Channel, PT-455, fails high) on cue from the Lead Evaluator.**
Indications Available: • ALB-009-5-2, Pressurizer High Pressure Alert		
	RO	IDENTIFIES that PT-455 has failed HIGH
	SRO	IMPLEMENT OWP-RP-02 to remove failed channel from service
	SRO	REFER to the following Tech Specs: • T.S. 3.3.1, Reactor Trip Instrumentation (6 hour action) • T.S. 3.3.2, ESF Instrumentation (6 hour action) • T.S. 3.3.3.5a, Remote Shutdown System (60 day)
	SRO	INITIATE an Equipment Failure Checklist
EVALUATOR NOTE:		**Once the Tech Specs have been evaluated, 'A' FRV is in AUTO, and PT-455 removed from service per the OWP then cue Event 3, Pressurizer Spray Valve PCV-444C fails open.**

Op Test No.: NRC	Scenario # 4	Event # 3	Page 12 of 31
Event Description: Pressurizer Spray Valve PCV-444C fails OPEN			

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**When Pressurizer Spray Valve PCV-444C fails open, Pressurizer pressure will decrease and all Pressurizer heaters will energize. Annunicators for Pressurizer low pressure will alarm. The crew should respond by entering AOP-019, Malfunction of RCS Pressure Control, and placing the malfunctioning spray valve in manual per the immediate actions. RCS pressure may drop below the DNB limit depending on how fast the operator responds to the failure. If so, the SRO should evaluate Tech Spec 3.2.5, DNB Parameters.**
BOOTH OPERATOR:		**Actuate ET-3 (Controlling PZR Pressure Channel, PT-444, fails HIGH).**
Indications Available: • **ALB-09-3-3 PRESSURIZER LOW PRESS DEVIATION CONTROL** • **ALB-09-5-1 PRESSURIZER HIGH-LOW PRESS**		
	RO	Responds to ALB-09 alarms.
	RO	Reports malfunction in the RCS Pressure Control system.
	SRO	Enters AOP-019, MALFUNCTION OF RCS PRESSURE CONTROL.
	RO	Perform AOP-019 Immediate Actions.
Immediate Action	RO	CHECK that a bubble exists in the PRZ. (YES)
Immediate Action	RO	VERIFY ALL PRZ PORVs AND associated block valves properly positioned for current PRZ pressure and plant conditions. (YES)
Immediate Action	RO	CHECK Both PRZ spray valves properly positioned for current PRZ pressure and plant conditions. (NO)

Op Test No.: NRC Scenario # 4 Event # 3 Page 13 of 31

Event Description: Pressurizer Spray Valve PCV-444C fails OPEN

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**The malfunction only affects PCV-444C. It is expected that the operator will recognize that only one spray valve is malfunctioning and operate that controller in MANUAL (option a below).**
Immediate Action	RO	CONTROL PRZ spray valves in MANUAL using ONE of the following (listed in order of preference): a) AFFECTED Spray Valve controller in MANUAL (if only one is obviously malfunctioning) OR b) PK-444A, Master Pressure Controller OR c) Both individual spray valve controllers
	SRO	GO TO Section 3.1, Pressure Control Malfunctions While Operating With a Pressurizer Bubble.
	SRO	Inform SSO to REFER to PEP-110, Emergency Classification and Protective Action Recommendations, AND ENTER the EAL Network at entry point X.
	RO	MONITOR PRZ pressure by observing other reliable indications.
	SRO	CHECK plant in MODE 1 OR 2. (YES)
	RO	CHECK PRZ pressure CONTROLLED. (YES)
	RO	CHECK PRZ pressure 2335 PSIG OR LESS. (YES)
	RO	CHECK ALL of the following PRZ PORV block valves OPEN:

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Event Description: Pressurizer Spray Valve PCV-444C fails OPEN

Time	Position	Applicant's Actions or Behavior
		• 1RC-117 (for PCV-445A SA) (YES) • 1RC-115 (for PCV-445B) (YES) • 1RC-113 (for PCV-44B SB) (YES)
	RO	CHECK that a malfunction of one or more of the following has occurred: • PT-444 (NO) • PK-444A (NO) • PRZ heater(s) (NO) • PRZ spray valve(s) or controller(s) (YES)
	RO	CHECK PK-444A controlling properly in AUTO. (YES)
	RO	CONTROL PRZ pressure as follows:
PROCEDURE NOTE:		**If individual spray valve controllers are already in MAN, do NOT return to AUTO.**
	RO	CHECK BOTH PRZ spray valve controllers in AUTO AND BOTH spray valves operating as desired. (NO)
	RO	VERIFY PRZ Spray Valve controllers in ONE of the following alignments: • AFFECTED Spray Valve controller in MANUAL (if only one is obviously malfunctioning) (YES)
	RO	OPERATE Spray Valves as necessary to control PZR pressure.
	RO	CHECK ALL PRZ heaters operating as desired. (YES)

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Event Description: Pressurizer Spray Valve PCV-444C fails OPEN

Time	Position	Applicant's Actions or Behavior
	RO	CHECK at least one of the following conditions present: • PRZ pressure is UNCONTROLLED (NO) • Status of a normal spray valve or a PRZ heater bank is UNCONTROLLED (NO)
	SRO	REFER TO Tech Spec 3.2.5 (DNB Parameters) AND IMPLEMENT action where appropriate. (Limit is 2185 psig – restore within 2 hours)
	SRO	Completes an Equipment Failure Checklist and contacts WCC for assistance.
EVALUATOR NOTE:		**The Lead Evaluator can cue Event 4 (Controlling Pressurizer Level Channel, LT-459, fails high) once the plant has stabilized back in its normal pressure band.**

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Event Description: Controlling Pressurizer Level Channel, LT-459, fails high

Time	Position	Applicant's Actions or Behavior
EVALUTATOR NOTE:		**Event #4 is the controlling Pressurizer Level Instrument, LT-459, failing high. The crew should respond in accordance with alarm response procedure APP-ALB-009. The crew will be required to take Charging FCV-122 to Manual and maintain Pressurizer level within the control band and shift level control to an alternate channel.**
BOOTH OPERATOR:		**Insert ET-4 (Controlling Pressurizer Level Instrument, LT-459, fails high), on cue from the Lead Evaluator.**
Indications Available: • **ALB-009-2-1, PZR CONT HIGH LEVEL DEV & HTRS ON** • **ALB-009-4-2, PRESSURIZER HIGH LEVEL ALERT** • **Lowering Pressurizer level**		
	RO	IDENTIFY a failed Pressurizer Level Channel
	SRO	ENTER APP-ALB-009
	RO	PLACE FCV-122, Charging Flow Control Valve, in manual.
	RO	OPERATE FCV-122 as necessary to restore Pressurizer Level to the normal band
	RO	SELECT 460/461 on Pressurizer Level Controller Selector
	SRO	Evaluate T.S. 3.3.1 (6 hours)
	RO	Restore Charging to Automatic (Requires shifting Master Controller to Manual and then back to Auto in order to remove integration

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Event Description: Controlling Pressurizer Level Channel, LT-459, fails high			

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**The Lead Evaluator can cue Event 5 (Controlling Steam Generator Level Channel on SG 'A', LT-476 failing LOW) once the plant has stabilized back in its normal Pressurizer Level band.**

Op Test No.: NRC	Scenario # 4	Event # 5	Page 18 of 31
Event Description: Controlling Steam Generator Level Channel on SG 'A', LT-476 failing LOW			

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Event 5 is the Controlling Steam Generator Level Channel on SG 'A', LT-476, failing low. The BOP should respond to multiple 'A' Steam Generator alarms on ALB-014 and take manual control of the 'A' FRV in accordance with the alarm response procedures and OMM-001, Conduct of Operations. The SRO should evaluate Tech Specs 3.3.1 (Reactor Trip Instrumentation), 3.3.2 (ESF Instrumentation), and 3.3.3.6 (Accident Monitoring Instrumentation). The failed channel does not have to be removed from service to continue with the scenario.**
BOOTH OPERATOR:		**Insert ET-5 (Controlling Steam Generator Level Channel on SG 'A', LT-476, fails low) on cue from the Lead Evaluator**
Indications Available: • **ALB-014-1-1B SG A NR LEVEL/ SP HI / LO DEV** • **ALB-014-4-4 SG A LOW LOW LEVEL** • **ALB-014-8-5 COMPUTER ALARM SG**		
	BOP	RESPONDS to multiple 'A' SG alarms
EVALUATOR'S NOTE:		**THE BOP may take MANUAL control of the associated FRV prior to entering the APP.**
	BOP	Enters APP-ALB-014-1-1B and/or 4-4.
	BOP	PLACES FRV for SG 'A' in MANUAL and controls flow.
	SRO	REFERS to OWP-RP to remove channel from service.
	SRO	CONTACTS work control for assistance.

Op Test No.: NRC	Scenario # 4	Event # 5	Page 19 of 31
Event Description:	Controlling Steam Generator Level Channel on SG 'A', LT-476 failing LOW		

Time	Position	Applicant's Actions or Behavior
	SRO	ENTERS TS: • 3.3.1.a Reactor Trip Instrumentation, Action 6 • 3.3.2.a ESF Instrumentation, Action 19 Both require tripping the inoperable channel within 6 hours. and • 3.3.3.6.a. Accident Monitoring Instrumentation – restore the inoperable channel within 7 days. (Not applicable but may initiate a tracking EIR related to this TS)
EVALUATOR'S NOTE:		**After the TS has been evaluated, the Lead Evaluator can cue Event 6 (High Vibration on the Main Turbine).**

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Event Description: High Vibration on the Main Turbine

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Event #6 is High Vibration on the Main Turbine.**
BOOTH OPERATOR:		**Insert ET-6 (Main Turbine Vibration increases from 6 to 16 over 2 minutes) on cue from the Lead Evaluator**
Indications Available: • **ALB-20-2-3 Turbine Trouble** • **ALB-20-5-5 Computer Alarm MS/TURB**		
	RO	Identify increasing vibrations on the Main Turbine
	SRO	Enter AOP-006, Turbine Generator Trouble
	BOP	CHECK that an automatic or manual Turbine trip signal has occurred. (NO)
	SRO	GO TO the applicable section: • Section 3.2, Turbine Eccentricity or Vibration (page 12)
PROCEDURE NOTE:		**Resonant ranges can be found in the Turbine Speed Hold Recommendations chart in the Operations Curve Book.**
	BOP	CHECK Turbine speed 600 RPM OR GREATER. (YES)
	BOP	COMMENCE an OSI-PI AOP-006 Attachment 1 Group Trend, Turbine Monitoring ERFIS Computer Points.
	BOP	REFER TO Attachment 6, Turbine Operating Limits AND CHECK that ALL readings applicable to current Turbine speed remain BELOW their trip values. (NO, Vibration exceeds)

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Event Description: High Vibration on the Main Turbine

Time	Position	Applicant's Actions or Behavior
	BOP	PERFORM the following: CONFIRM that a reading is at or above its trip value using at least one of the following: • Reading for the alternate vibration monitor from that bearing on Supervisory Panel • Abnormal Turbine noise or vibration
	SRO	IF a reading AT OR ABOVE its trip value is confirmed, THEN: (1) IF above P-7, THEN TRIP the Reactor AND GO TO EOP Path-1. (Perform Section 3.1 as time allows.) (NO) (2) TRIP the Turbine AND GO TO Section 3.1, Turbine Trip. (YES)
	BOP	CHECK for ANY of the following: • ALL turbine governor valves SHUT (4 total) (YES) OR • ALL turbine throttle valves SHUT (4 total) (YES)
	BOP	CHECK ALL of the following SHUT: • Reheat Stop valves (4 total) (YES) • Intercept valves (4 total) (YES)
	BOP	CHECK ALL Non-Return valves SHUT (8 total) (Status Light Box 3). (YES)
	BOP	CHECK ALL of the following HP Turbine Drains and Casing Vents OPEN (Status Light Box 2) (YES)
	BOP	CHECK BOTH of the following AVAILABLE: (YES) • Air Side Seal Oil Pump • Air Side Seal Oil Backup Pump

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Event Description: High Vibration on the Main Turbine

Time	Position	Applicant's Actions or Behavior
PROCEDURE NOTE:		**Vacuum should be maintained until Turbine speed drops to below 180 rpm except under the conditions listed in the next step. The listed conditions are serious enough that overall damage to the Turbine can be reduced by limiting coastdown time.**
	SRO	CHECK that AT LEAST ONE of the following conditions for breaking condenser vacuum is met: • ALB-18-2-3, TURBINE TRIP THRUST BEARING WEAR—ALARMED (NO) • ALB-18-2-4, TURBINE TRIP BEARING OIL LOW PRESS—ALARMED (NO) • PI-1842, GLAND STM SEAL HDR PRESS—LESS THAN 20 PSIG (NO) • Loss of Offsite Power (NO) • Turbine was manually tripped due to sustained vibration of GREATER THAN 14 MILS **(YES)** • Audible rubbing noises from the Turbine (NO)
	BOP	VERIFY that the following breakers are OPEN: • 52-9, GENERATOR TO NORTH BUS • 52-7, GENERATOR TO SOUTH BUS • 102, UNIT AUX XFMR A TO AUX BUS D • 108, UNIT AUX XFMR A TO AUX BUS A • 122, UNIT AUX XFMR B TO AUX BUS E • 128, UNIT AUX XFMR B TO AUX BUS B
	BOP	VERIFY that the following are SHUT: a. MSIVs b. MSIV bypass valves
	BOP	STOP BOTH condenser vacuum pumps.

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Event Description: High Vibration on the Main Turbine

Time	Position	Applicant's Actions or Behavior
	BOP	OPEN the following: • 1CE-447, CONDENSER VACUUM BREAKER • 1CE-475, CONDENSER VACUUM BREAKER
	BOP	REFER TO OP-133, Main Condenser Air Removal System, AND COMPLETE condenser shutdown.
EVALUATOR NOTE:		**Once the crew has isolated and broken vacuum, then initiate Event 7 (Two Dropped Control Rods, ATWS).**

Op Test No.: NRC	Scenario # 4	Event # 7,8	Page 24 of 31
Event Description: Two Dropped Control Rods - ATWS			

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Event #7 is Two Dropped Control Rods. The RO should report the event and the crew should recognize that an ATWS is in progress.** **Once the crew has carried the emergency boration of FRP-S.1 and transitioned to PATH-1, the Lead Examiner can cue the loss of off-site power. The 'A' EDG will fail to start and the 'B' EDG Output Breaker will fail to shut. The crew should enter EPP-001, Loss of AC Power to 1A-SA and 1B-SB Buses.** **Once the 'B' EDG has been restored the scenario can be terminated.**
BOOTH OPERATOR:		**Insert ET-7 (Two Dropped Control Rods) on cue from the evaluator.** **Delete the ATWS malfunction (RPS01B) and trip the reactor four (4) minutes after a field operator is dispatched by the crew to trip the reactor locally.**
Indications Available: • **ALB-013-7-3, TWO OR MORE RODS AT BOTTOM** • **ALB-013-7-4, ONE ROD AT BOTTOM**		
	RO	Recognizes indications of Dropped Rod
	SRO	Enters AOP-001, MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM.
	RO	Perform AOP-001 Immediate Actions.
Immediate Action	RO	CHECK that LESS THAN TWO control rods are dropped (NO)
Immediate Action	RO	TRIP the Reactor AND GO TO EOP Path-1.
	RO	Recognizes and reports that the reactor failed to trip

Op Test No.: NRC Scenario # 4 Event # 7,8 Page 25 of 31

Event Description: Two Dropped Control Rods - ATWS

Time	Position	Applicant's Actions or Behavior
	SRO	ENTER FRP-S.1, Response to Nuclear Power Generation/ATWS
PROCEDURE CAUTION:		**To maximize core cooling, RCPs should NOT be tripped with reactor power GREATER THAN 5%. (Normal support conditions for running RCPs are NOT required for these circumstances. The RCP TRIP CRITERIA for small break LOCA conditions is NOT applicable to this procedure.)**
PROCEDURE NOTE:		**Steps 1 through 4 are immediate action steps.**
	RO	Verify Reactor Trip:
		Check for all of the following:
		• Check for any of the following: o Trip breakers RTA AND BYA – OPEN (NO) o Trip breakers RTB AND BYB – OPEN (NO)
		• Rod bottom lights –LIT (NO)
		• Neutron flux – DECREASING (NO)
	RO	IF the reactor will NOT trip (automatically OR using either manual trip switch), THEN verify negative reactivity inserted by any of the following while continuing with this procedure: • Manually insert control rods • Verify control rods inserting in automatic
	BOP	Verify Turbine Trip: Check for any of the following: • All turbine throttle valves – SHUT (YES) • All turbine governor valves – SHUT (YES)
	BOP	Verify All AFW Pumps - RUNNING

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Event Description: Two Dropped Control Rods - ATWS

Time	Position	Applicant's Actions or Behavior
	RO	Check Reactor Trip Status: a. Check reactor – TRIPPED (NO)
	SRO	Direct an operator to contact OR report to the main control room (to receive instructions to locally trip the reactor).
	SRO	Initiate monitoring the Critical Safety Function Status Trees.
	SRO	Evaluate EAL Network using entry point X.
PROCEDURE NOTE:		**Actuation of the sequencer inhibits operation of the boric acid pumps. (If the sequencer runs on Program A, the pumps can be started manually after LB-9. Otherwise, the sequencer must be reset to restore operation of the pumps)** **SI flow accomplishes emergency boration.**
	RO	Initiate Emergency Boration of RCS:
		Check SI flow – GREATER THAN 200 GPM (NO)
	RO	Emergency borate from the BAT:
		1) Start a boric acid pump. 2) Perform any of the following (listed in order of preference): o Open Emergency Boric Acid Addition valve: 1CS-278 o Open normal boration valves: FCV-113A, FCV-113B 3) Verify boric acid flow to CSIP suction – AT LEAST 30 GPM 4) Verify CSIP flow to RCS - AT LEAST 30 GPM
	RO	Check PRZ Pressure – LESS THAN 2335 PSIG (YES)

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Event Description: Two Dropped Control Rods - ATWS

Time	Position	Applicant's Actions or Behavior
	BOP	Isolate CNMT Ventilation: a. Stop the following fans: o AH-82 A NORMAL PURGE SUPPLY FAN o AH-82 B NORMAL PURGE SUPPLY FAN o E-5A CNMT PRE-ENTRY PURGE EXHAUST FAN o E-5B CNMT PRE-ENTRY PURGE EXHAUST FAN b. Verify the valves and dampers listed in the table – SHUT (YES)
	RO	Check Trip Status:
		Check reactor – TRIPPED (YES)
		Check turbine – TRIPPED (YES)
		Check Reactor Subcritical: o Power range channels - LESS THAN 5% (YES) o Intermediate range startup rate channels – NEGATIVE (YES)
	SRO	Observe CAUTION prior to Step 25 AND GO TO Step 25.
PROCEDURE CAUTION:		**Boration should continue to obtain adequate shutdown margin during subsequent recovery actions.**
	SRO	Implement Function Restoration Procedures As Required.
	SRO	RETURN TO Procedure and Step in Effect (PATH-1)
		PATH-1

Op Test No.: NRC	Scenario # 4	Event # 7,8	Page 28 of 31
Event Description: Two Dropped Control Rods - ATWS			

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Once the crew has transitioned to PATH-1, the Lead Examiner can cue the loss of off-site power. The 'A' EDG will fail to start and the 'B' EDG Output Breaker will fail to shut. The crew should enter EPP-001, Loss of AC Power to 1A-SA and 1B-SB Buses.** **Once the 'B' EDG has been restored the scenario can be terminated.**

Op Test No.: NRC	Scenario # 4	Event # 9,10	Page 29 of 31
Event Description:	Loss of Offsite Power, 'A' EDG fails to start, 'B' EDG Output Breaker fails to shut		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**Initiate ET-9 (Loss of Offsite Power) upon cue from Lead Evaluator.**
	CREW	Identify entry conditions for EPP-001, Loss of AC Power to 1A-SA and 1B-SB Buses
Immediate Action	RO	Verify Reactor Trip: o Check for any of the following: o Trip breakers RTA AND BYA – OPEN (YES) o Trip breakers RTB AND BYB – OPEN (YES) o Neutron flux – DECREASING (YES)
Immediate Action	BOP	Verify Turbine Trip: a. Check for any of the following: o All turbine throttle valves - SHUT o All turbine governor valves - SHUT
	RO	Check If RCS Isolated
		Check PRZ PORVs – SHUT (YES)
		Check letdown isolation valves - SHUT: • 1CS-1 (LCV-460) (NO) • 1CS-2 (LCV-459) (NO)
	RO	Verify excess letdown valves - SHUT: • 1CS-460 • 1CS-461

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Event Description: Loss of Offsite Power, 'A' EDG fails to start, 'B' EDG Output Breaker fails to shut

Time	Position	Applicant's Actions or Behavior
	BOP	Verify AFW Flow AND Control SG Levels: • Verify AFW Flow – GREATER THAN 210 KPPH (YES) • Any level - GREATER THAN 25% [40%] • Control AFW flow to maintain all intact levels between 25% and 50% [40% and 50%]
	SRO	Evaluate EAL Network Using Entry Point X.
	BOP	Verify AC Emergency Bus Cross-Ties to Non-Emergency AC Buses - OPEN
		Verify any cross tie to Bus 1A-SA - OPEN o Breaker 104 o Breaker 105 Verify Any cross tie to Bus 1B-SB - OPEN o Breaker 124 o Breaker 125
	BOP	Energize AC Emergency Buses using EDGs:
		Check EDGs 1A-SA AND 1B-SB – AVAILABLE (NO)
		Check any EDG – RUNNING (YES, 'B')
	BOP	Check any AC emergency bus - ENERGIZED (NO)
	BOP	Perform the following: 1) Manually close running EDG output breaker at MCB OR locally perform at switchgear: EDG A: Breaker 106 (NO) EDG B: Breaker 126 (YES)
	BOP	Check any AC emergency bus - ENERGIZED (YES)

Op Test No.: NRC	Scenario # 4	Event # 9,10	Page 31 of 31
Event Description:	Loss of Offsite Power, 'A' EDG fails to start, 'B' EDG Output Breaker fails to shut		

Time	Position	Applicant's Actions or Behavior
	SRO	Implement function restoration procedures as required.
	SRO	RETURN TO procedure and step in effect.
Terminate the scenario upon exit from EPP-001.		