

FINAL AS-ADMINISTERED SCENARIOS

FOR THE BRAIDWOOD INITIAL EXAMINATION - OCTOBER 2001

Simulation Facility Braidwood Scenario No.: 01-1 Operating Test No.: 1

Examiners: _____ Applicant: _____ SRO
 _____ RO
 _____ BOP

Initial Conditions: IC-18, 76% power, steady state, MOC.

Turnover: Ramp to full power requested by Electric Operations. MESACs were completed on 1D SGWLC instrumentation on the previous shift. 1A MFP is out of service due to breaker cubicle work.

Event No.	Malf. No.	Event Type*	Event Description
Preload	FW48B FW43 MS01A-D, 100 FW45E, 100 Override ZDI1AF013E AUTO	C BOP C BOP C RO BOP SRO C BOP C BOP SRO	1B AFW pump fails to auto start, can be manually started. 1A AFW pump fails to auto or manually start. All MSIVs fail at 100% open, no closure available. 1AF005E potentiometer fails to 100% demand. 1AF013E stuck open.
1		R RO SRO N BOP	Raise Reactor Power using rods and dilution Ramp up turbine power from 75% to full power.
2	RX06O, 0	I BOP SRO	1LT549, 1D SG Controlling Water Level Channel fails low.
3	RX13A, 0	I RO SRO	1LT-459, Controlling PZR Level Channel fails low.
4	CV09, 50	C RO SRO	TCV-130A modulates closed
5	MS04D, 100	C BOP SRO	1MS018D, 1D SG PORV fails open.
6	FW09A, 100	C BOP SRO	1FW510, 1A SG Feed reg valve fails open.
7	FW19A, 2.0	M BOP RO SRO	1A SG Feed line break (2 MLB/HR) inside containment. 4 faulted steam generators.
8	1A and 1B AFW pumps fail to Start	C BOP US	Pre-loaded. 1A AFW pump fails to start. 1B AFW can only be manually started.
9	MS01A-D, 100	C BOP US	All MSIVs fail to Close. Stuck full open.

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

SCENARIO 01-1 OVERVIEW

The scenario begins with the plant at 76% power and a ramp up to full power is requested via the turnover. The turnover includes information that MESACs were completed for 1D SGWLC instrumentation on the previous shift and 1A MFP is out of service for breaker cubicle work.

After clearly observable plant response to the requested reactivity change, the controlling channel of S/G Water Level instrumentation for 1D S/G will fail low causing a demand for more feed flow to the 1D S/G. The BOP will diagnose the failure and take manual control of the 1D S/G feed regulating valve. The crew will enter and perform actions of 1BwOA INST-2 Attachment E, "OPERATION WITH A FAILED INSTRUMENT – NARROW RANGE S/G LEVEL CHANNEL FAILURE", to stabilize the plant and trip the bistables for the failed channel. The SRO will investigate Tech Specs. LCO 3.3.1 condition E and LCO 3.3.2 condition D will apply. Maintenance will investigate as requested.

After the bistables are tripped for the failed S/G water level control channel, a failure of the controlling channel of Pzr Level will occur causing letdown to isolate. The crew will respond by diagnosing the failure of the level channel and entering and performing the actions of 1BwOA INST-2 Attachment C, "OPERATION WITH A FAILED INSTRUMENT – PRESSURIZER LEVEL CHANNEL FAILURE". An alternate controlling level channel will be selected, letdown will be restored, and the crew will take actions to restore pressurizer level to the program value. Bistables will be tripped for the failed channel, and Tech Specs will be investigated. LCO 3.3.1 condition K will apply. Maintenance will investigate as requested.

Following the restoration of letdown and bistable tripping, the letdown temperature control valve for the on line letdown heat exchanger will close. Letdown temperature will increase causing a high temperature diversion around the mixed bed demineralizers. Manual control of the temperature controller is available and will be necessary to restore letdown temperature to normal. Annunciator response procedures will be referenced to respond to the failure.

When manual control of the letdown temperature control valve is selected, the 1D S/G PORV controller will cause the 1D S/G PORV to open. RCS Tave will decrease causing control rod motion in the outward direction. The crew will investigate the cause of the temperature decrease and diagnose the inadvertent PORV failure. Emergency closure of the PORV will be available from the control room and the PORV will be locally isolated if directed by the crew. The SRO will determine Tech Spec 3.7.4 applies.

A failure open of the 1A Feed Regulating Valve will cause a High-2 SG Level Turbine Trip if the crew does not manually trip the reactor first. A 1A S/G feed line break inside of containment will occur when the 1A FWIV closes requiring a safety injection. 1BwEP-0, "REACTOR TRIP OR SAFETY INJECTION" will be entered. Containment pressure will exceed the Containment Spray actuation setpoint. Manual action will be required to start the 1B AFW pump. The 1A AFW pump will fail to start. A diagnosis of a Faulted S/G will cause transition to 1BwEP-2, "FAULTED SG ISOLATION". Further diagnosis will determine 4 faulted S/Gs exist due to failure of all MSIVs to close and a transition to 1BwCA-2.1, "UNCONTROLLED DEPRESSURIZATION OF ALL S/Gs" will be made. Depending on the timing, a transition to 1BwFR Z.1, "RESPONSE TO CONTAINMENT HIGH PRESSURE," will occur after exiting the Reactor Trip/Safety Injection procedure. Manual operator action will be required to throttle AFW flow to a minimum to

Comments: _____

the SGs. Local operator action will be required to throttle B Train AFW flow to the faulted 1A S/G due to a failure of the potentiometer and a stuck open isolation valve. Containment Spray may be terminated (depending on the amount of secondary water inventory remaining in the SGs and the RCS temperature) before reaching the LO-2 RWST setpoint for auto swap over to the containment sump and an unnecessary injection of sump water into the RCS. NaOH addition to the CS water will be stopped due to the break being on a secondary system. If the LO-2 RWST level is reached, then the crew will transition to 1BwEP ES-1.3, TRANSFER TO COLD LEG RECIRCULATION and then back to the procedure and step in effect. The crew will proceed to terminate the safety injection in 1BwCA 2.1. Scenario termination is after stopping high head injection flow and re-establishing charging flow.

Critical Tasks

- E-0—F Establish the minimum required AFW flow rate to the SGs before transition out of E-0, unless the transition is to FR-H.1, in which case the task must be initiated before RCPs are manually tripped per FR-H.1.

- ECA-2.1---A Control the AFW flow rate to not less than 45 gpm per SG in order to minimize the RCS Cooldown rate before a severe (orange path) challenge develops to the integrity CSF.

Comments: _____

SIMULATOR OPERATOR NOTES:

Simulator Setup:

- Init IC 18, MOC, Xenon equilibrium, steady state.
- Align switches, "Perform ready for Training" checklist.
- Insert PRELOAD Events:
- Place 1A MFP control switch to Pull Out and hang tag.
- IMF FW48B 1B AFW pump fails to auto start, can be manually started.
- IMF FW43 1A AW pump fails to auto or manually start.
- IMF MS01A-D All MSIVs fail 100% open, no closure available.
- IMF FW45E 100 1AF005E potentiometer fails at 100% demand.
- IOR ZD11AF013E AUTO 1AF013E stuck open.

Event 1 Power ramp from 75% up to 100%.

- As SM acknowledge ramp initiation.
- As RP/HP/Chemistry acknowledge sample requirements for power change > 15% in one hour.

Event 2 1D SG Controlling water level channel fails low (1LT-549).

- SDG: RX19
- Malf: RX06O, 0 severity, no ramp.
- Initiate event after clearly observing reactivity change/response of plant from requested power ramp up or upon lead examiner cue.
- Role play as U-2 admin and/or extra NSO to accomplish bistable tripping. Acknowledge all info passed to the SM, WEC, and maintenance.

SDG: RX19					
Cabinet door #2 Open			RF	RX21	OPEN
P-14	LB549A	C2-753	BS-1	RF	RX069 TRIP
LO-2	LB549B	C2-753	BS-2	RF	RX070 TRIP
Cabinet door #2 Close			RF	RX21	CLOSE

Event 3 Controlling PZR level channel fails low (1LT-459).

- SDG: RX6
- Malf: RX13A, 0 severity, no ramp.
- Initiate event after bistables are tripped and tech specs are investigated for event 2, or at lead examiners cue.
- Role play as U-2 admin and/or extra NSO to accomplish bistable tripping. Acknowledge all info passed to the SM, WEC, and maintenance.

SDG: RX6

Comments: _____

Cabinet door #1 Open				RF	RP20	OPEN
Hi Level Trip	LB459A	C1-751	BS-1	RF	RX029	TRIP
Cabinet door #2 Close				RF	RP20	CLOSE

Event 4 On line letdown heat exchanger (1A) cooling flow control valve fails closed, (ITCV-130A).

SDG: CV2 and CC6

Initiate after bistable is tripped and tech specs are investigated for event 3, or at lead examiners cue.

Malf: CV09, 50

Intent is to cause operator to have to take manual control of the TCV-130 controller and restore letdown temperature without having to swap letdown heat exchangers. Manual control via the M/A station is available on this malfunction. Acknowledge all info passed to the SM, WEC, and maintenance. If dispatched as local operator, use first check and report no obvious problems at the valve. Valve appears to operate smoothly from local observation. (An additional simulator manipulation may be necessary as follows: On SDG CC6, may have to close 1CC9452B to reduce CC flow to the 1A letdown Hx, because the malfunction to cause the 1CC130A to close, does NOT fully close the valve. If this is the case, then as Manual Control of the M/A station for 1CC130A/B is taken and demand increased, reopen 1CC9452B to restore cooling flow. The original position of the 1CC9452B valve is ~50% open.)

Event 5 1D SG PORV 1MS018D, fails open.

SDG: MS4

Initiate at after letdown temperature is stabilized or at lead examiners cue.

Malf: MS04D, 100, no ramp

If dispatched to the controller box in the AEER, report no obvious problems. If dispatched to locally close 1MS019D, wait 5 minutes, use first check, and then use RF: MS54 CLOSE to close the isolation valve. Report 1MS019D closed when completed. Acknowledge all info passed to the SM, WEC, and maintenance. If asked, on-line risk is Yellow.

Events 6 and 7 1A SG Feed regulating valve (1FW510) fails open with no manual control available causing a feed line break inside containment on 1A feed line when feedwater isolates.

Initiate events 6 and 7 after tech specs are investigated for the 1D SG PORV, or at the lead examiners cue.

Action:

Malf: FW09A, 100, 30 second ramp.

SDG: FW8

Malf: FW19A, 2.0 Mlb/hr, when FW009A is full closed.

Trigger: When FWV1FW009A == 0, then IMF FW19A 2

Acknowledge all info passed to SM, WEC, and others regarding reactor trip and SI and procedure transitions.

Role play as STA when asked and monitor the Status Trees. Pay particular attention to the Containment Status Tree as the intent of the scenario is reach the Hi-3 setpoint. Actions in EP-0 will ensure CS is going, however if monitoring the Status Trees identifies an Orange path, report it to the US as usage rules apply.

If dispatched as local operators to check/investigate equipment, report as follows for the requested actions:

All running equipment is operating properly.

Comments: _____

1A Auxiliary Feed Pump Breaker has an over current flag on phase C. Bus 141, cub 8.
No obvious problems at the high speed breakers for the 1A and 1C RCFCs.
Bus 131X Compt 5C (for 1A RCFC) and Compt 3C (for 1C RCFC).
Need the floor plugs removed to get to the 1AF013E.

SDG: FW13

Use RF: FW161 to position the hand wheel for 1AF005E as requested. (8 will ~ 45 gpm)

Maintenance will attempt to locally close any/all MSIVs (but will be unsuccessful).

SDG: SIP

Use RF: ED55E to energize 1SI8806 at 131X1A:P3,
and RF: ED72B to energize 1SI8813 at 132X4A:L3
if 1BwEP ES-1.3 is entered.

Comments: _____

Scenario No: 01-1		Event No. 1
Event Description: Raise turbine load and reactor power.		
Time	Position	Applicant's Actions or Behavior
	CUE	Turnover information includes request from Electric Operations for an increase in Unit 1 MW to full load (1260 MW) to begin ASAP at 5 MWe/minute.
	US	<p>Implement actions of 1BwGP 100-3, Rev. 21 step 59.</p> <ul style="list-style-type: none"> • Initiate load swing instruction sheet (1BwGP 100-4T2 Boration Dilution Boundary Calculation). ○ Contact chemistry and Health Physics for load change > 15% in one hr. • Inform SM of plant Status, and Elec Ops of ramp start.
	CREW	Review Applicable Precautions, Limitations and Actions.
	RO	<p>Verify rod position and boron concentration.</p> <p>Perform reactivity manipulation calculation to determine amount of RCS dilution and expected rod outward movement to maintain Delta I within the limits of BwCB-1 Fig. 19.</p> <p>Determine required dilution volume by:</p> <ul style="list-style-type: none"> ○ Effects of previously performed dilutions. ○ Braidwood Boration Dilution Tables. <p>Initiate Dilution in accordance with BwOP CV5, Rev. 13:</p> <ul style="list-style-type: none"> • Determine required Primary Water flow rate. • Set 1FK-111 Pw/Total Flow Control to desired dilution rate. • Set 1FY-0111 Primary Water Control Preset Counter to desired volume. • Place MAKE-UP CONT Switch to STOP position. • Set MU MODE SELECT Switch to ALT DIL position. • Place MAKE-UP CONT Switch to START. ○ Verify proper operation of valves (1CV111A throttles open, PW flow indicated on recorder). <p>OR</p> <p>Batch Addition:</p> <ul style="list-style-type: none"> • OPEN 1CV110B. • OPEN 1CV111A. <p>When desired amount of Primary Water added:</p> <ul style="list-style-type: none"> • CLOSE 1CV111A. • CLOSE 1CV110B.

Comments: _____

Scenario No: 01-1		Event No. 1
Event Description: Raise turbine load and reactor power.		
Time	Position	Applicant's Actions or Behavior
	BOP	<p>Initiate turbine load increase:</p> <ul style="list-style-type: none"> • VERIFY the DEHC IMP IN, SPEED IN, and MW IN half of the pushbuttons are illuminated. • DEPRESS the LOAD RATE MW/MIN pushbutton. • ENTER the desired load rate (≤ 5). • DEPRESS the ENTER pushbutton. • DEPRESS the REF pushbutton. • ENTER the desired MW on the REFERENCE DEMAND Window using the numbered pushbuttons (1120). • DEPRESS the ENTER pushbutton. • DEPRESS the GO pushbutton when directed by the US/RO. • VERIFY load begins to increase.
	RO	<p>Monitor power increase:</p> <ul style="list-style-type: none"> • Monitor Reactor power, Tave, and Delta I. • Verify control rods automatically move to maintain Tave within ± 1.0 degree F of Tref. <p>If Diluting:</p> <ul style="list-style-type: none"> • Monitor VCT level. <ul style="list-style-type: none"> o Verify RCS boron concentration decreasing. • Monitor PW/Total counter. • Verify dilution auto stops at preset value. • Return Reactor Makeup system to blended flow at current boron concentration.
Note: Following clearly observable plant response from the reactivity changes, Event 2 is entered.		

Comments: _____

Scenario No: 01-1		Event No. 2
Event Description: 1LT-549, 1D SG Controlling Water Level Channel Fails LOW.		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: 1-15-D3 SG FLOW MISMATCH STM FLOW LOW 1-15-D5 SG 1D LVL LO-2 RX TRIP ALERT 1-15-D9 SG 1D LEVEL DEVIATION HIGH LOW Indications: Increasing Feed Flow to 1D SG Increasing 1D SG Level Increasing Feed regulating valve demand (1FW540) Decreasing RCS Tave
	BOP	Diagnose failure of 1LT-549. Announce controlling SG Narrow Range Level Channel Failure. Take manual control of 1FW540, and control feed flow to stabilize/restore level. Perform actions of 1BwOA INST-2 as directed by US: <ul style="list-style-type: none"> • Manually controls feed flow (Feed Reg valve 1FW540, and/or Main Feed Pump Speed Control). • SELECTS operable channel (1LT559). • Re-establishes Automatic level control. • Coordinates Bistable tripping for failed channel. (Expected alarm: 15-D-8)
	US	Diagnose/Acknowledge failure of Controlling Channel Narrow Range Water Level on 1D SG. Enter 1BwOA INST-2 Attachment E, Rev. 57B, "NARROW RANGE SG LEVEL CHANNEL FAILURE" and direct actions: <ul style="list-style-type: none"> • If affected SG level is NOT NORMAL, place 1FW540 in MANUAL and restore level. • SELECT operable channel for control. • Re-establish automatic level control. • Tripping of level bistables (2) for 1D SG. • Determines AMS is NOT failed. • Refers to Tech Specs 3.3.1. cond E, 3.3.2. cond D, and 3.3.3., and determines a 6 hour clock to get the channel tripped applies. • Informs SM of plant status. • Orders WEC to generate AR, CR, and get maintenance involved for repairs.

Comments: _____

Scenario No: 01-1		Event No. 2
Event Description: 1LT-549, 1D SG Controlling Water Level Channel Fails LOW.		
Time	Position	Applicant's Actions or Behavior
	RO	Monitors Reactor and Primary parameters for expected effects: <ul style="list-style-type: none"> • Reactor power and Delta I (makes recommendation with respect to continued ramp). • Tave and control rod motion. • Reports status to US. Assists BOP as directed by US: <ul style="list-style-type: none"> • Investigates BwARs.
		Note: Following Tech Spec determination, initiate Event 3.

Comments: _____

Scenario No: 01-1		Event No. 3
Event Description: 1LT-459 Controlling Pressurizer Level Channel Fails LOW.		
Time	Position	Applicant's Actions or Behavior
	CUE	<p>Annunciators:</p> <p>1-12-A4 PZR LVL LOW HTRS OFF LTDWN SECURED</p> <p>1-12-A5 PZR HTR TRIP</p> <p>1-12-B4 PZR LEVEL CONT DEV LOW</p> <p>1-12-C5 PZR PHASE LOSS OR REVERSAL</p> <p>1-12-D5 PZR HTR SCR CLG FAN FAILURE</p>
	RO	<p>Diagnose failure of 1LT-459.</p> <p>Announce failure and loss of letdown flow.</p> <p>Perform actions of 1BwOA INST-2 Attachment C, Rev. 57B, "PRESSURIZER LEVEL CHANNEL FAILURE" as directed by US:</p> <ul style="list-style-type: none"> • Evaluate PZR level. If NOT NORMAL, takes manual control (PZR Master Level controller and/ or 1CV121) to restore level. ○ Reduces charging to a minimum (seal injection), then close either 1CV8105 or 1CV8106. • SELECT operable channel (461/460, left position) for PZR level control. ○ SELECT operable channel to level recorder (ANY but 459, normally on 460). • VERIFY PZR level > 17%. • Re-establishes Letdown IAW BwOP CV-17, "ESTABLISHING AND SECURING NORMAL AND RH LETDOWN FLOW" (may be performed by either RO or BOP. See page 13). • Restores Variable heaters to NORMAL. • Restores Automatic level control (PZR Master Level Controller and/or 1CV121). • Coordinates bistable tripping (expected alarm 1-12-A3).

Comments: _____

Scenario No: 01-1		Event No. 3
Event Description: 1LT-459 Controlling Pressurizer Level Channel Fails LOW.		
Time	Position	Applicant's Actions or Behavior
	US	<p>Diagnose/Acknowledge failure of 1LT-459, Controlling PZR Level channel and loss of letdown.</p> <p>Enters 1BwOA INST-2 Attachment C, "PRESSURIZER LEVEL CHANNEL FAILURE" and directs actions:</p> <ul style="list-style-type: none"> • Orders manual control of PZR level if not normal. ○ Charging reduced to a minimum (seal injection), then 1CV8105 or 1CV8106 closed. • Operable channel selected for control. • Operable channel selected for recorder. • Re-establish letdown when level >17%. • Restore heaters to normal. • Restore Automatic level control (Master controller, and/or 1CV121). • Bistable Tripping. • Refers to Tech Specs 3.3.1. cond K, 3.3.4., 3.3.3., and determines a 6 hr action to trip bistables applies. • Informs SM of plant status. • Orders WEC to generate AR, CR, and get maintenance involved.
	BOP	<p>Performs actions as directed by US/RO:</p> <ul style="list-style-type: none"> • Re-establishes Letdown IAW BwOP CV-17, "ESTABLISHING AND SECURING NORMAL AND RH LETDOWN FLOW" (may be performed by either RO or BOP. See page 13). • Assists RO as directed by US/RO with panel monitoring. • Investigates BwARs. ○ Holds/controls ramp

Comments: _____

Scenario No: 01-1		Event No. 3
Event Description: 1LT-459 Controlling Pressurizer Level Channel Fails LOW.		
Time	Position	Applicant's Actions or Behavior
	RO/BOP	<p>Re-establishing Letdown per BwOP CV-17:</p> <ul style="list-style-type: none"> • VERIFY CLOSE 1CV8149A,B, and C . ○ Assumes CC is still aligned properly to Letdown HX. • PLACE 1CV-131 in MANUAL and RAISE demand to 40%. • PLACE ICC-130 in MANUAL and RAISE demand to 60%. • VERIFY OPEN 1CV459 and 1CV460. • VERIFY OPEN 1CV8324A/B and 1CV8389A/B. • VERIFY OPEN 1CV8160 and 1CV8152. • VERIFY OPEN 1CV381B. • VERIFY CLOSE 1CV381A. • VERIFY OPEN 1CV8401A/B. • VERIFY CLOSE 1CV8145 • VERIFY OPEN 1CV8147A/B. • VERFIY OPEN 1CV8105 and 1CV8106. • ADJUST in MANUAL 1CV121 to establish ~100 gpm charging flow. • ADJUST 1CV182 to obtain 8-10 gpm seal injection flow to each RCP. • SIMULTANEOUSLY OPEN 1CV8149A/B/C and ADJUST 1CV131 to control letdown pressure between 360 and 380 psig (1PI-131) • PLACE 1CV131 in AUTO and verify proper pressure control. • ADJUST ICC-130 to control temperature between 90 and 115 degrees F (1TI-130). • PLACE ICC-130 in AUTO and verify proper temperature control. • PLACE 1CV-121 in AUTO when conditions allow automatic charging control. • VERIFY/PLACE 1PR006 in service.
		NOTE: Once letdown has been restored, initiate EVENT 4.

Comments: _____

Scenario No: 01-1		Event No. 4
Event Description: Failure of ITCV-130A to control temperature / modulates closed.		
Time	Position	Applicant's Actions or Behavior
	CUE	<p>Annunciators: 1-9-E2 LTDWN TEMP HIGH</p> <p>Indications: Letdown Hx Outlet temperature decreasing (1TI-130) ITCV-129 Diverts to VCT</p>
	RO	<p>Announces increasing letdown temperature trend and diagnoses failure of ICC-130A closed.</p> <ul style="list-style-type: none"> o Dispatches operator to locally check valve and reports status to US. • VERIFY High Temperature divert valve diverts letdown flow and reports to US. • Takes manual control of ICC-130 and restores cooling flow. Verifies 1-9-E2 clears. • Determines auto control problem and reports to US. • Restores letdown flow to VCT when directed by US.
	US	<p>Diagnose/Acknowledge failure of ICC-130A closed.</p> <p>Directs use of BwARs.</p> <p>Directs manual control of ICC-130 Controller to re-establish proper letdown cooling flow.</p> <ul style="list-style-type: none"> • Determines auto control problem. o Dispatches operator to locally check valve and reports status to crew. o Contacts Chemistry for Demin Effluent sample. • Re-establish letdown flow to VCT. • Informs SM of status. • Orders WEC to generate AR, CR, and get maintenance involved for repairs.
	BOP	<p>Reviews BwARs</p> <p>Monitors control board indications.</p> <ul style="list-style-type: none"> o Holds/controls Ramp. o Dispatches operator to locally check valve and reports status to US.

Comments: _____

Scenario No: 01-1		Event No. 4
Event Description: Failure of 1TCV-130A to control temperature / modulates closed.		
Time	Position	Applicant's Actions or Behavior
		NOTE: After letdown temperature has been restored, initiate event 5.

Comments: _____

Scenario No: 01-1		Event No. 5
Event Description: 1MS018D, 1D SG PORV Fails OPEN.		
Time	Position	Applicant's Actions or Behavior
	CUE	<p>Indications:</p> <ul style="list-style-type: none"> RCS Tave decreasing Control rods stepping out Reactor Power increasing Reactor power/ turbine power mismatch increasing Red Porv OPEN position indication light lit. LVDT meter indication increasing above 0%.
	BOP	<p>Diagnoses 1D SG PORV OPEN, determines SG pressure is below setpoint (1115 psig) and reports failure to US.</p> <p>Performs actions directed by US:</p> <ul style="list-style-type: none"> • Take MANUAL control at the M/A Station and attempt to reduce demand. • Report MANUAL control has no effect to US. • PLACE EMERGENCY CLOSE switch to CLOSE. <ul style="list-style-type: none"> ○ Report/Acknowledge SG 1D PORV TROUBLE annunciator (1-15-D10) as expected alarm. • REPORT 1D SG PORV CLOSED. <ul style="list-style-type: none"> ○ Dispatch operator to AEER to PORV controller box. ○ Dispatch operator to locally isolate 1MS018D by closing 1MS019D. • Report status to US.
	US	<p>Diagnose/Acknowledge failure of 1D SG PORV OPEN and direct actions:</p> <ul style="list-style-type: none"> ○ Determine SG pressure < PORV setpoint. • Attempt MANUAL Control via M/A station to CLOSE PORV. • PLACE EMERGENCY CLOSE switch to CLOSE. ○ Dispatch operator to isolate PORV by closing 1MS019D. • Inform SM of plant status. • Order WEC to generate AR, CR, and get maintenance involved for repairs. • Refer to Tech Spec 3.7.4. (30 days to restore operability). ○ May refer to Tech Spec 3.6.3. (not applicable, porv is in its isolation positon.)

Comments: _____

Scenario No: 01-1		Event No. 5
Event Description: 1MS018D, 1D SG PORV Fails OPEN.		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Diagnose/Acknowledge failure of 1D SG PORV OPEN.</p> <p>Monitor Reactor and Primary parameters for effects and expected response:</p> <ul style="list-style-type: none"> • Reactor Power • Tave, Delta I and rod motion. • Assist as directed by US. • Investigate BwARs.
		NOTE: After PORV is Closed/Isolated, and Tech Specs actions determined, initiate event 6.

Comments: _____

Scenario No: 01-1		Event No. 7, 8, 9
Event Description: Reactor trip resulting in 1A SG Feed line break inside containment, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow.		
Time	Position	Applicant's Actions or Behavior
	CUE	<p>Annunciators:</p> <p>1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH 1-3-D4 CNMT PRESS HIGH 1-11-E1 CNMT PRESS HIGH SI/RX TRIP 1-15-A/B/C/D4 SG 1A/B/C/D LEVEL LOW 1-15-E4 P-4 FW ISOL</p> <p>Indications:</p> <p>1A and 1B AFW pumps NOT running after Auto Start signals generated. MSIV open position lights lit after MSIV Isolation signals generated. AFW Flow NOT changing when AF flow control/isolation valves control switches manually adjusted.</p>
	US	Enter 1BwEP-0, "REACTOR TRIP OR SAFETY INJECTION" and direct actions.
	RO	<p>Perform actions of 1BwEP-0:</p> <p>VERIFY Reactor Trip:</p> <ul style="list-style-type: none"> • Rod bottom lights Lit. • Reactor Trip and Bypass breakers Open. • Neutron Flux Decreasing. <p>CHECK SI Status:</p> <ul style="list-style-type: none"> • Determine SI is needed (due to unavoidable reaching of HI-1 Cnmt Pressure, and/or Low Steam line Pressure, setpoints) and MANUALLY actuate SI. <p>CHECK ECCS pumps running:</p> <ul style="list-style-type: none"> • Both CV pumps. • Both RH pumps. • Both SI pumps.

Comments: _____

Scenario No: 01-1		Event No. 7, 8, 9
Event Description: Reactor trip resulting in 1A SG Feed line break inside containment, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow.		
Time	Position	Applicant's Actions or Behavior
	BOP	Perform actions of IBwEP-0: VERIFY Turbine Trip: <ul style="list-style-type: none"> All TVs and GVs Closed. VERIFY power to 4 KV ESF buses: <ul style="list-style-type: none"> Bus 141 and 142 energized. VERIFY FW Isolation: <ul style="list-style-type: none"> FW pumps tripped. FW Isolation Monitor Lights Lit. FW pumps discharge valves (1FW002A,B, and C) Closed. VERIFY RCFCs in Accident Mode: <ul style="list-style-type: none"> Determine Group 2 RCFC Accident mode lights are lit. VERIFY CNMT Isolations: <ul style="list-style-type: none"> Phase A, Group 3 Isol Monitor lights lit. Ventilation Group 6 Isol Monitor lights lit.
	BOP CT E-0--F	VERIFY AF SYSTEM: <ul style="list-style-type: none"> Report neither AFW pump auto started. Attempt start of Both AFW pumps. Manually Start 1B AFW pump. Report failure of 1A AFW pump to manually start (after attempt). Report 1B AFW pump was manually started (after attempt). Dispatch operator(s) to check 1A AFW pump and breaker to investigate failure to start. Dispatch operator(s) to check 1B AFW pump to ensure proper operation. 1AF013E-H open (No running pump on Train A). 1AF005E-H throttled. (No running pump on Train A)
	BOP	VERIFY Pumps Running: <ul style="list-style-type: none"> Both CC pumps. Both SX pumps.

Comments: _____

Scenario No: 01-1		Event No. 7, 8, 9
Event Description: Reactor trip resulting in 1A SG Feed line break inside containment, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow.		
Time	Position	Applicant's Actions or Behavior
	RO/BOP/US	DETERMINE Steam line Isolation Required: <ul style="list-style-type: none"> Any SG pressure < 640 psig (or will become < 640 psig). Cmnt pressure approaching 8.2 psig or has exceeded 8.2 psig. Actuate MSIV Isolation (Both switches, and the individual MSIV switches) and verify Bypasses closed. DETERMINE Steamline Isolation has NOT occurred.
	Note	CS will eventually be required due to 4 SGs blowing down inside containment. When pressure exceeds 20 psig, then following step must be performed.
	BOP	CHECK if Containment Spray required: <ul style="list-style-type: none"> CMNT pressure increased to > 20 psig Stop All RCPs. Group 6 CS Monitor lights lit. Group 6 Phase B Isolation Monitor lights lit. CS Eductor Suction Flow > 15 gpm (1FI-CS013 and 1FI-CS014). CS Eductor Additive Flow > 5 gpm (1FI-CS015 and 1FI-CS016).
	BOP	VERIFY Total AFW Flow: <ul style="list-style-type: none"> > 500 gpm. Control feed flow to maintain narrow range SG levels 10% (31% Adverse) to 50%. Verify no SG level is increasing in an uncontrolled manner.
	RO/BOP	VERIFY ECCS Valve Alignment: <ul style="list-style-type: none"> Group 2 Cold Leg Injection lights lit. Reports Exceptions (Common CC pump, and 1A AFW pump)
	RO	VERIFY ECCS Flow: <ul style="list-style-type: none"> High head flow (1FI-917) > 100 gpm. SI pump flow (1FI-918/922) > 200 gpm when RCS pressure < 1700 psig.
	RO	CHECK at Least One PZR PORV Relief Path Available: <ul style="list-style-type: none"> 1RY8000A and B (PORV Isolation Valves) at least one energized and open. 1RY455A and 1RY456 (PZR PORVs) at least one in AUTO with Isolation valve open.

Comments: _____

Scenario No: 01-1		Event No. 7, 8, 9
Event Description: Reactor trip resulting in 1A SG Feed line break inside containment, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow.		
Time	Position	Applicant's Actions or Behavior
	BOP	<p>VERIFY Main Generator Trip:</p> <ul style="list-style-type: none"> • OCB 1-8 and 7-8 Open. • PMG Breaker Open. <p>VERIFY Emergency Diesel Generators Running:</p> <ul style="list-style-type: none"> • Both EDGs running. • SX Cooling valves (1SX169A and 1SX169B) both open. • Dispatch Operator(s) to locally check EDG operation. <p>VERIFY Ventilation Alignments:</p> <ul style="list-style-type: none"> • Control Room: <ul style="list-style-type: none"> • Outside air intake (Grid 2, 31-34J) < high alarm setpoint. • Operating VC train Supply, Return and Make-up Fan running. • Chilled Water pump and Chiller running. • M/U Fan outlet damper not fully closed. • M/U Filter light lit. • VC Charcoal Absorber on-line (Bypass damper closed, inlet and outlet dampers open). • Control Room DP > 0.125 " H2O (0PDI-VC038). • Aux Bldg: <ul style="list-style-type: none"> • Inaccessible Filter Plenums (Only 2 Plenums with Charcoal Filter Units on line) • Fuel Handling Bldg: <ul style="list-style-type: none"> • FHB Charcoal Absorbers (Only One train aligned). • Fan running (0VA04CA or 0VA04CB). • Inlet Isolation Damper Open. • Flow Control Damper Open. • Bypass Isolation Damper Closed.
	RO	<p>CHECK PZR PORVs and Spray valves:</p> <ul style="list-style-type: none"> • Normal Spray valves (1RY455B and 1RY455C) Closed. • PZR PORVs (1RY455A and 1RY456) Closed.

Comments: _____

Scenario No: 01-1		Event No. 7, 8, 9
Event Description: Reactor trip resulting in 1A SG Feed line break inside containment, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow.		
Time	Position	Applicant's Actions or Behavior
	RO	Maintain RCS Temperature Control: <ul style="list-style-type: none"> o With any RCP running, RCS Tave stable at or trending to 557 degrees F. o With No RCP running, RCS Cold Leg temperature stable at or trending to 557 degrees F.
	Note	RCS temperature will eventually decrease below 557, and the following step must be performed.
	BOP	If temperature is < 557 and decreasing, then perform the following: <ul style="list-style-type: none"> • Stop dumping steam. • Maintain total feed flow < 500 gpm until at least 1 SG is < 10 % (31% Adverse). • Verify the following valves closed: <ul style="list-style-type: none"> • Steam Dump valves. • MS RHTR Shutoff valves (1MS009A-D). • MS RHTR S/U Purge Control Valves (1MS067A-D). • MFP turbine HP Stop valves.
	Note	Containment pressure may have reached the spray initiation point, and the RCPs could be already stopped. If so, the diagnostic for a faulted SG will be performed and not all of the following step will be necessary.
	RO	CHECK Status of RCPs: <ul style="list-style-type: none"> • Determine if RCPS are running. • Check if RCPS should be stopped: <ul style="list-style-type: none"> • ECCS flow- high head > 100 gpm; or SI pump > 200 gpm. • RCS pressure < 1425 psig. • Controlled cooldown NOT in progress, nor previously initiated. <p>If yes to all of the above, Stop All RCPs.</p>
	BOP	Determine faulted SG(s) exist: <ul style="list-style-type: none"> • Any SG pressure decreasing uncontrollably. • Any SG completely depressurized.

Comments: _____

Scenario No: 01-1		Event No. 7, 8, 9
Event Description: Reactor trip resulting in 1A SG Feed line break inside containment, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow.		
Time	Position	Applicant's Actions or Behavior
	US	<p>Diagnose Faulted SG, and transition to 1BwEP-2, FAULTED STEAM GENERATOR ISOLATION:</p> <ul style="list-style-type: none"> Announce transition to 1BwEP-2, get acknowledgements from RO and BOP. Inform SM of plant status, evaluate for GSEP. Request STA report to control room for Status Tree Monitoring. (See Examiner's Note this page) <p>Enter 1BwEP-2 and direct actions.</p> <p>Review Cautions and Note in 1BwEP-2.</p>
	BOP	<p>CHECK Main Steam Isolation:</p> <ul style="list-style-type: none"> Report all attempts to close MSIVs have been unsuccessful so far.
	US	<p>Determine All Steam Generators are Faulted:</p> <ul style="list-style-type: none"> Check pressures in all SGs, and determine NONE are stable or increasing. Announce Transition to 1BwCA-2.1 UNCONTROLLED DEPRESSURIZATION OF ALL SGs, and get acknowledgements from RO and BOP. Inform SM of plant status, evaluate for GSEP. <p>Enter 1BwCA-2.1 and direct actions.</p> <p>Review Note in 1BwCA-2.1.</p>
	BOP	<p>CHECK Secondary Pressure boundary:</p> <ul style="list-style-type: none"> Request engineering assistance to close MSIVs. Verify MSIV Bypass valves all closed (1MS101A-D). Check all SG PORVs Closed (1MS018A-D) Check FW Isolated to all SGs (FWI Monitor lights lit). Check SG Blowdown Isolation (1SD002A-H) and Sample Valves (1SD005A-D) all closed.
		<p>Examiner's Note: The STA (role played by an instructor) will monitor Status Trees when requested by the US/Crew. The challenge to Containment will be identified by the STA and he will make the recommendation to transition to and implement 1BwFR-Z.1, "Response to Containment High Pressure" when containment pressure exceeds 20 psig, even if spray is already operating. Refer to page 28 for the evaluation of the crew when in 1BwFR-Z.1.</p>

Comments: _____

Scenario No: 01-1		Event No. 7, 8, 9
Event Description: Reactor trip resulting in 1A SG Feed line break inside containment, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow.		
Time	Position	Applicant's Actions or Behavior
	BOP/RO CT CA-2.1— A.	Control Feed Flow to Minimize RCS Cooldown: <ul style="list-style-type: none"> • Determine cooldown rate in all RCS cold legs > 100 degrees F in any one hr. • Decrease feed flow to 45 gpm to each steam generator. • Report no control over feed flow to 1A Steam Generator. • Set 1AF005E flow controller to 0%. • Dispatch operator to locally close 1AF005E. • Check Hot leg temperatures stable or decreasing.
	RO/BOP	Check Status of RCPs (Stopped due to CS Actuation). Monitor AF Suction Pressure: <ul style="list-style-type: none"> • 1-3-E7 AF PUMP SX SUCT VLVS ARMED not lit.
	RO	CHECK PZR PORVs and Isolation valves: <ul style="list-style-type: none"> • 1RY8000A and 1RY8000B energized and open. • 1RY455A and 1RY456 closed.
	BOP/US	Determine no SGTRs: <ul style="list-style-type: none"> • Reset Phase A Isolation. • Request Chemistry sample all SGs. • Check Secondary Radiation trends normal for plant conditions: <ul style="list-style-type: none"> • SJAE/GS Exhaust. • SG Blowdown Liquid. • MS Line Rads.
	CREW	Determine RH pumps can be stopped: <ul style="list-style-type: none"> • Both RH pumps running with suction aligned to the RWST. • RCS pressure stable or increasing and > 325 psig. • Reset SI, and verify SI Actuated Light NOT Lit, and the AUTO SI BLOCKED Light Lit. • Stop RH pumps and place in standby.

Comments: _____

Scenario No: 01-1		Event No. 7, 8, 9
Event Description: Reactor trip resulting in 1A SG Feed line break inside containment, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow.		
Time	Position	Applicant's Actions or Behavior
		Note: If CS is stopped in the next step, Containment pressure must be monitored for CS restart conditions (≥ 20 psig). Crew may elect to allow CS to continue running to reduce Cnmt pressure much lower than 15 psig before stopping CS based on remaining water inventory in the faulted SGs and RCS temperature.
	BOP/US	Check if CS can be stopped: <ul style="list-style-type: none"> • Both CS pumps are running. • Reset CS signal. • Even if Spray additive tank low 2 lights are NOT lit, Close 1CS019A and 1CS019B (per Caution prior to step 8, 1BwCA-2.1). • Check Cnmt pressure < 15 psig. • If cnmmt pressure < 15 psig, stop both CS pumps. • If CS pumps stopped, Verify/Close 1CS019A and 1CS019B, and 1CS007A and 1CS007B.
		Examiner's Note: The Crew will transition to and perform 1BwEP ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, only when RWST level reaches the LO-2 setpoint. If and when that occurs, see page 30 for the evaluation.
	BOP/US	Check RWST > 46%.
	RO/US	Determine RCS pressure > 125 psig. Do NOT isolate SI Accumulators.
	CREW	Determines ECCS Flow may be reduced: <ul style="list-style-type: none"> • RCS Subcooling Acceptable by ICONIC or Calculation. • RCS Pressure Stable or Increasing. • PZR Level > 12% (28% Adverse).
	RO/US	Determine SI already RESET (to stop RH pumps earlier)

Comments: _____

Scenario No: 01-1		Event No. 7, 8, 9
Event Description: Reactor trip resulting in 1A SG Feed line break inside containment, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow.		
Time	Position	Applicant's Actions or Behavior
		Note: The following is to be used whenever the crew implements 1BwFR-Z.1, "Response to High Containment Pressure".
	US	Enters 1BwFR-Z.1 and directs actions: <ul style="list-style-type: none"> • Announces procedure transition and gets acknowledgements from RO/BOP. • Informs SM of plant status and requests GSEP evaluation.
	RO/BOP	Performs actions of 1BwFR-Z.1 as directed: <ul style="list-style-type: none"> • Verify Cnmt Isolation Phase A- Group 3 Cnmt Isol monitor lights Lit. • Verify Cnmt Ventilation Isolation- Group 6 Cnmt Vent Isol monitor lights Lit. • Determines CS is required (Cnmt pressure has increased to > 20 psig). • Stops all RCPs if NOT previously stopped.

Comments: _____

Scenario No: 01-1		Event No. 7, 8, 9
Event Description: Reactor trip resulting in 1A SG Feed line break inside containment, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow.		
Time	Position	Applicant's Actions or Behavior
	BOP:	<p>Performs actions of 1BwFR-Z.1 as directed:</p> <ul style="list-style-type: none"> • Verifies proper CS system alignment: <ul style="list-style-type: none"> • CS suction valves open (1CS001A\ 1CS009A, or 1CS001B\ 1CS009B). • CS pump header isolation valves open (1CS007A and 1CS007B). • CS eductor spray additive valves open (1CS019A and 1CS019B). • CS eductor inlet flow control valves open (1CS010A and 1CS010B). • CS pumps running. • Group 6 Phase B lights Lit. • CS eductor suction flow > 15 gpm (1FI-CS013\ 1FI-CS-14). • CS eductor additive flow > 5 gpm (1FI-CS015\ 1FI-CS016). • Reset CS signal. • Checks Spray additive tank LO-2 lights, then closes 1CS019A and 1CS019B even if NOT lit per Caution prior to Step 3, 1BwFR-Z.1 (Secondary Break only). • Verify RCFCs running in Accident Mode- Group 2 RCFC Accident Mode status lights lit. • Determines MS Isolation necessary and Manually actuates MSIV isolation and verifies MS B\ P valves Closed. Reports all MSIVs still open.
	BOP CT: CA-2.1— A.	<p>Determines all SGs are faulted and controls AF Flow:</p> <ul style="list-style-type: none"> • Any SG pressure decreasing uncontrollably or completely depressurized. • Controls AFW flow to 1B, 1C, and 1D SG at 45 gpm per SG by throttling 1AF005F, G, and H; or 1AF013F, G, and H. • Attempts Control of AFW to 1A SG via 1AF005E, and 1AF013E and reports no control available. • Sets potentiometer for 1AF005E to 0%. • Dispatches operator to locally throttle 1AF005E. • Checks FW isolated to all SGs – all FW Isolation Monitor Lights Lit.
	US	<p>Returns to step and procedure in effect:</p> <ul style="list-style-type: none"> • Announces procedure transition and gets acknowledgements for RO and BOP. • Informs SM of Status.

Comments: _____

Scenario No: 01-1		Event No. 7, 8, 9
Event Description: Reactor trip resulting in 1A SG Feed line break inside containment, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow.		
Time	Position	Applicant's Actions or Behavior
		Examiner's Note: Use the following to evaluate the performance of 1BwEP ES-1.3 TRANSFER TO COLD LEG RECIRCULATION, if and when the crew enters it.
	US	Enter and Direct actions of 1BwEP ES-1.3, Transfer to Cold Leg Recirculation: <ul style="list-style-type: none"> Announce transition and get acknowledgements from RO and BOP. Inform SM of status and to evaluate for GSEP. Suspend performance of any BwFRs until after completing step 6 of 1BwEP ES-1.3.
	BOP	Perform actions of 1BwEP ES-1.3 as directed: <ul style="list-style-type: none"> Establish CC flow to RH HX – Open 1CC9412A and 1CC9412B, ensure flow > 5000 gpm (1FI-0688/9) Check adequate Cnmt Sump level - \geq 8 inches (13 inches adverse) 1LI-PC006/007. Verify/Start RH pumps running (may have been stopped earlier). Check Cnmt Sump Isolation Valves open – 1SI8811A and 1SI8811B. Close RH pump suction from RWST – 1SI8812A and 1SI8812B. Check SI or CV pumps running in ECCS injection mode – SI pumps running, or 1SI8801A/B Open. (if not due to previous actions, then only CS pump suction must be swapped to Sump.)
	BOP/RO	Align SI and CV for Cold Leg Recirc: <ul style="list-style-type: none"> Stop SI pumps if RCS pressure > shutoff head. Dispatch operator to energize 1SI8813 and 1SI8806. Verify 1A CV pump miniflow isolation valves closed – 1CV8111 and 1CV8114. Verify 1B CV pump miniflow isolation valves closed – 1CV8110 and 1CV8116. Close SI pump miniflow isolation valves – 1SI8814, 1SI8920, and 1SI8813. Close RH HX discharge crosstie valves – 1RH8716A and 1RH8716B. Open SI and CV pump suction header crosstie valves – 1SI9907A, 1SI8807B and 1SI8924. Check RH pumps 1A and 1B running. Open RH to CV pumps isolation valve (1CV8804A) and RH to SI pumps isolation valve (1SI8804B). Start ECCS pumps as necessary (SI and CV)
	US	Implement BwFRs as necessary.

Comments: _____

Scenario No: 01-1		Event No. 7, 8, 9
Event Description: Reactor trip resulting in 1A SG Feed line break inside containment, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow.		
Time	Position	Applicant's Actions or Behavior
	RO/BOP	<p>Complete actions of 1BwEP ES-1.3 as directed:</p> <ul style="list-style-type: none"> • Reset SI, Verify SI Actuated Light OUT, and AUTO SI Blocked light Lit. • Isolate RWST for CV and SI pumps: <ul style="list-style-type: none"> • Check either/ both 1CV8804A and 1SI8804B open. • Close SI pump suction from RWST – 1SI8806. • Close RWST to CV pump suction valves – 1CV112D and 1CV112E, and dispatch operator to de-energize. • When RWST LO-3 lights lit: <ul style="list-style-type: none"> • Open CS pump sump suction valves - 1CS009A and 1CS009B. • Close CS pump RWST suction valves – 1CS001A and 1CS001B. • Verify both CS pumps running. • Align CC for Post LOCA recovery: <ul style="list-style-type: none"> • Open CC HX 0 Outlet valve – 0SX146. • Open CC HX 0 Inlet valve – 1SX005. • Dispatch operator to adjust 0/1SX007 valves to maintain CC HX outlet < 105 degrees F and SX pump motor amps < 191 amps. • Initiate alignment of CC for Post LOCA Recovery per BwOP CC-14, POST LOCA ALIGNMENT OF THE CC SYSTEM.
	US	Return to procedure and step in effect.

Comments: _____

Simulation Facility Braidwood Scenario No.: 01-2 Operating Test No.: 1

Examiners: _____ Applicant: _____ SRO

_____ RO

_____ BOP

Initial Conditions: IC-22, 100% Power, Steady state, MOC.

Turnover: 1A MFP is unavailable due to breaker cubicle work. MESACs were completed for 1D SGWLC instrumentation last shift. Ramp down to 90% power in preparation for TV-GV Surveillance due next shift.

Event No.	Malf. No.	Event Type*	Event Description
Preload	FW01 ED06H RP01 RP02A and B TC03 Override: ZDI1HSTG010, NORM RF RP 34 and 35 OUT RF RP60 and 61 OUT FW44	C BOP C BOP C RO C BOP C BOP C BOP	MFP 1A fails to start/ OOS. 6.9KV Breaker 1591 fails to ABT. Reactor fails to auto Trip/ATWS Reactor Trip breakers fail to open from control room/ATWS Turbine fails to Auto Trip Turbine fails to Manually Trip. MSIVs fail to Isolate on Auto Isolation signal. 1B AFW pump fails to start.
1		R RO SRO N BOP	Lower Reactor power with boration and control rods. Ramp down turbine power from 100% to 90%.
2	RX18B, 590, 1 min ramp	I RO SRO	RCS Loop 1B Tcold RTD fails to mid-span over 1 minute.
3	RF RP38 IN FW43 (Trigger)	C BOP SRO	Inadvertent Auto start of 1A AFW pump. 1A AFW pump fails to start after C/S taken to Pull Out.
4	RX05, 0, 5 min ramp	I BOP SRO	Main steam Header Pressure Controller (1PT-507) fails low over 5 minutes.
5	CV08, 0	C RO SRO	Letdown Pressure Control valve (1PT-131) fails closed.
6	ED05D RP09A	M BOP RO SRO	SAT feed breaker to bus 159 trips opens, no ABT. Loss of RCS flow (Loop 1D) ATWS and turbine fails to trip. Inadvertent FWI. Loss of Heat Sink.
7	RD09, 8 RF ED073B OPEN (Trigger)	C RO C RO SRO	Auto rod speed failure to 8 spm. Manual rod control available. Emergency boration valve stuck closed.
8	RF RP 34 and 35 Out RF RP 60 and 61 Out	C RO BOP	MSIVs fail to Auto Isolate, may be manually closed.

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

SCENARIO 01-2 OVERVIEW

The scenario begins with the plant at 100% power and a ramp down to 90% in preparation for the TV-GV surveillance due next shift. The turnover includes information that 1A MFP is unavailable due to breaker cubicle work, and MESACs were completed for 1D SGWLC instrumentation on the previous shift.

After clearly observable plant response to the requested reactivity change, the Tcold RTD on Loop 1B will drift high causing inward rod motion. The RO will diagnose the instrument failure and place rod control in manual. The power change may be suspended. The SRO will enter 1BwOA INST-2 Attachment A, "OPERATION WITH A FAILED INSTRUMENT CHANNEL -- RCS NARROW RANGE RTD CHANNEL FAILURE", and direct crew actions to defeat the failed channel, restore Tave and automatic rod control, investigate Tech Specs, and trip bistables. LCO 3.3.1 condition E will apply. Maintenance will investigate as requested. When the recovery is complete, the load ramp will recommence if previously suspended.

After the bistables are tripped for the failed RTD, an inadvertent automatic start of the 1A AFW pump will occur due to a slave relay actuation. The addition of colder feedwater to the SGs will cause Tave to decrease and outward rod motion to occur. The BOP will respond by referencing the annunciator response procedures. When the control switch for the 1A AFW pump is placed in PULL OUT to stop the unwanted addition of AFW, the pump will no longer start for the remainder of the scenario. (This failure to start may not be discovered until the major transient.) The SRO will investigate Tech Specs for AFW. LCO 3.7.5 will apply. Maintenance will investigate as requested.

Shortly after the inadvertent start of the 1A AFW pump, the main steam header pressure controller will slowly fail low. This will cause the main feed pumps to slow down, the feed regulating valves to open, and a decrease in all SG water levels. The BOP will diagnose the failure, place main feed pump speed control in manual and increase feed pump speed to restore SG levels and main feed header pressure to the program value. The steam dump controller will no longer respond correctly in the steam pressure mode of operations, but this is inconsequential at power.

After SG levels are stable, the letdown pressure control valve will fail closed causing the letdown relief valve to lift to the PRT. There will be no manual control available and the indication will be that the valve is trying to control letdown pressure at 600 psig. The RO will diagnose this from high letdown pressure and manually isolate letdown. The pressure control valve will be locally isolated and bypassed and letdown flow restored. Excess letdown may be placed on line.

After letdown restoration, breaker 1592 trips causing a loss of 6.9KV Bus 159. No ABT to the UAT will occur, resulting in a loss of the 1D RCP. The Reactor Protection System will sense the loss of RCS flow and generate a reactor trip (OPDT) signal. The Reactor will fail to trip (ATWS), requiring manual rod insertion due to auto rod speed failed at 8 steps per minute, and emergency boration. The Turbine will fail to trip, necessitating a manual runback of the turbine. The voltage transient will cause feedwater to isolate. The delay in getting the turbine tripped and the loss of feed will most likely result in the generation of Safety Injection and MSIV Isolation signals. The MSIVs will NOT automatically close, but can be manually closed. The SRO will implement 1BwFR S.1, "RESPONSE TO NUCLEAR POWER GENERATION/ ATWS", and the crew will perform Immediate Actions. The 1A AFW pump will NOT start if taken out of PULL OUT. The 1B AFW pump will fail to start. The emergency boration valve will be stuck closed, necessitating

Comments: _____

an alternate emergency boration source and flow path. The reactor will trip when the steam dumps are taken to off.

A transition from the ATWS procedure to 1BwFR H.1, "LOSS OF SECONDARY HEAT SINK," will be made if the SRO has directed the STA to monitor Critical Safety Function Status Trees and narrow range steam generator levels are all less than 10%. Otherwise, the SRO will transition to 1BwEP-0, "REACTOR TRIP OR SAFETY INJECTION", and diagnose the need to transition the 1BwFR H.1 when AFW flow is unable to be verified.

Upon entering 1BwFR H.1, the loss of SG water levels will require the initiation of Bleed and Feed. The SRO will direct tripping of all RCPs and the initiation of Bleed and Feed. After Bleed and Feed is initiated, the SRO will direct attempts to restore feed flow. Main feed and AFW are not available. When Condensate flow is established, the scenario ends.

Critical Tasks

- FR-S.1—A: Isolate main steam from the main turbine before exceeding 3107 psig RCS pressure.
- FR-S.1—C Insert negative reactivity into the core by inserting control rods and/or emergency boration.
- FR-H.1—B Initiate RCS Bleed and Feed before PZR PORVS remain open due to loss of secondary heat sink.

Comments: _____

SIMULATOR OPERATOR NOTES

Simulator Setup:

Init IC-22, 100% power, MOC, Xenon equilibrium, steady state.

Align switches, perform "Ready for Training" checklist.

Insert PRELOAD Events:

Take 1A MFP CS to Pull Out and hang tag. IMF FW01 (1A MFP fails to start)

IMF ED06H 6.9 Breaker 1591 fails to Auto Bus Transfer.

IMF RP01 Reactor fails to Auto Trip.

IMF RO02A and RP02B Reactor Trip breakers fail to open from Control Room/ATWS.

IMF TC03 Turbine fails to auto trip.

IMF FW 44 1B AFW pump fails to start.

IOR ZDIIHSTG010 NORM Turbine fails to manually trip.

MRF RP34 and RP35 OUT MSIVs fail to isolate on auto isolation signal.

MRF RP60 and RP61 OUT MSIVs fail to isolate on auto isolation signal.

Event 1: Ramp down to 90% (1134Mwe).

As SM acknowledge ramp.

As Elec Ops acknowledge ramp.

Event 2 RCS Loop 1B Tcold RTD fails to mid span (590 degrees F), over 1 minute.

SDG: RX2

Malf: RX18B, 590, 1 minute ramp.

Initiate event after clearly observing reactivity change/response of plant from requested power ramp or upon lead examiner cue.

Role play as U-2 admin and/or extra NSO to accomplish bistable tripping. Acknowledge all info passed to the SM, WEC, and maintenance.

SDG: RX4 and RX2

Cabinet door #2 Open

RF RX21 OPEN

OPDT Trip TB421G C2-124 BS-1

RF RX018 TRIP

OPDT Runback TB421H C2-124 BS-2

RF RX138 TRIP

OTDT Trip TB421C C2-124 BS-3

RF RX017 TRIP

OTDT Runback TB421D C2-124 BS-4

RF RX137 TRIP

Low Tave TB422G C2-121 BS-2

RF RX020 TRIP

Lo-Lo Tave TB422D C2-121 BS-1

RF RX019 TRIP

Cabinet door #2 Close

RF RX21 CLOSE

Comments: _____

Event 3 Inadvertent start of 1A AFW pump.

SDG: RP14
MRF RP38 IN

Initiate inadvertent start of 1A AFW pump after tech specs are investigated for the failed RTD in event 2, or at the lead examiners cue.

If dispatched to locally turn off the aux oil pump, use OVERRIDE, to override the 1A AFW pump Aux Lube Oil pump light OFF. IOR ZLO1AF01PAA OFF.

INSERT Malf FW43 to prevent any further starts of the 1A AFW pump. Use Trigger: When ZDI1AF01PA(5) == 1, then IMF FW43.

If sent to locally investigate, the pump looks normal, and there are no abnormal indications at the breaker. If sent to the slave relay, report it is IN. (K633)

Acknowledge all info passed to the SM, WEC, and maintenance.

Event 4 Main Steam Header Pressure Controller (1PT-507) fail low over 5 minutes.

SDG: RX22
Malf: RX05, 0, 5 minutes

Initiate malfunction after tech specs are investigated for the inoperable 1A AFW pump, or at the lead examiners cue.

Acknowledge all info passed to the SM, WEC, and maintenance.

Event 5 Letdown pressure control valve (1PT-131) fails closed.

SDG: CV2
Malf: CV08, 0. As valve fails, in order to simulate no auto control, also use RF CV01 CLOSE to close the Isolation valve (1CV8408A).

Initiate malfunction after the feed flows and feed pump speeds are stabilized in manual, or at the lead examiners cue.

Acknowledge all info passed to the SM, WEC, and maintenance.

If dispatched to locally isolate and bypass the valve use the following:

SDG: CV2
Isolate: RF CV01 CLOSE CV8408A (and CV8408B is not modelled).
Bypass: RFCV02 OPEN CV8409

Events 6 and 7 are run together.

Event 6 Loss of Bus 159 and Spurious feedwater isolation.

SDG: ED2A
Malf: ED05D
Malf: RP09A

Comments: _____

Initiate Major Accident sequence after the letdown pressure control valve is bypassed, or at the lead examiners cue.
Set up trigger to cause the FWI when the 1592 breaker fails:
When YP:MED05D==1, then IMF RP09A.

Event 7 Auto Rod Speed Fails to 8 spm.

Ensure the trigger to activate the auto rods speed failure at 8 steps per minute malfunction occurs at the time of the loss of bus 159.

When YP:MED05D ==1, then IMF RD09, 8.

Ensure the trigger to de-energize 1CV8104 (Bus 132X5:B1) occurs when bus 159 is lost.

When YP:MED05D == 1, then MRF ED073B OPEN

Acknowledge the call to locally trip the reactor, but do NOT trip the reactor until the steam dumps are taken to OFF.

If asked to locally trip the turbine at the pedestal, wait until after the steam dumps are taken to OFF, then use RF TC03 TRIP on SDG TC1.

Trigger: When ZDI1HSBYPA(1) == 1, then DMF RP01.

Trigger: When ZDI1HSBYPB(1) == 1, the DMF RP02A and RP02B.

Acknowledge the call for the STA to monitor Status Trees. Pay particular attention to Heat Sink (after ATWS). The intent is to get to H.1 and Bleed and Feed..

Acknowledge all info passed to the SM, WEC, and maintenance.

If directed to remove the FWI aux relay fuses, use the following:

RF FW150 REMOVE

RF FW151 REMOVE

RF RP78 REMOVE

RF RP79 REMOVE

Report fuses removed when complete.

Comments: _____

Scenario No: 01-2		Event No. 1
Event Description: Ramp down Turbine and reactor power to 90% (1120 Mwe).		
Time	Position	Applicant's Actions or Behavior
	CUE	Turnover information identifies upcoming TV-GV Surveillance requiring power reduction.
	US	Implement actions of 1BwGP 100-4, Rev. 15 step 1, Power Descension.
	US	Direct load reduction to 1120 Mwe at desired rate (5 MW/minute). <ul style="list-style-type: none"> • Initiate Load Swing Instruction sheet, 1BwGP 100-4T2, and Boration Dilution Boundary Calculation (~100 gals). o Contact Chemistry and HP for load change. • Inform SM of plant status, and Elec Ops of ramp.
	CREW	Review applicable Precautions, Limitations and Actions.

Comments: _____

Scenario No: 01-2		Event No. 1
Event Description: Ramp down Turbine and reactor power to 90% (1120 Mwe).		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Verify rod position and boron concentration.</p> <p>Initiate boration, if required. (BwOP CV-6, Rev. 13.)</p> <ul style="list-style-type: none"> • Determine required boric acid volume by: <ul style="list-style-type: none"> ○ Effects of previously performed borations. ○ Braidwood Boration Dilution Tables. • Determine required boric acid flow rate. • Set 1FK-110 BA Flow Cont to desired boration rate. • Set 1FY-0110 BA BlenderPreset Counter to desired volume. • Place MAKE-UP MODE CONT SWITCH to STOP position. • Set MU MODE SELECT to BOR position. • Place MAKE-UP MODE CONT Switch to START. • Verify proper operation of valves and BA transfer pump (CV110B open, BA pump is running, CV110A throttles opens, BA flow on recorder. <p>OR</p> <p>Batch addition:</p> <ul style="list-style-type: none"> • Open CV110B. • Open CV110A. • Start BA Transfer pump. • When desired amount of BA added, stop BA Transfer pump. • Close CV110A. ○ Flush BA line. • Close CV110B.
	BOP	<p>Initiate turbine load reduction:</p> <ul style="list-style-type: none"> • Depress LOAD RATE MW/MIN. • Enter desired value for rate – 5MW/min. • Depress REF. • Enter power level 1120 MW. • When ready to begin, depress GO. <p>• Verify load decreases.</p>

Comments: _____

Scenario No: 01-2		Event No. 1
Event Description: Ramp down Turbine and reactor power to 90% (1120 Mwe).		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Monitor power decrease:</p> <ul style="list-style-type: none"> • Monitor reactor power, Tave, ΔI. • Verify rods move in AUTO to maintain Tave within ± 1 degree F of Tref. <p>If borating:</p> <ul style="list-style-type: none"> • Monitor VCT level. • Verify RCS boron concentration increasing. • Monitor BA Blender counter. • Verify boration auto stops at preset value. ○ Flush the BA line if desired. • Return Reactor Makeup System to blended flow at current blended flow. • If required to equalize boron concentration between the PZR and the loops, open PZR sprays by placing B/U HTR GRPS A/B/D Contactor Control Switch to the on position
		Note: Following clearly observable plant response from the reactivity changes, Event 2 is entered.

Comments: _____

Scenario No: 01-2		Event No. 2
Event Description: RCS Loop 1B Tcold RTD fails to mid-span over 1 minute.		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: 1-14-B5 LOOP 1B DT DEV LOW 1-14-A/C/D3 LOOP 1A/C/D TAVE DEV LOW 1-14-D1 TAVE CONT DEV HIGH 1-14-E2 AUCTION TAVE HIGH Indications: Rod Motion Inward Loop 1B Tave Meter higher than normal.
	RO/US	Identify/report failed RTD input/Tave Channel • Diagnose Loop 1B NR Tcold RTD Failure.
	US	Implement 1BwOA INST-2, "OPERATION WITH A FAILED CHANNEL", ATTACHMENT A, "RCS NARROW RANGE RTD CHANNEL FAILURE", and direct actions. • Get acknowledgements of procedure entry from RO and BOP. • Inform SM of status and to evaluate for GSEP. • Direct WEC to write AR, CR, and get maintenance involved.
	RO/US	Perform actions as directed: • Place Rod Bank select Switch to Manual • Manually defeat failed RTD channel: • Select Loop B on Tave Defeat switch • Select Loop B on DT defeat switch • Ensure Loop B is NOT selected on DT recorder • Check Tave stable and within 1 degree F of Tref. • If NOT, o Adjust Rods. o Adjust turbine load. o Adjust Boron. • When Tave and Tref stable and within 1 degree F, place Rod control in Automatic. • Check PZR Level normal and stable • If NOT, manually restore to program level.

Comments: _____

Scenario No: 01-2		Event No. 2	
Event Description: RCS Loop 1B Tcold RTD fails to mid-span over 1 minute.			
Time	Position	Applicant's Actions or Behavior	
	RO/BOP	Coordinate tripping of bistables: <ul style="list-style-type: none"> • OPDT Trip TB431G C3-124 BS-1 • OPDT Runback TB431H C3-124 BS-2 • OTDT Trip TB431C C3-124 BS-3 • OTDT Runback TB431D C3-124 BS-4 • LOW TAVE TB432G C3-121 BS-2 • LO-LO TAVE TB432D C3-121 BS-1 	Expected Alarms: <ul style="list-style-type: none"> 14-A-1 10-A-5 14-B-1 10-C-5 14-B-3 14-C-1
	US/RO	Check P-12 Status (Bypass Permissive Panel 4.5): <ul style="list-style-type: none"> o Tave > 550, P-12 NOT LIT. o Tave < 550, P-12 LIT. 	
	US	Refer to Tech Specs: <ul style="list-style-type: none"> • 3.3.1 (6 hrs to trip bistables) FU 6 and 7, condition E. • 3.3.2 N/A, meets required # of operable channels. 	
	BOP	Assist RO/US as directed: <ul style="list-style-type: none"> o Adjust turbine load or ramp o Monitor FW and Reactor panels as directed. o Coordinate tripping of Bistables. o Review BwARs. 	
Note: Following Tech Spec determination, initiate Event 3.			

Comments: _____

Scenario No: 01-2		Event No. 3
Event Description: Inadvertent Automatic Start of 1A AFW pump.		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-3-B6 AF PUMP AUTO START 1-3-B7 AF PUMP DISCH FLOW HIGH Indications: Run/Flow indication from 1A AFW pump. Decreasing Tave, and Feed Reg Valve Position Demand. Increasing Reactor Power.
	BOP/US	Diagnose an automatic spurious start of 1A AFW pump and announce/report to crew.
	BOP	Refer to BwARs for actions: 1-3-B6 AF PUMP AUTO START Rev. 7E1.
	US	Direct BOP to shutdown 1A AFW pump.
	BOP	Shutdown 1A AFW pump: o Attempt Shutdown by taking control switch to Trip. • Take control switch to PULL OUT.
	US	Investigate cause of auto start: • Dispatch NSO to check Slave relay cabinet. • Dispatch operator to locally check pump and breaker. • Declare 1A AFW pump inoperable and apply Tech Spec 3.7.5. • Report status to SM, and direct WEC to write AR, CR, and get maintenance involved.
	RO	Assist as directed by US/RO: • Monitor Reactor Power and primary parameters. • Monitor SG levels. • Refer to BwARs.
NOTE: After Tech Specs are investigated, initiate EVENT 4.		

Comments: _____

Scenario No: 01-2		Event No. 4
Event Description: Main Steam Header Pressure Controller (IPT-507) Fails low over 5 minutes.		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: 1-18-B7 MSR SHELL DRAIN TANK LEVEL HIGH LOW 1-18-A7 MSR SHELL DRAIN TANK EMER DRAIN VALVE OPEN 1-15-A/B/C/D4 SG 1A/B/C/D FLOW MISMATCH FW FLOW LOW 1-15-A/B/C/D9 SG 1A/B/C/D LEVEL DEVIATION HIGH LOW Indications: Feed flow indication decreasing Feed Pumps Speed Decreasing SG levels decreasing Feed Reg Valves Position Demand Increasing IPI-507 Decreasing
	BOP/US	Diagnose/Report decreasing feed pump speed and SG levels as a result of IPT-507 failing low.
	RO	Monitor Reactor power and primary parameters. Refer to BwARs as directed by US. Assist BOP as directed/necessary.
	US	Direct actions stabilize the plant and restore normal feedwater conditions: <ul style="list-style-type: none"> Place Master feed pump speed control in Manual and Increase feed pumps speed to increase feed flow. Direct flagging of Master Feed pump speed controller, IPI-507, and Steam Dumps Steam Pressure. Review effect of failure with crew with regard to Steam Dumps. Inform SM of plant status, and direct WEC to write AR, CR, and get maintenance involved. Acknowledges DNB Tech spec if Pzr Pressure < 2209 psig.
	BOP	Perform actions as directed by US: <ul style="list-style-type: none"> Place Master feed pump speed control in Manual and Increase feed pumps speed to increase feed flow. Control feed flow to recover SG levels in a controlled manner without over cooling the RCS. Stabilize feed flow/ pump speed to maintain SG levels at ~60%.

Comments: _____

Scenario No: 01-2		Event No. 4
Event Description: Main Steam Header Pressure Controller (1PT-507) Fails low over 5 minutes.		
Time	Position	Applicant's Actions or Behavior
NOTE: After crew stabilizes SG levels, initiate event 5.		

Comments: _____

Scenario No: 01-2		Event No. 5
Event Description: Letdown Pressure Control Valve 1PT-131 fails closed.		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: 8-B-5 LTDWN HX OUTLT PRESS HIGH Indicators: 1PI-131 @ 0 psig. Letdown flow cycling Letdown Pressure cycling
	RO/US	Diagnose failure of 1CV-131 closed, and report/announce to crew. Refer to BwARs.
	US	Direct actions of RO/BOP. Inform SM of plant status. Direct WEC to generate AR, CR, and get maintenance involved.
	RO/BOP	Perform actions as directed by US: <ul style="list-style-type: none"> • Attempt manual control to open 1CV-131, report no success. • Isolate Letdown – Close 1CV8149A,B,C; Close 1CV459 and/or 1CV460. • Reduce Charging flow- throttle 1CV182 to maintain 8-13 gpm seal injection per RCP. • Isolate Charging – Close 1CV8105 and/or 1CV8106. • Dispatch operator to locally check 1CV-131. • Determine 1CV-131 must be isolated, and direct isolation –close 1CV8408A and/or 1CV8408B.
		Note: US may direct actions to place excess letdown on line (see next page).
	RO/BOP	Bypass 1CV-131 and re-establish letdown: <ul style="list-style-type: none"> • Dispatch operator to throttle open 1CV8409 as necessary during process to re-establish letdown per BwOP CV-17: <ul style="list-style-type: none"> • Re-establish charging flow at ~100 gpm – Open 1CV8105 and 1CV8106. • Throttle open 1CC130 to 60% in manual. • Direct local operator to open 1CV8409 to 40%. • Open 1CV459 and 1CV460. • Open 1CV8149A/B/C, as necessary to establish desired letdown flow. • Restore PZR level to program value.

Comments: _____

Scenario No: 01-2		Event No. 5
Event Description: Letdown Pressure Control Valve IPT-131 fails closed.		
Time	Position	Applicant's Actions or Behavior
	RO/BOP	Monitor reactor power and primary parameters: <ul style="list-style-type: none"> • Seal injection flow. • PZR Level. • VCT level.
	RO/BOP	Perform actions as directed by US to place excess letdown online per BwOP CV-15 Excess Letdown Operations: <ul style="list-style-type: none"> • Locate and Open BwOP CV-15. • Review Precautions, Prerequisites, Limitations and Actions. • Verify Rx Power is at least 0.1% below applicable limits. • Verify/OPEN 1CV800 and 1CV8112. • OPEN 1CC9437A and 1CC9437B. • Verify/CLOSE HCV-1CV123. • Place 1CV8143 in position directed by US (either VCT or RCDT). o Determine seal return does not need to be changed. • OPEN 1RC8037A/B/C/D. • OPEN 1CV8153A/B. • SLOWLY OPEN HCV-1CV123. • Ensure excess letdown temperature is < 165 degrees F on 1TI-122A. • Report excess letdown on line when complete.
Note: After letdown has been re-established, initiate event 6 (and 7)		

Comments: _____

Scenario No: 01-2		Event No. 6 and 7 and 8
Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. Turbine fails to trip – Loss of Heat Sink. During ATWS Auto Control rod speed fails to 8 spm, and 1 emergency boration flow path is unavailable.		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: 20-A-6 BUS 159 Fd BRKR 1592 TRIP 20-D-6 BUS 159 VOLT LOW 13-A-2 RCP BUS UNDERVOLTAGE RX TRIP ALERT 13-D-3 RCP 1D BRKR OPEN OR LOW FLOW ALERT 13-E-3 RCP TRIP 11-A-4 OPDT RX TRIP 11-C-5 RCP LOW FLOW ABOVE P8 RX TRIP No voltage on Bus 159: Loop 1D RCS flow coasting down Inward rod motion demanded at only 8 steps per minute. Open light indication for 1CV8104 NOT lit. No indicated AFW flow FWI monitor lights lit.
	CREW	Diagnoses loss of Bus 159, 1D RCP, and RED First Out dictating need for Reactor Trip, but failure of Automatic Trip to Occur. RO attempts manual reactor trip from both switches (1PM05J and 1PM06J) and reports no reactor trip.
	US	Announces ATWS, and enters and directs actions of 1BwFR-S.1, ATWS: <ul style="list-style-type: none"> • Gets acknowledgement from RO and BOP. • Informs SM, requests GSEP. • Requests STA to monitor Status Trees.
		Examiner's Note: STA will be role played by an instructor. A Red path will be identified on Subcriticality (as long as it exists) and on Heat Sink when it exists. Appropriate procedure transitions will be identified by the STA on the Status Tree log.

Comments: _____

Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. Turbine fails to trip – Loss of Heat Sink. During ATWS Auto Control rod speed fails to 8 spm, and 1 emergency boration flow path is unavailable.

Time	Position	Applicant's Actions or Behavior
	RO	Performs immediate actions of 1BwFR-S.1 ATWS: <ul style="list-style-type: none"> ○ Manually attempts reactor trip from 1PM05J and 1PM06J RX Trip Switches (optional only if previously tried). ● Determines rods should be auto inserting but are NOT moving fast enough, and reports to US. ● Attempts manual control rod insertion, and reports success to US (48 steps per minute). ○ Dispatches operator to locally trip Unit 1 Reactor Trip Breakers.
	RO/BOP CT FR-S.1— C.	Initiate Emergency Boration: <ul style="list-style-type: none"> ● Checks at least one CV pump running. ● Attempts to open 1CV8104. ○ Reports 1CV8104 won't open. ● Aligns either of the following boration flow paths: <ul style="list-style-type: none"> ● Opens 1CV112D and/or 1CV112E. ● Closes 1CV112B and/or 1CV112C. ● Maximizes Charging flow. ● Verifies letdown established. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> ● Open 1CV110A and 1CV110B. ● Starts Boric Acid Transfer Pump. ● Verify Charging flow > 30 gpm. <ul style="list-style-type: none"> ● Check PZR pressure < 2335, if NOT, then VERIFIES PZR PORVs and Isolation valves are OPEN, VERIFIES PZR PORVs close at 2135 psig.

Comments: _____

Scenario No: 01-2		Event No. 6 and 7 and 8
Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. Turbine fails to trip – Loss of Heat Sink. During ATWS Auto Control rod speed fails to 8 spm, and 1 emergency boration flow path is unavailable.		
Time	Position	Applicant's Actions or Behavior
	BOP CT FR-S.1— A.	<p>Performs immediate actions of 1BwFR-S.1 ATWS:</p> <ul style="list-style-type: none"> • Determine Turbine did NOT auto trip, attempts Manual Turbine Trip, and determine turbine did NOT manually Trip. • Isolate MS from the main turbine by: <ul style="list-style-type: none"> • Run back the Turbine at the Maximum rate: • Press Turbine Manual. • Press Fast Action Lower. <p>OR</p> <ul style="list-style-type: none"> • Closing All MSIVs and bypasses (by actuating MSIV Isolation and using individual MSIV switches on 1PM06J). o Places EH pumps in PULL OUT if any MSIV does not close.
	BOP	<p>Completes Immediate Actions of 1BwFR-S.1 ATWS:</p> <ul style="list-style-type: none"> • Determine AF pumps not running: <ul style="list-style-type: none"> • Attempts auto start of 1A AFW pump by taking control switch out of PULL OUT. • Attempts manual start of 1A and 1B AFW pumps, reports no success to US. • Dispatches operator to locally start 1B AFW pump per BwOP AF-7. o Dispatches operators to locally check 1A AFW pump and breakers.
	BOP/RO	<p>Verify Containment Ventilation Isolation:</p> <ul style="list-style-type: none"> • Group 6 Cnmt Vent Isol Monitor lights LIT.
	CREW	<p>Determine if MSIV Isolation signal is Active, but MSIVs did NOT Auto Close. Close MSIVs if signal present. Determines SI Actuation Signal has occurred.</p>
	RO	<p>Determines Reactor is NOT Shutdown:</p> <ul style="list-style-type: none"> • Power range channels NOT < 5%. • Intermediate range channels NOT negative Startup rate.

Comments: _____

Scenario No: 01-2		Event No. 6 and 7 and 8	
Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. Turbine fails to trip – Loss of Heat Sink. During ATWS Auto Control rod speed fails to 8 spm, and 1 emergency boration flow path is unavailable.			
Time	Position	Applicant's Actions or Behavior	
		Note: Reactor will trip when Dumps are taken to OFF.	
	BOP	Isolate Steam Dumps: <ul style="list-style-type: none"> Place steam dump BYPASS/INTERLOCK switches to OFF RESET. 	
	RO	Reports Reactor Tripped.	
	BOP	Dispatches operator to: <ul style="list-style-type: none"> Locally actuate turbine Trip lever at pedestal. Open both EH pump breakers by depressing the switch gear manual trip buttons. 	
	BOP	Reports Heat Sink Status: <ul style="list-style-type: none"> SG Narrow Range Levels all less than 10 % (31% adverse). No AFW is available. SG Blowdown valves 1SD002A-H all Closed. 	
	RO	Checks dilution paths Isolated: <ul style="list-style-type: none"> 1CV11A and 1CV111B CLOSED. BTRS mode selector switch in OFF. Dispatches operators to locally verify dilution paths isolated per step 10.c. of 1BwFR-S.1. 	
	RO/BOP	Determine NO reactivity insertion from uncontrolled cooldown: <ul style="list-style-type: none"> RCS temperature NOT decreasing in an uncontrolled manner. No SG pressure decreasing in an uncontrolled manner. 	
	US/RO	Determines CETC < 1200 degrees F.	
	US/RO	Determines Reactor Subcritical: <ul style="list-style-type: none"> PR channels < 5%. IR channels negative SUR. 	
		Note: Crew may transition to 1BwEP-0, Reactor Trip or SI, from the ATWS procedure until the STA provides the report of a Red path on Heat Sink. (See page 22)	

Comments: _____

Scenario No: 01-2		Event No. 6 and 7 and 8	
Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. Turbine fails to trip – Loss of Heat Sink. During ATWS Auto Control rod speed fails to 8 spm, and 1 emergency boration flow path is unavailable.			
Time	Position	Applicant's Actions or Behavior	
	US	Returns to procedure and step in effect (1BwEP-0, Reactor Trip or SI). Announces procedure transition and gets acknowledgement from RO and BOP. Informs SM of plant Status. Requests GSEP evaluation from SM. Directs actions of 1BwEP-0, Reactor Trip or SI.	
	RO	Performs Immediate Actions of 1BwEP-0, Reactor Trip or SI: <ul style="list-style-type: none"> • Verify Reactor Trip: <ul style="list-style-type: none"> • All Rod Bottom Lights Lit. • Reactor Trip and Bypass Breakers Open. • Neutron Flux Decreasing. • Determines SI is Required/Actuated, and Manually Actuates SI. 	
	BOP	Performs Immediate Actions of 1BwEP-0, Reactor Trip or SI: <ul style="list-style-type: none"> • Verify Turbine Trip: <ul style="list-style-type: none"> • Verify all Turbine Throttle Valves are Closed. • Verify all Turbine Governor Valves are Closed. • Verify Power to 4KV ESF Buses: <ul style="list-style-type: none"> • Buses 141 and 142 Bus Alive Lights both LIT. 	
	BOP	Performs Actions of 1BwEP-0 as directed: <ul style="list-style-type: none"> • Verify FW Isolation: <ul style="list-style-type: none"> • FW Pumps Tripped. • FW Isolation Monitor Lights LIT. • FW Pump Discharge Valves (1FW002A, B, C) Closed. 	
	RO	Performs Actions of 1BwEP-0 as directed: <ul style="list-style-type: none"> • Verify ECCS Pumps running: <ul style="list-style-type: none"> • Both CV pumps. • Both RH pumps. • Both SI pumps. 	

Comments: _____

Scenario No: 01-2		Event No. 6 and 7 and 8
Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. Turbine fails to trip – Loss of Heat Sink. During ATWS Auto Control rod speed fails to 8 spm, and 1 emergency boration flow path is unavailable.		
Time	Position	Applicant's Actions or Behavior
	BOP	<p>Performs actions of 1BwEP-0 as directed:</p> <ul style="list-style-type: none"> • Verify RCFCs running in Accident Mode: <ul style="list-style-type: none"> • Group 2 RCFC Accident Mode status lights lit. • Verify Cnmt Isolation Phase A: <ul style="list-style-type: none"> • Group 3 Cnmt Isol monitor lights lit. • Verify Cnmt Ventilation Isolation: <ul style="list-style-type: none"> • Group 6 Cnmt Vent Isol monitor lights lit. • Verify AF system: <ul style="list-style-type: none"> • Reports Neither AFW pump is running, operators have been dispatched. • 1AF013A through H all Open • 1AF005A through H all Throttled. • Verify 1A and 1B CC pumps are running. • Verify 1A and 1B SX pumps are running. ○ Verify All MSIVs were manually closed, all MSIV Bypass valves are closed. • Reports Containment Pressure has not exceeded 20 psig and CS is not required. • Reports No AFW flow is available and all SG narrow range levels are < 10% (31% adverse).
	US	<p>Transitions to 1BwFR H.1, Loss of Secondary Heat Sink, if the STA has been stationed and is monitoring the Status Trees; or Transitions to 1BwFR H.1, Loss of Secondary Heat Sink, from 1BwEP-0, due to No AFW flow and low inventory levels in all SGs.</p> <p>Announces procedure transition and gets acknowledgements from RO and BOP. Informs SM of plant Status. Requests GSEP evaluation from SM. Directs actions of 1BwFR-H.1, Loss of Secondary Heat Sink.</p>
		<p>Note: Upon entry into 1BwFR-H.1, the Operator Action Summary page item for Bleed and Feed Initiation becomes effective. The Crew may immediately go to step 13 of 1BwFR-H.1 when the criteria are met. Step 3 of 1BwFR-H.1 will also direct the Crew to step 13.</p>

Comments: _____

Scenario No: 01-2		Event No. 6 and 7 and 8
Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. Turbine fails to trip – Loss of Heat Sink. During ATWS Auto Control rod speed fails to 8 spm, and 1 emergency boration flow path is unavailable.		
Time	Position	Applicant's Actions or Behavior
	US/RO	Determines Secondary Heat Sink is required: <ul style="list-style-type: none"> • RCS Pressure > any Non faulted SG pressure. • RCS Temperature > 350 degrees F.
	RO	Reports at least one CV pump is running.
	RO/BOP	Reports plant conditions require Bleed and Feed Initiation: <ul style="list-style-type: none"> o Wide Range Level in any 3 SGs < 27% (43% Adverse) o PZR Pressure > 2335 due to Loss of Heat Sink.
	US	Announces Bleed and Feed required and goes to Step 13 of 1BwFR-H.1. <ul style="list-style-type: none"> • Get acknowledgements from RO and BOP. • Brief crew on necessity to establish RCS heat removal by Bleed and Feed quickly.
	RO CT FH- H.1—B.	Performs actions of 1BwFR-H.1 as directed to establish RCS Bleed and Feed: <ul style="list-style-type: none"> • Stops all RCPs • Actuates SI. • Checks at least 1 CV or SI pump running. • Checks Group 2 Cold Leg Injection monitor lights lit. (Except AFW pumps) • Verify PZR PORV Isolation Valves (1RY8000A and 1RY8000B) energized. • Verify PZR PORV Isolation Valves (1RY8000A and 1RY8000B) Open. • Opens PZR PORVs (1RY455A and 1RY456). • Verify Both PORVs and Isolation valves Open.
	US	Directs the performance of ESF Actuation Verifications of 1BwEP-0 as time permits (or assigns BOP to perform them as time permits.)

Comments: _____

Scenario No: 01-2		Event No. 6 and 7 and 8
Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. Turbine fails to trip – Loss of Heat Sink. During ATWS Auto Control rod speed fails to 8 spm, and 1 emergency boration flow path is unavailable.		
Time	Position	Applicant's Actions or Behavior
	RO/BOP	Perform the ESF Actuation Verifications not previously performed (as time permits): <ul style="list-style-type: none"> o Verify Power to 4KV ESF buses. o Verify ECCS pumps running. o Verify Cnmt Isolations Phase A and Cnmt Vent. o Verify RCFCs running in Accident Mode. o Verify CC and SX pumps running. o Check MSIVs and Bypasses Closed. o Check CS Actuated and Phase B Isolation if Cnmt Pressure exceeds 20 psig
	RO/BOP	Perform Actions of 1BwFR-H.1 as directed: <ul style="list-style-type: none"> • Reset SI: <ul style="list-style-type: none"> • Depress Both SI Reset Pushbuttons. • Verify SI Actuated Permissive Light NOT LIT. • Verify AUTO SI Blocked Permissive Light LIT. • Reset Cnmt Isolation: <ul style="list-style-type: none"> • Reset Cnmt Phase A. • Reset Cnmt Phase B (if necessary). • Check Any Station Air Compressor running. • Restore Instrument Air to Cnmt by Opening 1IA065 and 1IA066. • Maintain RCS heat Removal: <ul style="list-style-type: none"> • Maintain ECCS flow. • Maintain Both Pzr PORVs Open. • Determines if CS is running. If running, then: <ul style="list-style-type: none"> • Checks CS pump run lights –any lit. • Reset CS signal. • Determines Spray Add tank Low-2 lights are NOT lit. • Determines CS termination criteria NOT met. (RCS is being discharged into cnmt via PRT, CS must operate for at least 2 hours and cnmt pressure must be < 15 psig.) • Verify Cold Leg Recirculation capability: <ul style="list-style-type: none"> • Both RH pumps running. • Both Cnmt Sump Isolation Valves (1SI8811A and 1SI8811B) energized.

Comments: _____

Scenario No: 01-2		Event No. 6 and 7 and 8	
Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. Turbine fails to trip – Loss of Heat Sink. During ATWS Auto Control rod speed fails to 8 spm, and 1 emergency boration flow path is unavailable.			
Time	Position	Applicant's Actions or Behavior	
	RO/BOP	Try to establish AF to at least one SG: <ul style="list-style-type: none"> • 1SD002A-H Closed. • 1SD005A-D Closed. 	
	US	Prior to initiating feed flow, reviews Feed Flow Limitations (Attachment B of 1BwFR-H.1): <ul style="list-style-type: none"> • Determines bleed and feed has been initiated and is either <ul style="list-style-type: none"> • Effective in preventing further rise in CETCs in which case the limitations are: <ul style="list-style-type: none"> • Feeds any Non Dry SG with Non voided feedlines at desired rate. • If all SGs are dry, feeds one SG at 40-80 gpm for 15 minutes, then after 15 minutes does NOT exceed 100 gpm feed rate. When SG WR level >10% (27% Adverse) feed rate may be increased as desired. OR <ul style="list-style-type: none"> • Ineffective (CETCs are still rising) in which case the limitations are: <ul style="list-style-type: none"> • Feeds any non-dry S/Gs at maximum rate until CETCs decrease. Then feeds at desired rate. • If all S/Gs are dry, feeds one S/G at maximum rate until CETCs decrease then feeds restored S/G at desired rate; checks for faults or ruptures. 	
	RO/BOP	Performs actions as directed: <ul style="list-style-type: none"> • Check AF PUMP SX SUCT VLVS ARMED alarm (1-3-E7) NOT LIT. • Checks AF test valves (1AF004A and 1AF004B) open. • Checks 1AF013A-H open for selected SG(s). • Checks 1AF005A-H Throttled/Open for selected SG(s). • Checks AFW pumps still not running/ No AF flow established, and report same to US. 	
	RO/BOP	Prepare FW System for Restoration: <ul style="list-style-type: none"> • Checks at least one CD/CB pump running. • Place valves in Manual at Zero Demand: <ul style="list-style-type: none"> • FW Reg valves (1FW510, 520, 530, 540). • FW Bypass Reg Valves (1FW510A, 520A, 530A, 540A). • Tempering Flow Control Valves (1FW034A-D). 	

Comments: _____

Scenario No: 01-2		Event No. 6 and 7 and 8
Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. Turbine fails to trip – Loss of Heat Sink. During ATWS Auto Control rod speed fails to 8 spm, and 1 emergency boration flow path is unavailable.		
Time	Position	Applicant's Actions or Behavior
	US	Dispatch NSO to Remove Fuses for FWI: <ul style="list-style-type: none"> • At 1PA27J, fuses 24 and 27. • At 1PA28J, fuses 24 and 27.
	RO/BOP	Try to establish Main FW Flow to at least one SG: <ul style="list-style-type: none"> • Open FW Tempering Isol Valve on selected SG(s)- 1FW035A/B/C/D. • Determine neither the S/U Feedwater pump nor the 1A MFP is available.
	RO/BOP	Try to establish condensate booster flow to at least one SG: <ul style="list-style-type: none"> • Close FW pump recirc valves (1FW076, 1FW012A, B, and C). • Start Aux Oil Pump for Selected FW pump. • Open Selected FW pump Discharge Valve(s)- 1FW002A and 1FW016, or 1FW002B or 1FW002C, or 1FW059. • Verify HD pumps tripped.

Comments: _____

Scenario No: 01-2		Event No. 6 and 7 and 8
Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. Turbine fails to trip – Loss of Heat Sink. During ATWS Auto Control rod speed fails to 8 spm, and 1 emergency boration flow path is unavailable.		
Time	Position	Applicant's Actions or Behavior
	US	<p>Review Feed Flow Limitations before initiating feed flow:</p> <ul style="list-style-type: none"> Determines bleed and feed has been initiated and is either <ul style="list-style-type: none"> Effective in preventing further rise in CETCs, in which case the limitations are: <ul style="list-style-type: none"> Feeds any Non Dry SG with Non voided feedlines at desired rate. If all SGs are dry, feeds one SG at 40-80 gpm for 15 minutes, then after 15 minutes does NOT exceed 100 gpm feed rate. When SG WR level >10% (27% Adverse) feed rate may be increased as desired. <p>OR</p> <ul style="list-style-type: none"> Ineffective (CETCs are still rising) in which case the limitations are: <ul style="list-style-type: none"> Feeds any non-dry S/Gs at maximum rate until CETCs decrease. Then feeds at desired rate. If all S/Gs are dry, feeds one S/G at maximum rate until CETCs decrease then feeds restored S/G at desired rate; checks for faults or ruptures.
	RO/BOP	<p>Establish Condensate Booster Flow to Selected SG(s):</p> <ul style="list-style-type: none"> Open Tempering flow control valve on selected SG(s) 1FW034A/B/C/D. Depressurize at least one SG to < 650 psig via steam dumps or SG PORV(s). Maintain Hotwell level > 7 inches Check Wide Range SG level increasing.
		Scenario is complete at this point or at the Chief examiners discretion

Comments: _____

Simulation Facility Braidwood Scenario No.: 01-3 Operating Test No.: 1

Examiners: _____ Applicant: _____ SRO

_____ RO

_____ BOP

Initial Conditions: IC-174, 25% power, following a restart from a trip from full power 12 hours ago.

Turnover: Ramp to full power. 1A RH and 1A MFP pumps are unavailable. MESACs were completed for 1D SGWLC instrumentation on the previous shift. 1BwGP 100-3 step 45 in progress.

Event No.	Malf. No.	Event Type*	Event Description
Preload	CS01A RH01A RF RP63 OUT RH04B Override	C BOP C BOP SRO C BOP SRO	1A Containment Spray pump fails to start Auto or Manually. 1A RH pump fail to start. 1B Containment Spray pump fails to start Auto (Manual Avail) 1B Containment Sump Recirc Isol valve stuck closed.
1		R RO SRO N BOP	Raise Reactor power with dilution and control rods. Ramp up turbine power from 25% to full power.
2	CH08D, 60	I BOP SRO	Containment Pressure Transmitter IPT-937 fails high.
3	NI09B, 120	I RO SRO	Power Range Channel N42 fails high.
4	CV27C, 3.3, 1 min ramp	C RO SRO	1C RCP #1 Seal Leakage (degradation).
5	CV15, 50	C BOP SRO	50 gpm Seal water heat exchanger leak, CCW into seal return.
6	CV27C, 10, 5 min ramp	C RO SRO	1C RCP #1 Seal Leakage worsens, requiring reactor trip.
7	TH06C, 540K (Trigger)	M RO SRO BOP	Large break LOCA at time of Reactor Trip.
8	Preload	C BOP SRO	Containment Spray failure, only one train available.
9	Preload	M RO SRO BOP	Loss of Emergency Coolant Recirculation.

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

SCENARIO 01-3 OVERVIEW

The scenario begins with the plant at approximately 25% power with orders to ramp up to full power. The turnover includes information that the 1A RH pump is unavailable due to a scheduled work window, 1A MFP is unavailable due to breaker cubicle work, and MESACS were completed for 1D SGWLC instrumentation on the previous shift.

After clearly observable plant response to the requested reactivity change, a Containment Pressure channel will fail high. The BOP and RO will diagnose the failure from annunciators, instrumentation indications, and the bistable light. The SRO will enter 1BWOA INST-2 Attachment J, "OPERATION WITH A FAILED CHANNEL – CONTAINMENT PRESSURE CHANNEL FAILURE," and direct actions to trip the bistable and investigate Tech Specs. LCO 3.3.2 condition E applies. Maintenance will investigate as requested.

After the bistable is tripped for the containment pressure channel, a Power Range Channel will fail high causing inward rod motion. The RO will diagnose the failure from control board indications and alarms and place rod control in manual. The ramp up may be suspended. The SRO will enter 1BWOA INST-1 Attachment A, "NUCLEAR INSTRUMENTATION MALFUNCTION – PR CHANNEL FAILURE," and direct actions to defeat the channel, restore Tave and automatic rod control, trip bistables, and investigate Tech Specs. LCO 3.3.1 conditions D and E apply. Maintenance will investigate as requested. The ramp up may be restarted if suspended earlier.

After the bistables are tripped for the failed NI, 1C RCP seal will begin to leak abnormally. The RO will diagnose the failure from RCP parameters, and the SRO will enter 1BWOA RCP-1, "REACTOR COOLANT PUMP SEAL FAILURE". The crew will determine the seal problem is real, not an instrumentation problem, and commence a shutdown.

While preparations are being made to shutdown the unit, a seal water heat exchanger tube leak will occur, causing a decreasing Surge Tank level, and a dilution of the RCS from Component Cooling water entering the flowpath to the CV pumps. The problem will be diagnosed by the BOP from makeup occurring to the CCW surge tank. The SRO will enter 1BWOA PRI-12, "UNCONTROLLED DILUTION", and/or 1BWOA PRI-6, "COMPONENT COOLING MALFUNCTION", and direct actions to isolate and bypass the seal water heat exchanger. Control rods will be verified to be above the RIL to satisfy Tech Specs.

After the seal water heat exchanger is bypassed, the 1C RCP seal leak gets worse and exceeds the limit requiring a trip. At the time of the reactor trip, a large break LOCA occurs. The SRO will enter and direct actions of 1BwEP-0, "REACTOR TRIP OR SAFETY INJECTION". Containment pressure will exceed the Containment Spray actuation setpoint. One train of CS will not start, the other train must be manually started due to a slave relay failure. An RCS LOCA will be diagnosed and a transition to 1BwEP-1, "LOSS OF REACTOR OR SECONDARY COOLANT" will be made. If, after Status Tree monitoring is commenced, containment pressure remains above the CS actuation setpoint, a transition to 1BwFR-Z.1, "RESPONSE TO HIGH CONTAINMENT PRESSURE" will be made. A Challenge to the Integrity Status Tree will also be identified, and implementation of 1BwFR-P.1, "RESPONSE TO IMMINENT PTS CONDITION" will result in the performance of just the first step before exiting this procedure. When the LO-2 RWST level is reached, the crew will transition to 1BwEP ES-1.3, "TRANSFER TO COLD LEG RECIRCULATION". A

Comments: _____

failure of the B Train sump recirculation valve will occur, requiring a transition to 1BwCA-1.1, "LOSS OF EMERGENCY COOLANT RECIRCULATION". The SRO will direct one operator to add make up to the RWST, and direct the other operator to stop the running CS pump. Minimum ECCS flow will be established to the RCS. The scenario is terminated after make-up is established to the RWST.

Critical Tasks

- E-0—E: Manually actuate at least the minimum required compliment of containment cooling equipment before an extreme (red path) challenge develops to the containment critical safety function.
- ECA-1.1—A: Stop ECCS pumps with suctions aligned to the RWST before they cavitate and trip. (applicable when RWST < 7%).
- ECA-1.1—B: Makeup to the RWST and minimize outflow.

Comments: _____

SIMULATOR OPERATOR NOTES

Simulator Setup:

Init IC____, 25% power, 12 hours after a trip from full power.

Align switches. Perform "Ready for Training" checklist. Place Hotwell Placard to '89'.

Insert PRELOAD Events:

Place 1A MFP control Switch in Pull Out and hang tag.

Place 1A RH pump control switch in Pull Out and hang tag. IMF RH01A 1A RH pump fails to start.

IMF CS01A 1A CS pump fail to start.

MRF RP63 OUT 1B CS pump fails to automatically start.

IMF RH04B 1SI8811B fails to auto open.

IOR ZDI1SI8811B CLOSE override control switch for 1SI8811B to prevent manual open.

Place orange dot on 1CV112 controller (set at 6.0)

Fill out flowchart for 100-3 thru step 44.

To prevent inaccurate sim response to seal water heat exchanger leak, fail the Rad monitors for CC Hx outlet "AS IS".

OPR09J

1PR09J.

Event 1 Power Ramp from 25% to full power.

As SM acknowledge ramp initiation.

Support requests for MFP startup.

As RP/HP/Chemistry acknowledge sample requirements for load change > 15% in one hour.

Event 2 Containment Pressure Channel 1PT-937 fails high (60 psig).

SDG: CH6

Malf: CH08D, 60 psig.

Initiate event after clearly observing reactivity change/response of plant from requested power ramp or upon lead examiners cue.

Role play as U-2 admin and/or extra NSO to accomplish bistable tripping. Acknowledge all info passed to the SM, WEC, and maintenance.

SDG: RP13

Cabinet door #1 open

CS and Phase B PB937A

C1-754

BS-1

RF

RX20 OPEN

RF

RP18 TRIP

Cabinet door #1 close

RF

RX20 CLOSE

Event 3 Power Range Channel N42 fails high (120%, no ramp).

Comments: _____

SDG: NI6

Malf: NI09B, 120%

Initiate power range channel failure after tripping bistables and investigating Tech Specs for the containment pressure channel failure, or at the lead examiners cue.

Role play as U-2 admin and/or extra NSO to accomplish bistable tripping.

Acknowledge all info passed to the SM, WEC, and maintenance.

SDG: RX4

Cabinet door #2 open

OTDT Trip

OTDT Runback

Cabinet door #2 close

TB421C

TB421D

C2-124

C2-124

BS-3

BS-4

RF

RF

RF

RF

RX21 OPEN

RX017 TRIP

RX137 TRIP

RX21 CLOSE\

Event 4 1C RCP #1 Seal Leak (3.3 gpm plus normal, total needs to be between 6 and 8 gpm) 1 minute ramp.

SDG: CV7C

Malf: CV27C, 3.3 gpm, 1 minute ramp

Role play as necessary for requested cnmt entry to check #2 seal leakoff.

If asked, report the RCDT pumps switch at the RWP panel is in REMOTE, and the switch for 1RE1003 is in AUTO.

As system engineer (Tom Cole) acknowledge the request for assistance, and that you'll monitor vibrations and seal performance.

Event 5 Seal water Heat Exchanger Leak (50 gpm CCW to Seal return – dilution of VCT).

SDG: CV6

Malf: CV15, 50 gpm

Initiate Seal Water Hx leak after crew makes decision to commence a S/D due to RCP seal conditions, or at lead examiners cue.

When asked as local operator, report the position of the following valves:

1CV8441 Locked Closed

1CV8435 Locked Closed

1CV8453 Locked Closed

1AB8629A Closed

When asked as local operator to Isolate CC flow for the Seal Water Heat Exchanger:

SDG: CV6

CLOSE 1CC9449A

CLOSE 1CC9449B

Comments: _____

When asked to swap the VCT inlet valves:
OPEN 1CV8482
CLOSE 1CV8484

Acknowledge all info passed to the SM, WEC, and maintenance.

Event 6 1C RCP #1 Seal Leakage increases to 10 gpm over 5 minutes, requiring reactor trip.

SDG: CV7C

Malf: CV27C, 10gpm, 5 minute ramp.

Initiate additional RCP seal leakage after VCT inlets are swapped, or at lead examiners cue.

NOTE: Ensure Event 7 (LBLOCA) is ready on a trigger to initiate when the reactor is tripped. Also ensure, 1A CS pump will fail to start, and 1B Train CS will only manually start due to the slave relay failing to auto open 1CS019A.

Event 7 Large Break LOCA.

SDG:

Malf: TH06C, 540,000 gpm

Initiates on trigger at time of reactor trip due to degrading conditions on the 1C RCP #1 Seal.

NOTE: Ensure malfunction to keep 1SI8811B from auto swapping to the containment Recirc Sump is active, and the OVERRIDE for the 1SI8811B Control Switch prevents manual opening of the valve.

When dispatched to locally open 1SI8811B, report the valve hand wheel turns, but it does not appear that the stem is moving. Power is RF ED071N OPEN (132X4 H1)

1A RH pump is not available for at least 45 minutes if asked.

Acknowledge all info passed to the SM, WEC, and maintenance.
Respond as STA to monitor Status Trees when asked.

If asked, clear tags and energize the SVAG valves:

SDG: SIP

Use RF: ED55E to re-energize 1SI8806 at 131X1A:P3

And RF: ED72B to re-energize 1SI8813 at 132X4A:L3.

Perform any local actions as requested to align make up to the RWST per BwOP SI-13.

Either report key for 1CV8553 is in the Locked Close Location in the Locked Valve Key Cabinet, or

Report from local observation that 1CV8553 is Locked Closed.

SDG: CV4

CLOSE 1CV8428

Comments: _____

OPEN 1CV8432
UNLOCK and OPEN 1CV8434 (Not modelled)

If asked for H2 monitors:

SDG: CH4
RFCH01 LOW
RFCH06 LOW

Comments: _____

Scenario No: 01-3		Event No. 1
Event Description: Continue ramp up towards full power by raising reactor power and turbine load.		
Time	Position	Applicant's Actions or Behavior
	CUE	Turnover information provided cues to continue ramp towards full power.
	US	Implement actions of 1BwGP 100-3, Rev 20, Step F.
	US	Direct load increase to 620 MW at 5 MW/min. <ul style="list-style-type: none"> • Initiate load swing instruction sheet (1BwGP-1004T2 Boration Dilution Boundary Calculation). • Contact Chemistry and HP for load change > 15%/hr.
	CREW	Review applicable Precautions, and Limitations and Actions.

Comments: _____

Scenario No: 01-3		Event No. 1
Event Description: Continue ramp up towards full power by raising reactor power and turbine load.		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Verify rod position and boron concentration.</p> <p>Initiate dilution (BwOP CV-5, Rev 13)</p> <p>Determine required dilution volume by:</p> <ul style="list-style-type: none"> o Effects of previously performed dilutions o Braidwood Boration Dilution Tables <ul style="list-style-type: none"> • Determine required PW flow rate. • Set IFK-111 PW/Total Flow Control to desired dilution rate. • Set 1FY-0111 Primary Water Control Preset Counter to desired volume. • Place MAKE-UP CONT SWITCH to STOP position. • Set MU MODE SELECT to Alt DIL position. • Place MAKE-UP CONT Switch to START o Verify proper operation of valves (CV111A throttles open, CV110B open, PW flow on recorder) <p>OR</p> <p>Batch addition:</p> <ul style="list-style-type: none"> • Open CV110B. • Open CV111A. • <p>When desired amount of primary water added:</p> <ul style="list-style-type: none"> • Close CV111A. • Close CV110B.
	BOP	<p>Initiate turbine load increase:</p> <ul style="list-style-type: none"> • Depress LOAD RATE MW/MIN • Enter 5 MW/min <ul style="list-style-type: none"> • Depress REF • Enter power level (620 MW) • When ready to begin load increase, depress GO <ul style="list-style-type: none"> • Verify load increases.

Comments: _____

Scenario No: 01-3		Event No. 1
Event Description: Continue ramp up towards full power by raising reactor power and turbine load.		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Monitor power increase:</p> <ul style="list-style-type: none"> • Monitor reactor power, Tave, ΔI • Verify rods move in AUTO to maintain Tave within ± 1.0°F of Tref. <p>If diluting:</p> <ul style="list-style-type: none"> • Monitor VCT level • Verify RCS boron concentration decreasing • Monitor PW/Total counter • Verify dilution auto stops at preset value. • Return Reactor Makeup System to blended flow at current boron concentration.
		Note: Following clearly observable plant response from the reactivity changes, Event 2 is entered.

Comments: _____

Scenario No: 01-3		Event No. 3
Event Description: Power Range Channel N-42 Fails High		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-10-B5 PWR RNG FLUX HIGH ROD STOP 1-10-C3 PWR RNG FLUX RATE RX TRIP ALERT 1-10-C3 PWR RNG CHANNEL DEV Rods Stepping Inward Meter indications NR-45 Recorder Indications
	RO/US	Diagnose/Announce Power Range Channel failure (N-42)
	US	Announce procedure entry 1BwOA INST-1, Attachment A, NUCLEAR INSTRUMENTATION MALFUNCTION, POWER RANGE CHANNEL FAILURE, and direct actions: <ul style="list-style-type: none"> • Announce procedure entry and get acknowledgements from RO and BOP. • Inform SM of plant status, GSEP evaluation. • Direct WEC to write AR, CR, and get maintenance involved. • Brief RO and U-2 Admin NSO on bistable tripping for N-42. • Refer to Tech Specs: <ul style="list-style-type: none"> • Spec 3.3.1 Conditions D and E apply, 6 hrs to trip channel. Perform a risk assessment. Return to procedure and step in effect (1BwGP 100-3, power Ascension)
	RO	Perform actions as directed by US: <ul style="list-style-type: none"> • Take Rod Control to Manual • Determine PWR RNG FLUX HIGH ROD STOP (1-10-B5) is Lit. • Check Tave – Tref deviation stable and within 1 degree F. If NOT: <ul style="list-style-type: none"> • Adjust Rods or turbine or boron to restore to within 1 degree F. ○ Check to ensure no coincidences will be made up when bistables are tripped. • Coordinate bistable tripping for OTDT Trip and OTDT Runback. • Ensure Operable channel selected to the DT recorder. • Determine Turbine Low Power Interlock C5 is Not lit. • Restore Auto rod control when Tave – Tref deviation is stable and within 1 degree F.

Comments: _____

Scenario No: 01-3		Event No. 3
Event Description: Power Range Channel N-42 Fails High		
Time	Position	Applicant's Actions or Behavior
	BOP	Perform actions as directed by US: <ul style="list-style-type: none"> • At 1PM07J, Bypass ROD STOP for channel N-42. • Check SG levels normal and stable. • At 1PM07J, Bypass the following functions for N-42: <ul style="list-style-type: none"> • Upper Section of the Detector Current Comparator. • Lower Section of the Detector Current Comparator. • Power Mismatch Bypass ○ Rod Stop Bypass (if not done previously). • Comparator Channel defeat • Remove Control Power Fuses for N-42 • Control turbine ramp.
		NOTE: Once the proper bistables have been tripped and tech specs determined, initiate EVENT 4.

Comments: _____

Scenario No: 01-3		Event No. 4
Event Description: 1C RCP #1 Seal leakage (degradation).		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: 1-7-B3 RCP SEAL LEAKOFF FLOW HIGH #1 Seal Leakoff Recorder indication
	RO/US	Diagnose/Announce RCP Seal problem
	US	Announce entry into 1BwOA RCP-1 RCP SEAL FAILURE, and direct actions: <ul style="list-style-type: none"> • Get acknowledgements for procedure entry from RO and BOP. • Inform SM of plant status, evaluate for GSEP. • Direct WEC to write AR, CR, and get maintenance/engineering involved.
	RO	Perform actions of 1BwOA RCP-1 as directed by US: <ul style="list-style-type: none"> • Determine #1 Seal Delta P is > 200 psid. • Determine #1 Seal leakoff to be > 5 gpm and provide input to US.
	BOP/RO	Perform actions of 1BwOA RCP-1 as directed by US: <ul style="list-style-type: none"> • Trend RCP parameters on the computer to determine there is NO failed instrument.
	RO	Perform actions as directed: <ul style="list-style-type: none"> • Maintain ≥ 9 gpm seal injection flow to 1C RCP #1 Seal. • Monitor seal conditions: <ul style="list-style-type: none"> • #1 seal leakoff flow < 8 gpm. • RCP lower Radial Bearing Temperature Stable or decreasing and < 225 degrees F. • RCP seal outlet temperature stable or decreasing and < 235 degrees F. <p>If any of the above conditions exceeded, report to US so that an immediate trip can be initiated.</p> <ul style="list-style-type: none"> • #1 Seal leakoff flow < 6 gpm. If not, then report to US so that a controlled shutdown can be initiated.
	US	Direct actions outside the control room: <ul style="list-style-type: none"> o Direct the WEC/Field Supervisor to assemble a team to enter containment and locally check 1C RCP #2 seal leakoff flow status.
	RO	Perform actions as directed: <ul style="list-style-type: none"> • Determine sum of #1 and #2 seal leakoff is between 6 and 8 gpm.

Comments: _____

Scenario No: 01-3		Event No. 5
Event Description: 50 gpm Seal Water Heat Exchanger Tube Leak		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: 1-2-E4 CC SURGE TANK AUTO M/U ON Decreasing CC Surge Tank level Auto makeup to the CC Surge Tank. VCT level Increasing
		Note: Crew may enter 1BwOA PRI-6, Component Cooling Malfunction and/or 1BwOA PRI-12, Uncontrolled Dilution.
	US/BOP	Diagnose/Announce decreasing CC Surge Tank level. Direct BOP to refer to BwAR. Enter 1BwOA PRI-6 COMPONENT COOLING MALFUNCTION, and direct actions: <ul style="list-style-type: none"> • Get acknowledgements for procedure entry from RO and BOP. • Inform SM of plant status, evaluate GSEP. • Direct WEC to write and AR, CR, and get maintenance involved.
	BOP	Perform actions of 1BwOA PRI-6, as directed: <ul style="list-style-type: none"> • Determine surge tank level is > 13 %, and is being maintained by auto make-up but is NOT STABLE.
	US	Directs actions of Attachment B, ABNORMAL CC SURGE TANK LEVEL.
	BOP	Performs actions of Attachment B as directed: <ul style="list-style-type: none"> • Reports surge tank level is decreasing but > 50% and is being maintained by auto make up.
	RO	Performs actions as directed: <ul style="list-style-type: none"> • Diagnoses and reports unexpected increase in VCT level.

Comments: _____

Scenario No: 01-3		Event No. 5
Event Description: 50 gpm Seal Water Heat Exchanger Tube Leak		
Time	Position	Applicant's Actions or Behavior
	US	Directs the following actions: <ul style="list-style-type: none"> • Locally isolate seal water heat exchanger- close 1CC9449A and 1CC9449B. ○ Open seal water heat exchanger to top of VCT isolation valve 1CV8482 ○ Close seal water heat exchanger outlet to bottom of VCT isolation valve 1CV8484. • Initiate boration as necessary to maintain RCS Temperature. • Monitor CC Surge tank to determine out leakage isolated. Level stable and makeup valves closed.
	BOP	Performs actions of 1BwOA PRI-6 as directed: <ul style="list-style-type: none"> • Determines at least one CC pump is running. • Checks CC PUMP DSCH PRESS LOW (1-2-B5) is NOT LIT. • Checks CC PUMP SUCT TEMP HIGH (1-2-D5) is NOT LIT. • Checks CC Hx outlet is < 120 degrees F and < 105 degrees F. • RCPs are all running. • CC flow to the RCPs is Normal: <ul style="list-style-type: none"> • RCP 1_ THERM BAR CC WTR FLOW LOW (1-7- 4) NOT LIT. • RCP 1_ BRNG CC WTR FLOW LOW (1-7- 5) NOT LIT. • RCP THERM BARR CC WTR TEMP HIGH (1-7-E3) NOT LIT. • RCP THERM BARR CC WTR FLOW HIGH LOW (1-7-E4) NOT LIT. • RCP BRNG CC WTR TEMP HIGH (1-7-E5) NOT LIT. • Checks HMI or RM11 rad monitor trends for CC Hx outlet Normal • Checks 1CC685 Open. • RCPs temperatures: <ul style="list-style-type: none"> • Motor bearing temps < 195 degrees F. • Lower Radial Bearing Temps < 225 degrees F. • Seal Outlet Temps < 235 degrees F. • Checks CC Surge tank between 50 and 65%.
	RO	Performs actions of 1BwOA PRI-6 as directed: <ul style="list-style-type: none"> • Checks letdown in service. • Checks LTDWN HX OUTLET TEMP HIGH (1-8-C5) NOT LIT. • Checks LTDWN TEMP HIGH (1-9-E2) NOT LIT.
	US	Refers to tech specs: 3.7.7; 3.6.3, and has the SM perform a risk assessment. Returns to step and procedure in effect (for shutting down unit)
Note: Crew may enter 1BwOA PRI-12 Uncontrolled Dilution.		

Comments: _____

Scenario No: 01-3		Event No. 5
Event Description: 50 gpm Seal Water Heat Exchanger Tube Leak		
Time	Position	Applicant's Actions or Behavior
	US	Announces procedure entry and directs actions for 1BwOA PRI-12, UNCONTROLLED DILUTION: <ul style="list-style-type: none"> • Gets acknowledgements from RO and BOP. • Informs SM of plant status, evaluate GSEP.
	RO	Performs actions of 1BwOA PRI-12 as directed: <ul style="list-style-type: none"> • Places Make-up Control Switch in OFF. • Checks valves closed: <ul style="list-style-type: none"> • 1CV111A • 1CV111B • 1CV110A • 1CV110B • Verify BTRS Mode Selector Switch in OFF. • Checks Letdown temperature > 80 degrees F. • Determines an unexpected VCT level increase is occurring/ CC surge tank level decrease is occurring.
	CREW	Dispatch operator to verify dilution paths isolated: <ul style="list-style-type: none"> • 1CV8441 locked closed • 1CV8435 locked closed • 1CV8453 locked closed • 1AB8629A closed
	US	Directs the following actions: <ul style="list-style-type: none"> • Locally isolate seal water heat exchanger- close 1CC9449A and 1CC9449B. • Open seal water heat exchanger to top of VCT isolation valve 1CC8482 • Close seal water heat exchanger outlet to bottom of VCT isolation valve 1CC8484.

Comments: _____

Scenario No: 01-3		Event No. 5
Event Description: 50 gpm Seal Water Heat Exchanger Tube Leak		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Performs the following actions to determine if dilution is terminated:</p> <ul style="list-style-type: none"> • Reports Unit is in Mode 1, RCS Tave is stable, rods are not inserting in auto, and power is stable. <p>If not, then borates as necessary to maintain RCS Tave-Tref within 5 degrees F, and adjusts rods to control Delta I.</p> <ul style="list-style-type: none"> • Checks BDPS ACTUATED CHG SUCT SWITCH OVER (1-10-E5) NOT LIT. • 1CV112D and 1CV112E are Closed. • Aligns RMCS for Auto: <ul style="list-style-type: none"> • BA flow controller set for current RCS boron concentration. • BA flow controler in Auto. • Mode Select switch in Auto. • Control switches for 1CV111A, 1CV111B, 1CV110A, and 1CV110B in auto. • Makeup Control Switch in Start • Checks rods > LO-2 insertion limit.
	US	Refers to tech specs: 3.1.1, 3.1.6, 3.9.1, 3.9.2, TRM 3.1.i and determines no further actions are required. Returns to procedure and step in effect (shutting down the unit).

Comments: _____

Scenario No: 01-3		Event No. 6 and 7
Event Description: 1C RCP Seal leak worsens requiring Rx Trip, resulting in LBLOCA. Only one CS Train Available, Loss of Emergency Coolant Recirculation.		
Time	Position	Applicant's Actions or Behavior
	CUE	Increasing #1 Seal leak off beyond 8 gpm. Increasing #1 Seal outlet temperatures and bearing temperatures. Rapid decrease in RCS Pressure to Cnmt pressure. Rapid Decrease in PZR level to zero. Both CS trains fail to Auto start. Recirc Sump Isolation valve fails to open
	RO/US	Diagnose/announce increasing leakage from 1C RCP #1 Seal.
	US	Directs a manual reactor trip, then after verifying the reactor trip, orders a trip of the 1C RCP and closure of Spray valve 1RY455C. Enters 1BwEP-0, REACTOR TRIP OR SI, and directs actions: <ul style="list-style-type: none"> • Gets acknowledgements from RO and BOP • Informs SM of plant status, evaluate GSEP.
	RO	Performs Immediate Actions of 1BwEP-0, REACTOR TRIP OR SI: <ul style="list-style-type: none"> • Verify Reactor Trip: <ul style="list-style-type: none"> • Verify Rod Bottom Lights Lit. • Verify Reactor Trip and Bypass Breakers are Open. • Verify Neutron Flux is Decreasing • Determine SI Status: <ul style="list-style-type: none"> o Check any SI First Out Annunciator Lit or o SI Actuated permissive Light Lit or o SI Equipment Automatically Actuated (either SI pump running or 1SI8801A/B open). • Manually Actuate SI
	BOP	Performs Immediate Actions of 1BwEP-0, REACTOR TRIP OR SI: <ul style="list-style-type: none"> • Verify Turbine Trip: <ul style="list-style-type: none"> • All Turbine Throttle Valves Closed. • All Turbine Governor Valves Closed. • Verify Power to 4KV ESF Buses: <ul style="list-style-type: none"> • Bus 141 energized • Bus 142 energized

Comments: _____

Scenario No: 01-3		Event No. 6 and 7
Event Description: 1C RCP Seal leak worsens requiring Rx Trip, resulting in LBLOCA. Only one CS Train Available, Loss of Emergency Coolant Recirculation.		
Time	Position	Applicant's Actions or Behavior
	BOP	<p>Performs subsequent actions of 1BwEP-0, REACTOR TRIP or SI, as directed:</p> <ul style="list-style-type: none"> • Verify FW Isolation: <ul style="list-style-type: none"> • FW pumps Tripped • FW Isolation monitor lights Lit. • FW Pumps Discharge Valves (1FW002A, 1FW002B, and 1FW002C) Closed. • Verify RCFCs running in Accident Mode: <ul style="list-style-type: none"> • Group 2 RCFC Accident Mode status lights Lit. • Verify Containment Isolations: <ul style="list-style-type: none"> • Cnmt Isolation Phase A- Group 3 Cnmt Isol monitor lights Lit. • Cnmt Ventilation Isolation -Group 6 Cnmt Vent Isol monitor lights Lit. • Verify AF system: <ul style="list-style-type: none"> • AF pumps -Both Running • 1AF013A-H Open. • 1AF005A-H Throttled. • Verify CC and SX pumps Running: <ul style="list-style-type: none"> • Both CC pumps running. • Both SX pumps running. • Verify Main Steam Line Isolation: <ul style="list-style-type: none"> • Check SG pressures All > 640 psig. • Check Cnmt Pressure > 8.2 psig. • Verify MSIVs and MSIV Bypass valves all closed.
	RO	<p>Performs subsequent actions of 1BwEP-0, REACTOR TRIP or SI, as directed:</p> <ul style="list-style-type: none"> • Verify ECCS pumps running <ul style="list-style-type: none"> • Both CV pumps running • Both SI pumps running • 1B RH pump running (1A RH pump is Not available.)

Comments: _____

Scenario No: 01-3		Event No. 6 and 7	
Event Description: IC RCP Seal leak worsens requiring Rx Trip, resulting in LBLOCA. Only one CS Train Available, Loss of Emergency Coolant Recirculation.			
Time	Position	Applicant's Actions or Behavior	
	BOP	Perform actions of 1BwEP-0, REACTOR TRIP or SI, as directed: <ul style="list-style-type: none"> • Determine Containment pressure has exceeded the Containment Spray Actuation Setpoint (20 psig) and has NOT automatically actuated. • Stop All RCPs. • Determines Group 6 CS monitor lights are NOT Lit. • Manually Actuates CS and Phase B Isolation and reports not all group 6 CS monitor lights are lit: <ul style="list-style-type: none"> • 2/2 switches from 1PM05J and/or • 2/2 switches from 1PM06J 	
	US	Directs the performance of 1BwEP-0, REACTOR TRIP or SI, ATTACHMENT B, MANUAL CS ACTUATION.	
	BOP CT E-0—A.	Performs the actions of ATTACHMENT B, MANUAL CS ACTUATION as directed: <ul style="list-style-type: none"> • Check CS Valve Alignment: <ul style="list-style-type: none"> • CS pump RWST Suction valves Open- 1CS001A and 1CS001B. • Check CS pump header isolation valves Open- 1CS007A and 1CS007B. • Determines CS eductor Spray Additive valves did NOT Open and performs the following: <ul style="list-style-type: none"> • Places 1B CS pump test switch in TEST. • Manually Opens 1CS019B. • Places 1B CS pump test switch in NORMAL • Check CS eductor inlet flow control valve (1CS010B) Open. • Checks 1B CS pump running. <ul style="list-style-type: none"> o Dispatches operator to check why 1A CS pump fail to start. • Check Group 6 CS monitor lights Lit. • Check Group 6 Phase B Isolation monitor lights Lit. • Check CS eductor suction flow on running pump (1FICS014) > 15 gpm. • Check CS eductor additive flow on running pump (1FI-CS016) > 5 gpm. 	
	BOP	Performs subsequent actions of 1BwEP-0, REACTOR TRIP or SI, as directed: <ul style="list-style-type: none"> • Verify Total AF flow > 500 gpm. • Controls feed flow to maintain narrow range SG level between 10% (31% Adverse) and 50%. • Determines Narrow Range Levels NOT increasing in an uncontrolled manner. 	
	RO	Performs subsequent actions of 1BwEP-0, REACTOR TRIP OR SI, as directed: <ul style="list-style-type: none"> • Verify ECCS valve alignment: <ul style="list-style-type: none"> • Group 2 Cold Leg Injection monitor lights required for ECCS valve alignment Lit. 	

Comments: _____

Scenario No: 01-3		Event No. 6 and 7
Event Description: 1C RCP Seal leak worsens requiring Rx Trip, resulting in LBLOCA. Only one CS Train Available, Loss of Emergency Coolant Recirculation.		
Time	Position	Applicant's Actions or Behavior
	RO	Verify ECCS flow: <ul style="list-style-type: none"> • High Head Flow (1FI-917) > 100 gpm. • RCS Pressure (1PI-403A/405) < 1700 psig. • SI pump discharge flow (1FI-918/922) > 200 gpm. • RCS pressure < 325 psig. • 1B RH pump discharge flow (1FI-619) > 1000 gpm.
	RO	Check at least one PZR Porv Relief Path available: <ul style="list-style-type: none"> • PORV Isolation valves (1RY8000A and 1RY8000B) energized and Open • PORVs (1RY455A and 1RY456) in AUTO, with associated block valve open.
	BOP	Performs subsequent actions of 1BwEP-0 as directed: <ul style="list-style-type: none"> • Verify Generator Trip – OCB 1-8 and OCB 7-8 Open; PMG Breaker Open. • Verify Emergency Diesel Generators running, with cooling valves open (1SX169A and 1SX169B); dispatches operator to locally check diesel operation. • Verify Control Room Ventilation Aligned for Emergency Operation: <ul style="list-style-type: none"> • Checks RM-11, Grid 2, 0PR31J-0PR34J < high alarm setpoint. • Checks operating VC train equipment running: <ul style="list-style-type: none"> • Supply fan • Return fan • M/U fan • Chilled Water pump • MCR Chiller • Checks Operating VC train dampers aligned: <ul style="list-style-type: none"> • M/U fan outlet damper (0VC024Y/0VC08Y) NOT FULLY CLOSED. • VC train M/U Filter Light Lit • Checks Operating VC Train Charcoal Absorber Aligned: <ul style="list-style-type: none"> • Bypass damper closed (0VC43Y/0VC44Y) • Inlet damper Open (0VC21Y/0VC05Y) • Outlet Damper Open (0VC22Y/0VC06Y) • Control Room pressure (MCR/TB DP, 0PDI-VC038) > +0.125" H2O.

Comments: _____

Scenario No: 01-3		Event No. 6 and 7
Event Description: 1C RCP Seal leak worsens requiring Rx Trip, resulting in LBLOCA. Only one CS Train Available, Loss of Emergency Coolant Recirculation.		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify Aux Bldg Ventilation Aligned for Emergency Operation: <ul style="list-style-type: none"> • Inaccessible Filter Plenums – Only TWO Aligned with Charcoal Absorbers On Line: <ul style="list-style-type: none"> ○ Plenum A: <ul style="list-style-type: none"> ○ Fan 0VA03CA Running with Flow Control Damper (0VA022Y) Open and Byp Isol Damper (0VA020Y) Closed. ○ Fan 0VA03CB Running with Flow Control Damper (0VA023Y) Open and Byp Isol Damper (0VA436Y) Closed. ○ Plenum B: <ul style="list-style-type: none"> ○ Fan 0VA03CC Running with Flow Control Damper (0VA024Y) Open and Byp Isol Damper (0VA021Y) Closed. ○ Fan 0VA03CD Running with Flow Control Damper (0VA025Y) Open and Byp Isol Damper (0VA437Y) Closed. ○ Plenum C: <ul style="list-style-type: none"> ○ Fan 0VA03CE Running with Flow Control Damper (0VA067Y) Open and Byp Isol Damper (0VA052Y) Closed. ○ Fan 0VA03CF Running with Flow Control Damper (0VA072Y) Open and Byp Isol Damper (0VA438Y) Closed.
	BOP	Verify FHB Ventilation Aligned for Emergency Operation: <ul style="list-style-type: none"> • FHB Charcoal Absorbers -One Train Aligned: <ul style="list-style-type: none"> ○ Train A: <ul style="list-style-type: none"> • Fan 0VA04CA Running • 0VA060Y Charcoal Absorber Inlet Isol Damper – Open. • 0VA057Y Filter Flow Control Damper – Open. • 0VA051Y Charcoal Absorber Bypass Isolation Damper – Closed. ○ Train B: <ul style="list-style-type: none"> • Fan 0VA04CB Running • 0VA055Y Charcoal Absorber Inlet Isol Damper – Open. • 0VA062Y Filter Flow Control Damper – Open. • 0VA435Y Charcoal Absorber Bypass Isolation Damper – Closed.
	RO	Check PZR Spray Valves and Porvs: <ul style="list-style-type: none"> • Spray valves (1RY455B and 1RY455C) Closed. • Porvs (1RY455A and 1RY456) Closed.

Comments: _____

Scenario No: 01-3		Event No. 6 and 7
Event Description: IC RCP Seal leak worsens requiring Rx Trip, resulting in LBLOCA. Only one CS Train Available, Loss of Emergency Coolant Recirculation.		
Time	Position	Applicant's Actions or Behavior
	RO	Maintain RCS Temperature Control and RCP Status: <ul style="list-style-type: none"> • With NO RCPs running – RCS Cold leg temperatures all < 557 and decreasing. <ul style="list-style-type: none"> • Maintains > 500 gpm AF flow until at least one SG is 10% (31% Adverse). • Verifies All MSIVs and Bypasses are Closed. • Reports all RCPs are OFF.
	BOP	Evaluates for faulted SG and ruptured SG: <ul style="list-style-type: none"> • Reports NO SG pressure decreasing in an uncontrolled manner. • Reports NO SG completely depressurized. • Reports the following have all remained less than Alert Alarm Setpoints: <ul style="list-style-type: none"> • SJAEG/Gland Steam Exhaust Gas Radiation (1PR27J) • SG Blowdown Liquid Radiation (1PR08J) • Main Steam Line Radiation (1TR-AR022 and 1RT-AR023) for all Steam Lines.
	ROBOP	Evaluates if RCS Intact: <ul style="list-style-type: none"> o Cnmt Area radiation has exceeded Alert Alarm Setpoints (1RT-AR014, or 1RT-AR011/012, or 1RT-AR020/21). o Cnmt pressure has exceeded 3.4 psig. o Cnmt Floor water level has exceeded 5 inches.
	US	Diagnoses RCS is NOT Intact, and Transitions to 1BwEP-1, LOSS OF REACTOR OR SECONDARY COOLANT, and directs actions: <ul style="list-style-type: none"> • Get acknowledgements from RO and BOP. • Informs SM of plant status; evaluates for GSEP. • Directs STA to monitor Status Trees.
		Note: Status Tree monitoring will be performed by an instructor who will role play as the STA when asked. The Integrity Status Tree and the Containment Status Tree will both be challenged. The evaluation for the use of these procedures are found starting on page 32 for the Integrity challenge (1BwFR-P.1) and page 32 for the Containment challenge (1BwFR-Z.1).

Comments: _____

Scenario No: 01-3		Event No. 6 and 7
Event Description: 1C RCP Seal leak worsens requiring Rx Trip, resulting in LBLOCA. Only one CS Train Available, Loss of Emergency Coolant Recirculation.		
Time	Position	Applicant's Actions or Behavior
	RO	Performs actions of 1BwEP-1, LOSS OF REACTOR OR SECONDARY COOLANT, as directed: <ul style="list-style-type: none"> • Maintains seal injection to all RCPs • Reports NO RCPs are running.
	BOP	Performs actions of 1BwEP-1, LOSS OF REACTOR OR SECONDARY COOLANT, as directed: <ul style="list-style-type: none"> • Determines all SGs are intact: <ul style="list-style-type: none"> • No SG pressure decreasing uncontrollably. • No SG completely depressurized • Determines No SGTR exists: <ul style="list-style-type: none"> • Maintains total AF Flow > 500 gpm until at least one narrow range SG levels > 10% (31% Adverse). • Controls SG levels between 10% (31% Adverse) and 50%. • Reports NO SG level increasing in an uncontrolled manner. • Determines all secondary radiation levels/trends are normal on the RM-11 or HMI: <ul style="list-style-type: none"> • SJAE/GS Exh 1PR27J • SG B/D 1PR08J • MSL 1RT-AR022/23 for all MSLs
	RO	Check PZR PORVs and Isolation valves: <ul style="list-style-type: none"> • PORV Isolation valves (1RY8000A and 1RY8000B) Energized and Open. • Porvs (1RY455A and 1RY456) Closed.
	US/RO	Determines ECCS Flow should NOT be Reduced: <ul style="list-style-type: none"> • RCS Subcooling is NOT Acceptable per Iconic Display or Attachment A.
	BOP/US	Determines CS should NOT be Stopped: <ul style="list-style-type: none"> • 1B CS pump is running. • Resets CS signal • Spray Additive Tank Lo-2 Lights are NOT lit yet. • Spray Termination Criteria (2 hr run time) NOT met yet.

Comments: _____

Scenario No: 01-3		Event No. 6 and 7
Event Description: 1C RCP Seal leak worsens requiring Rx Trip, resulting in LBLOCA. Only one CS Train Available, Loss of Emergency Coolant Recirculation.		
Time	Position	Applicant's Actions or Behavior
	BOP/US	Determines RH Pump should NOT be Stopped: <ul style="list-style-type: none"> • Reset SI: <ul style="list-style-type: none"> • Depress Both SI Reset Pushbuttons. • Verify SI Actuated Permissive light NOT LIT. • Verify AUTO SI BLOCKED permissive light LIT. • Checks RH pump suction aligned to RWST (1RH8812B Open) • Checks RCS Pressure < 325 psig.
	BOP	Performs subsequent actions of 1BwEP-1 as directed: <ul style="list-style-type: none"> • Determines DGs may be stopped: <ul style="list-style-type: none"> • Checks 4KV ESF buses energized. • Checks 4KV Non-ESF buses energized. • Coordinates with local operator to stop both DGs and place in standby per BwOP DG-12, DIESEL GENERATOR SHUTDOWN.
	CREW	Initiate Evaluation of Plant Status: <ul style="list-style-type: none"> • Verify Cold Leg Recirculation capability: <ul style="list-style-type: none"> • Power available to 1B RH pump • 1SI8811B valve position light lit. • Check Aux Bldg Radiation levels NORMAL for plant conditions on RM-11 or HMI: <ul style="list-style-type: none"> • Unit 1 and Unit 2 Aux Bldg Vent Stack (1PR28J, 1PR30J, 2PR28J, 2PR30J) • ECCS Pump Cubicles (1PR13J through 1RP18J) • Grid 4 Aux Bldg area Radiation. • Reset Cnmt Isolation Phase A if necessary. • Place Hydrogen Monitors in service per BwOP PS-9, POST LOCA CNMT HYDROGEN MONITORING SYSTEM OPERATION. • Obtain samples: <ul style="list-style-type: none"> • RCS Activity • RCS Boron Concentration • Cnmt Atmosphere and Cnmt Sump.

Comments: _____

Scenario No: 01-3		Event No. 6 and 7
Event Description: 1C RCP Seal leak worsens requiring Rx Trip, resulting in LBLOCA. Only one CS Train Available, Loss of Emergency Coolant Recirculation.		
Time	Position	Applicant's Actions or Behavior
	BOP/US	Evaluate plant equipment: <ul style="list-style-type: none"> • At SM discretion, prepare both Hydrogen Recombiners for operation per BwOP OG-10, STARTUP OF A HYDROGEN RECOMBINER. • Trip all HD pumps. • Shutdown all FW pumps per BwOP FW-3, SHUTDOWN OF A TURBINE DRIVEN MAIN FEEDWATER PUMP. • Shutdown all unnecessary CD/CB pumps per BwOP-CD/CB-2, CONDENSATE/CONDENSATE BOOSTER SYSTEM SHUTDOWN. • Shutdown all unnecessary CW pumps per BwOP CW-2, CIRCULATING WATER PUMP/SYSTEM SHUTDOWN. • Shutdown chiller on Non Operating VC Train by momentarily placing control switch in Trip.
		Note: Depending on the timing, the crew may cycle back to 1BwEP-1 Step 11, to continue evaluating plant status while awaiting the RWST LO-2 setpoint. Reaching the LOW-2 RWST setpoint prior to getting to this step may also occur, necessitating a transition to 1BwEP ES-1.3 at that time, even if the crew is in the middle of one of the 1BwFR procedures.
	RO/US	Determine Transfer to Cold Leg Recirculation is necessary: <ul style="list-style-type: none"> • RCS pressure < 325 psig. • 1B RH pump Flow (1FI-619) > 1000 gpm. • 1BwEP ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, NOT previously entered. • RWST level < 46%.
	US	Announces transition to 1BwEP ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, when RWST LO-2 Level is reached, and directs actions: <ul style="list-style-type: none"> • Get acknowledgements from RO and BOP. • Informs SM of plant status, evaluate for GSEP. • Reviews Notes to perform steps 1-6 without delay, and to NOT implement BwFRs until completion of step 6, unless a transition to 1BwCA1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION is made. • Reviews Operator Action Summary Page Item to Stop all pumps taking suction from RWST if level decreases to 7% unless suction flowpath is established from Cnmt Sump.
	BOP	Performs actions of 1BwEP ES-1.3 as directed: <ul style="list-style-type: none"> • Establishes CC flow to 1B RH heat exchanger: <ul style="list-style-type: none"> • Opens 1CC9412B. • Checks CC flow to 1B RH Hx (1FI-0688) > 5000 gpm.

Comments: _____

Scenario No: 01-3		Event No. 6 and 7
Event Description: 1C RCP Seal leak worsens requiring Rx Trip, resulting in LBLOCA. Only one CS Train Available, Loss of Emergency Coolant Recirculation.		
Time	Position	Applicant's Actions or Behavior
	BOP	Check Adequate Cnmt Sump Level: <ul style="list-style-type: none"> • CNMT Floor water level at least 8 inches (13 inches Adverse) on 1LI-PC006 or 1LI-PC007.
	BOP	Align RH Pumps Suction to Cnmt Sumps <ul style="list-style-type: none"> • Determines 1A RH pump is NOT running and Closes 1SI8812A. • Determines 1SI8811B did NOT AUTO Open and performs actions of Attachment A as directed. • Determines Train A is NOT available. • Reports 1SI8811B is Closed and energized, with 1B RH pump running. • Attempts to Manually Align 1B RH pump Suction to Cnmt Sump: <ul style="list-style-type: none"> • Place 1B RH pump in Pull Out. • Close RH pumps 1B Suction from RWST isol valve (1SI8812B) • Place 1B CS pump in Pull Out • Close CS pump 1B RWST Suction valve (1CS001B) • Open 1B RH pump Cnmt Sump Isol valve • Reopen 1CS001B • Restart 1B CS pump by taking control switch out of Pull Out, (and if necessary because CS Actuation Signal has been reset with Cnmt Pressure < 20 psig, Manually Actuate CS and Phase B Isolation) • Determine at least one Cnmt Sump Recirc Flowpath does NOT exist: <ul style="list-style-type: none"> • 1A RH pump is NOT available • 1B RH pump is NOT aligned to Cnmt Sump.
	US	Diagnose/Announce a Loss of Emergency Coolant Recirculation, and transitions to 1BwCA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION, and directs actions: <ul style="list-style-type: none"> • Get acknowledgements from RO and BOP. • Informs SM of plant Status, evaluate for GSEP.
	BOP	Performs actions of 1BwCA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION, as directed: <ul style="list-style-type: none"> • Reports Train B Available – 1B RH pump is available, and 1SI8811B is energized. • Determines RWST LO-2 Level Alarm (1-6-B7) is Lit. • Determines 1SI8811B is NOT open and dispatches operator(s) to open 1SI8811B. • Verifies adequate Cnmt Sump level – at least 8 inches (13 inches Adverse) on 1LI-PC006/007. • Determine emergency coolant recirculation on at least one train NOT yet restored.

Comments: _____

Scenario No: 01-3		Event No. 6 and 7
Event Description: 1C RCP Seal leak worsens requiring Rx Trip, resulting in LBLOCA. Only one CS Train Available, Loss of Emergency Coolant Recirculation.		
Time	Position	Applicant's Actions or Behavior
		Note: The following Critical Task conditions may present themselves at any time after reaching the LO-3 RWST level.
	BOP CT: CA-1.1— A.	Stop pumps with suctions aligned to the RWST before they cavitate and/ or Trip: <ul style="list-style-type: none"> • Stop 1A and 1B CV pumps • Stop 1A and 1B SI pumps • Stop 1B RH pump. • Stop 1B CS pump if suction still aligned to RWST (1CS001B still Open, and 1CS009B still closed.)
	RO	Perform actions of 1BwCA-1.1 LOSS OF EMERGENCY COOLANT RECIRCULATION, as directed: <ul style="list-style-type: none"> • Reset SI (if not previously performed): <ul style="list-style-type: none"> • Depress Both SI Reset Pushbuttons. • Verify SI ACTUATED permissive light NOT Lit. • Verify AUTO SI BLOCKED permissive light Lit. • Reset SI Recirc Sump Isolation valves – 1SI8811A/1CV8110 and 1SI8811B/1CV8111.
	RO CT: CA-1.1— B.	Add makeup to the RWST as necessary per BwOP SI-13, Filling the RWST: <ul style="list-style-type: none"> • Determine the required blended flow boron concentration to the RWST. • Determine the required 4% Boric Acid Flowrate to obtain the desired blended flowrate. • Place the Reactor Make-up Control Switch to Stop. • Place the Reactor Makeup Mode Selector Switch to Manual. • Set the Makeup Control System thumbwheels for Primary Water and Boric Acid to the desired numbers in accordance with BwOP CV-7. • Set the Blend Control Station 1FK110, for Boric Acid to the desired position. • Set Blend Control Station 1FK111, for Primary Water to the Desired position. • Dispatch operator to verify Close 1CV8553, Boric Acid Blender to HUT. • Dispatch operator to Close 1CV8428, BA Blender to CV pumps isolation valve. • Open 1CV110B, Boric Acid Blender to CV pumps valve. • Dispatch operator to Open 1CV8432, Boric Acid Supply to the RWST. • Dispatch operator to Unlock and Open 1CV8434, Boric Acid Supply to RWST. • Place Reactor Coolant Makeup Control Switch to Start. • Verify/Start 0PW02PA or 0PW02PB, PW Makeup Pump. • Verify/Start 1AB03P, Boric Acid Transfer Pump • Contact Chemistry to sample the Blended flow to the RWST. • Monitor Aux Bldg PR detectors (0REPR025A, B, and C) and RWST level on 1LI930-933 at 1PM06J.

Comments: _____

Scenario No: 01-3

Event No. 6 and 7

Event Description: 1C RCP Seal leak worsens requiring Rx Trip, resulting in LBLOCA. Only one CS Train Available, Loss of Emergency Coolant Recirculation.

Time	Position	Applicant's Actions or Behavior
	BOP	Perform actions of 1BwCA-1.1 as directed: <ul style="list-style-type: none"> • Check Intact SG levels > 10% (31% Adverse) • Control feed flow to maintain levels between 10% (31% Adverse) and 50%.
	CREW	Initiates RCS Cooldown to 200 degrees F as follows: <ul style="list-style-type: none"> • Maintains Cooldown rate < 100 degrees F in any one hour in the RCS Cold legs. • Determine P-11 is Lit, and Blocks Low Pressure SI, and STM Line SI. • Uses SG Porvs to dump steam as necessary. • Verify RCFCs running in Accident Mode- Group 2 RCFC Accident Mode status lights Lit.
	BOP	Perform actions of 1BwCA-1.1 for RWST LESS THAN 7%: <ul style="list-style-type: none"> • Report RWST level < 7%. • Stop Pumps taking suction from RWST, by taking control switches to Pull Out: <ul style="list-style-type: none"> • 1B RH pump • Both SI pumps • 1B CS Pump • Both CV pumps • Try to add makeup to RCS from Rx Makeup system: <ul style="list-style-type: none"> • Reset Cnmt Phase A if necessary. • Check SACs – Any running, restore Instrument Air to Cnmt- Open IIA065 and IIA066. • Establish VCT level > 37%, and VCT pressure 15 to 65 psig. • Open 1CV112B and 1CV112C. • Close 1CV112D and 1CV112E. • Check Closed 1CV8804A, 1SI8807A and 1SI8807B, or 1SI8924. • Reset SI CV pump miniflow isol valves – 1CV8114 and 1CV8116 • Verify CV pump miniflow valves open – 1CV8110, 1CV8111, 1CV8114, and 1CV8116. • Close 1SI8801A and 1SI8801B. • Place 1CV182 to 0% demand. • Open 1CV8105 and 1CV8106. • Close 1CV8355A-D if RCP lower radial bearing temperatures >225 degrees F. • Start 1CV pump. • Throttle 1CV182 to maintain 8-13 gpm seal infection per RCP. • Throttle 1CV121 to maintain desired charging flow. • Maximize makeup to VCT.

Comments: _____

Scenario No: 01-3		Event No. 6 and 7
Event Description: 1C RCP Seal leak worsens requiring Rx Trip, resulting in LBLOCA. Only one CS Train Available, Loss of Emergency Coolant Recirculation.		
Time	Position	Applicant's Actions or Behavior
		Note: If the STA identifies a challenge to the Integrity Status Tree and recommends transition to 1BwFR-P.1 RESPONSE TO IMMINENT PTS CONDITION, the following may be used to evaluate.
	US	Announce transition to 1BwFR-P.1, RESPONSE TO IMMINENT PTS CONDITION, and directs actions: <ul style="list-style-type: none"> • Get acknowledgements from RO and BOP. • Informs SM of plant status, evaluate for GSEP.
	RO/US	Determine RCS Pressure is < 325 psig and returns to procedure and Step in effect.
		Note: If the STA identifies a challenge to the Containment Status Tree and recommends transition to 1BwFR-Z.1 RESPONSE TO HIGH CONTAINMENT PRESSURE, the following may be used to evaluate.
	US	Announce transition to 1BwFR-Z.1, RESPONSE TO CONTAINMENT HIGH PRESSURE, and directs actions: <ul style="list-style-type: none"> • Get acknowledgements from RO and BOP. • Informs SM of plant status, evaluate for GSEP. • If 1BwCA 1.1 is in effect, then CS should be operated per 1BwCA-1.1 vice 1BwFR-Z.1.
	BOP	Performs actions of 1BwFR-Z.1, as directed: <ul style="list-style-type: none"> • Verify Cnmt Isolation Phase A – Group 3 CNMT Isol monitor lights Lit. • Verify Cnmt Ventilation Isolation -Group 6 CNMT Vent Isol monitor lights Lit. • Determine CS is required – Cnmt pressure had exceeded 20 psig. • Stop all RCPs • Verify Proper CS Emergency Alignment: <ul style="list-style-type: none"> ○ 1CS001A or 1CS009A open • 1CS001B or 1CS009B open ○ 1CS007A open, manually open if necessary. • 1CS007B open • 1CS019A and B Not Open: <ul style="list-style-type: none"> • Places CS pump test switch in Test • Manually open 1CS019B • Place CS pump test switch in Normal • 1CS010B Open • 1B CS Pump running (1A CS pump not running) ○ Manually actuate CS and Phase B Isolation.

Comments: _____

Simulation Facility Braidwood Scenario No.: 01-4 Operating Test No.: 1

Examiners: _____ Applicant: _____ SRO
 _____ RO
 _____ BOP

Initial Conditions: IC-16, 50% power, equilibrium xenon, steady state.

Turnover: A 60 gpd tube leak in 1D SG has been ongoing for 48 hrs. Steps 1-9 of 1BwOA SEC-8 are complete. Ongoing sample reports are due shortly after shift turnover. 1A MFP is unavailable. 1D SG PORV is isolated due to leaky. MESACs on 1A SGWLC instrumentation were completed last shift. The unit has been requested to ramp to full power.

Event No.	Malf. No.	Event Type*	Event Description
Preload	TH03D, .042 gpm SI12A SI01B Override	C RO SRO BOP C BOP C BOP C BOP	60 gpd tube leak 1D SG. 1A SI pump fails to Auto start, can be manually started. 1B SI pump fails to Auto and Manual start. 1D MSIV fails to manually close, can Auto close.
1	TH03D, 0.115 gpm	C SRO	Leak in 1D SG increases to > procedural limit requiring shutdown.
2		R RO SRO N BOP	Lower reactor power with boration and control rods. Ramp down turbine power form 50% to off line.
3	RX21A, 2500 TH11A, 100	I RO SRO C RO SRO	1PT-455 Controlling pressure Channel fails high, causing 1RY455 PZR PORV open and stick open.
4	CV01A	C RO SRO	1A CV pump trip.
5	FW16, 1500, 3 min ramp	I BOP SRO	Main Feed Header Pressure controller fails high, 1.5 min ramp.
6	EG03, 100	C BOP SRO	Main Generator Field Force – Auto Voltage Regulator Failure.
7	TH03D, 500, 5 min ramp	M BOP RO SRO	1D SG Tube leak increases to 500 gpm over 5 minutes.
8	MS03H, 100 MS03L, 100	M BOP SRO RO	Main steam safety valve(s) on 1D SG fails open resulting in faulted ruptured SG.
9	SI01B SI12A	C BOP RO SRO	1B SI pump fails to Auto and Manually Start. 1A SI pump fails to Auto Start, can be manually started. 1D MSIV fails to manually close, can auto close.

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

SCENARIO 01-4 OVERVIEW

The scenario begins with the unit at 50% power steady state. A report just after turnover confirms 165 gpd tube leakage in 1D S/G. This is an increase from 60 gpd at the beginning of last shift. Steps 1-9 of 1BwOA SEC-8, "STEAM GENERATOR TUBE LEAK" are complete. 1B SI pump will fail to start. 1A MFP is unavailable due to breaker cubicle work, and 1D S/G PORV is isolated due to leakby. MESACs on 1A SGWLC instrumentation were completed last shift.

The SRO will determine the unit must be shutdown within 2 hrs due to exceeding the procedural limit for tube leakage per 1BwOA SEC-8 SGTL, step 10. After clearly observable plant response to the reactivity change for shutting down, the controlling pressurizer pressure channel will fail high causing a PZR PORV to open and stick. The RO will diagnose the pressure channel failure and the PORV sticking open from alarms, meter indications, and decreasing PZR pressure. The RO will attempt to close the failed open PZR PORV, and then close its block valve to stop the pressure decrease. Manual action will also be required to close the PZR spray valves. The SRO will enter and direct actions from 1BwOA INST-2 Attachment B, "PRESSURIZER PRESSURE CHANNEL FAILURE," to select an operable channel, restore pressure, trip bistables and investigate Tech Specs. LCO 3.3.1 conditions E and K, LCO 3.3.2 condition D, LCO 3.3.4 condition A, and LCO 3.4.1 condition A apply for the failed instrument. Tech spec 3.4.11 applies for the PZR PORV and power will be removed from the block valve. Maintenance will investigate as requested.

After the bistables are tripped for the failed pressure channel, the operating CV pump will trip. The RO will diagnose this failure from the annunciators, pump tripped indications, and a loss of charging flow. The SRO will enter and direct actions from 1BwOA PRI-15, "LOSS NORMAL CHARGING" to verify the tripped pump was not gas bound, start the standby charging pump, and investigate Tech Specs. LCO 3.5.2 condition A and TLCO 3.1.d apply. Maintenance will investigate as requested.

After swapping charging pumps, the Main Feed Header Pressure instrument will drift high causing the SG levels to decrease due to decreasing feed pump speed. The BOP will diagnose the failure from an increasing indication on MCB meter 1PI-508 and level deviation alarms for each SG, and restore main feed pump speed via manual control. The SRO will direct the actions based on the annunciator response procedure. Maintenance will investigate as requested.

After stabilizing feed flows, the automatic voltage regulator (AVR) will increase its output, overexciting the main generator. The BOP will diagnose this failure from main control board indications and alarms. The SRO will direct the BOP to take the regulator to OFF or TEST and reduce voltage to within acceptable limits per the annunciator response procedures. Maintenance will investigate as requested.

Shortly after the generator is stabilized, the tube leak on 1D SG will increase in severity to 500 gpm over 5 minutes. The RO will report decreasing pressurizer level, the BOP will report decreasing feed flow on 1D SG and water level stable or increasing. The MSL rad monitors will indicate increases. The SRO will determine PZR level can NOT be maintained, order a Reactor Trip and SI, and enter and direct response from 1BwEP-0, "REACTOR TRIP OR SAFETY INJECTION". The crew will perform Immediate and subsequent actions, diagnosing a SGTR in 1D S/G, and transition to 1BwEP-3 SGTR. The 1A SI pump will fail to start automatically but can be manually started. When an attempt is made to close the 1D MSIV, it will not close. The use of the MSIV Isolation switch will close all MSIVs. When the RH

Comments: _____

pumps are stopped, a Main Steam Safety valve on 1D SG will fail open. The crew will diagnose the faulted ruptured steam generator by the decrease in steam generator pressure and transition to 1BwCA-3.1, "SGTR WITH LOSS OF REACTOR COLLANT – SUBCOOLED RECOVERY DESIRED." Initiation of further RCS cooldown will depend on the previous cooldown rate not exceeding 100 degrees F in any 1 hr. The scenario ends after the crew determines if a subcooled recovery is appropriate.

Critical Tasks

- E-0—J: Establish flow from at least one intermediate head (SI) ECCS pump before transition out of E-0.
- E-3—A: Isolate feed water flow into and steam flow out from the ruptured steam generator before a transition to ECA-3.1 occurs.
- ECA-3.1—B: Cooldown the RCS to cold shutdown conditions at the highest rate achievable but less than 100 degrees F per hour in all RCS cold legs.

Comments: _____

SIMULATOR OPERATOR NOTES

Simulator Setup:

IC-16, 50% power, MOC, Xenon Equilibrium, steady state.

Align switches. Perform "Ready for Training" checklist.

Insert PRELOAD Events:

Take 1A MFP CS to PTL and hang tag.

Close 1MS019D. RF MS54 CLOSE. Put orange dot on 1D S/G Porv M/A station and Control Switch.

IMF TH03D 0.042 gpm (~ 60 gpd tube leak 1D S/G.)

IMF SI12A 1A SI pump fails to Auto Start, can be Manually started.

IMF SI01B 1B SI pump fails to Auto and Manually Start.

IOR ZDI1MS001D AUTO (override control switch for 1D MSIV to "AS IS" position forcing closure of ALL MSIVs.)

Event 1 Increase in tube leakage to greater than allowed by tech specs and procedures.

SDG:

Malf: TH03D, 0.115 gpm

NOTE: The minor increase in tube leakage in 1D SG is intended to cause the SRO to make a decision to shutdown based on exceeding allowable limits per Tech Specs and the procedure. A phone call from chemistry to the control room is necessary to report sample results confirm an increase in tube leakage to 165 gpd. (150 gpd is the limit.)

Initiate the event immediately after turnover or at the lead examiner's cue.

Acknowledge all info passed to the SM, WEC, and maintenance.

Event 2 Power reduction.

As SM, and Elec Ops acknowledge power reduction.

As Chemistry and RP acknowledge power reduction and requests for samples and RETS actions.

Event 3 Controlling PZR Pressure Channel fails high (2500 psig) causing PZR PORV to open and stick.

SDG: RX8

Trigger: When PORV 1RY 455 > 0, then IMF TH11A, 100.

Malf: RX21A, 2500

Initiate event after clearly observing reactivity change/response of plant to requested power ramp or at lead examiners cue.

Role play as U-2 admin and/or extra NSO to accomplish bistable tripping. Acknowledge all info passed to the SM, WEC, and maintenance.

SDG:

Comments: _____

Cabinet door #1 open				RF	RX20	OPEN
Pzr Press High Pressure Rx Trip	PB455A	C1-153	BS-1	RF	RX032	TRIP
Pzr Press Low Press Rx Trip	PB455C	C1-153	BS-4	RF	RX034	TRIP
Pzr Low Press SI	PB455D	C1-153	BS-3	RF	RX035	TRIP
P-11	PB455B	C1-153	BS-2	RF	RX033	TRIP
OTDT Rx Trip	TB411C	C1-124	BS-3	RF	RX013	TRIP
OTDT Runback	TB411D	C1-124	BS-4	RF	RX135	TRIP
Cabinet door #1 Close				RF	RX20	CLOSE

When requested to remove power from the block valve, 1RY8000A: RF ED058C OPEN.

Event 4 1A CV pump Trip.

SDG:

Malf: CV01A

Initiate event after actions for failed Pzr pressure control instruments and PORV are completed or at the lead examiners cue.

If sent to locally investigate the 1A CV pump and breaker, wait 3 minutes, perform first check, and report no apparent cause at the breaker (bus 141 cub ____). If asked about 1A CV pump seal leakoff, report leakoff as "less than when it was running".

If sent to check the 1B CV pump, wait 3 minutes, perform first check, and report "normal operating conditions". If asked about seal leakoff, report "it looks about the same as when 1A CV pump runs".

Acknowledge all info passed to the SM, WEC, and maintenance.

Remote Starts or Stops of the Aux Lube Oil pumps can be accomplished by:

RF CV76

Event 5 Main Feed Header Pressure Controller (IPT-508) fails high over 3 minutes.

SDG:

Malf: FW16, 1500 psig, 1.5 minute ramp.

Initiate failure after tech specs are investigated for the CV pump trip, or at lead examiners cue.

Acknowledge all info passed to the SM, WEC, and maintenance.

Event 6 Main Generator Field Force – Auto voltage regulator failure, manual control available.

SDG:

Malf: EG03, 100

NOTE: Failure to take prompt action to reduce exciter field current will result in a generator trip reactor trip.

Initiate excitation problem after actions are taken to stabilize feed flow and SG levels, or at lead examiners cue.

Acknowledge all info passed to the SM, WEC, and maintenance.

Comments: _____

Event 7 SGTR 1D SG. Leakage increases to 500 gpm over 5 minutes.

SDG:

Malf: TH03D, 500 gpm, 5 minute ramp.

Initiate malfunction after actions are taken to manually control main generator exciter field current, or at lead examiners cue.

Acknowledge all info passed to the SM, WEC, and maintenance.

If requested to investigate failure of 1D MSIV report assistance is being called out.

3 minutes after steam is being dumped out of the SG Porvs for the cooldown, call the control room as Security, and report steam is visible coming out of the top of the applicable (1A and 1D; and/or 1B and 1C) MSIV room enclosures.

Event 8 Main Steam Safety Valve fails open.

SDG:

Malf: MS03H, 100

Malf: MS03L, 100 if necessary to get a depressurization of the 1D SG to less than 320 psig.

Ensure the safety valve fails open when the RH pumps are stopped.

Trigger: When 1B RH pump CS is OFF, then IMF MS03H 100 (and MS03L 100 if necessary).

If asked about steam flow from any MSIV room enclosures, there will be steam flow from the 1A and 1D MSIV enclosures if steam is being dumped from 1A SG during the cooldown. Additional steam flow will be visible when 1D SG safety opens, but you won't be able to tell specifically that the flow is from the 1D SG, just that there is flow from the top of the 1A and 1D enclosure. If steam is still being bled from the 1B and or 1C SG Porvs, then if asked, report steam flow from the 1B and 1C room enclosure.

If asked, the H2 monitors can be placed in service on Low Scale by:

RF CH01 Low

RF CH06 Low

Comments: _____

Scenario No: 01-4		Event No. 1 and 2
Event Description: SGTL increases to greater than procedural limit and requires a shutdown of the unit be completed within 2 hrs.		
Time	Position	Applicant's Actions or Behavior
	CUE	Report from chemistry indicating an increase in tube leakage from 60 to 165 gpd. Procedural direction from step 10 of 1BwOA SEC-8 SG Tube Leak to shutdown within 2 hrs.
	US	Determine Unit shutdown to mode 3 must be complete within 2 hrs/ Announce to RO and BOP: <ul style="list-style-type: none"> • Get acknowledgements from RO and BOP • Inform SM of plant status; evaluate GSEP. • Inform WEC of plant status. • Implement 1BwGP 100-4T3, "RAPID POWER REDUCTION FLOWCHART" and/or 1BwGP 100-4T2 Boration Dilution Boundary Calculation. • Contact Chemistry and HP for load change.
	RO/BOP	Perform actions as directed: <ul style="list-style-type: none"> • Review Precautions, Prerequisites, and Limitations and Actions of 1BwGP 100-4T3. • Initial flowchart. • Take RRD Data.

Comments: _____

Scenario No: 01-4		Event No. 1 and 2
Event Description: SGTL increases to greater than procedural limit and requires a shutdown of the unit be completed within 2 hrs.		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Verify rod position and boron concentration.</p> <p>Initiate boration, if required. (BwOP CV-6, Rev. 13.)</p> <ul style="list-style-type: none"> • Determine required boric acid volume by: <ul style="list-style-type: none"> ○ Effects of previously performed borations ○ Braidwood Boration Dilution Tables • Determine required boric acid flow rate. • Set 1FK-110 BA Flow Cont to desired boration rate. • Set 1FY-0110 BA BlenderPreset Counter to desired volume. • Place MAKE-UP MODE CONT SWITCH to STOP position. • Set MU MODE SELECT to BOR position. • Place MAKE-UP MODE CONT Switch to START • Verify proper operation of valves and BA transfer pump (CV110B open, BA pump is running, CV110A throttles opens, BA flow on recorder. <p>OR</p> <p>Batch addition:</p> <ul style="list-style-type: none"> • Open CV110B. • Open CV110A. • Start BA Transfer pump. • When desired amount of BA added, stop BA Transfer pump. • Close CV110A ○ Flush BA line. • Close CV110B.
	BOP	<p>Initiate turbine load reduction:</p> <ul style="list-style-type: none"> • Depress LOAD RATE MW/MIN • Enter desired value for rate – 5MW/min • Depress REF • Enter power level 185 MW. • When ready to begin, depress GO. <p>Verify load decreases.</p>

Comments: _____

Scenario No: 01-4		Event No. 1 and 2
Event Description: SGTL increases to greater than procedural limit and requires a shutdown of the unit be completed within 2 hrs.		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Monitor power decrease:</p> <ul style="list-style-type: none"> • Monitor reactor power, Tave, ΔI • Verify rods move in AUTO to maintain Tave within ± 1 degree F of Tref. <p>If borating:</p> <ul style="list-style-type: none"> • Monitor VCT level • Verify RCS boron concentration increasing • Monitor BA Blender counter • Verify boration auto stops at preset value. ○ Flush the BA line if desired. • Return Reactor Makeup System to blended flow at current blended flow. • If required to equalize boron concentration between the PZR and the loops, open PZR sprays by placing B/U HTR GRPS A/B/D Contactor Control Switch to the on position
		Note: Following clearly observable plant response from the reactivity changes, Event 3 is entered.

Comments: _____

Scenario No: 01-4		Event No. 3
Event Description: Controlling Pressure Channel (IPT-455) fails high, causing PZR Porv 1RY455A to open and stick open, requiring closure of the Porv Block Valve, 1RY8000A.		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: 1-12-B2 PZR PORV OR SAF VLV OPEN 1-12-C6 PZR PORV DSCH TEMP HIGH 1-12-D2 PZR PRESS CONT DEV HIGH Porv 1RY455A OPEN Position Indicating Light Lit. IPI-455 Indicating 2500 psig. Decreasing PZR pressure
	RO/US	Diagnose/Announce PZR Pressure Transmitter failure and 1RY455A is open: <ul style="list-style-type: none"> • Verify PZR Pressure is decreasing and attempt to close 1RY455A. • Close Block Valve 1RY8000A. • Manually Close spray valves.
	US	Implement 1BwOA INST-2 "OPERATION WITH A FAILED CHANNEL", ATTACHMENT B, "PZR PRESSURE CHANNEL FAILURE", and direct actions: <ul style="list-style-type: none"> • Get acknowledgements from RO and BOP. • Inform SM of plant status, evaluate for GSEP. • Direct WEC to write AR, CR, and get maintenance involved. • Briefs Unit 1 NSO and Unit 2 Admin NSO on Bistable tripping.

Comments: _____

Scenario No: 01-4		Event No. 3
Event Description: Controlling Pressure Channel (1PT-455) fails high, causing PZR Porv 1RY455A to open and stick open, requiring closure of the Porv Block Valve, 1RY8000A.		
Time	Position	Applicant's Actions or Behavior
	RO	Perform actions of 1BwOA INST-2 as directed: <ul style="list-style-type: none"> • Determine PZR Pressure NOT NORMAL, and take Manual Control to restore Pressure. • Determine Operable Channel NOT selected, Place the Master PZR Pressure Controller in Manual, Control PZR Pressure, and Select an Operable Channel. • Check PZR Porvs, Spray Valves and Heaters: <ul style="list-style-type: none"> • PORVS Closed. If NOT, and PZR Pressure < 2315 psig, manually close PORV (1RY455A). • When recognized that PORV 1RY455A won't Close, Close Block Valve 1RY8000A. • PZR Spray Valves NORMAL. If not, then manually control. • PZR Heaters NORMAL. • Check PZR Pressure Control In Auto: <ul style="list-style-type: none"> • DOES NOT place 1RY455A in Auto. • 1RY456 in Auto. • Sprays in Auto (after operable channel selected for control). • Master PZR Pressure Controller in Auto. • Select Operable Channels to Recorders: <ul style="list-style-type: none"> • PZR Pressure. • Loop DT. • Coordinates Bistable Tripping: <ul style="list-style-type: none"> • Places colored dots on bistable, indications, and annunciators. • Maintains communications with NSO tripping bistables.
	RO	Ensures the following Bistables are tripped: <ul style="list-style-type: none"> • PB455A • PB455C • PB455D • PB455B • TB411C • TB411D Checks PZR Pressure > 1930 psig and P-11 permissive is NOT Lit (Bypass Permissive 3.3).

Comments: _____

Scenario No: 01-4		Event No. 3
Event Description: Controlling Pressure Channel (1PT-455) fails high, causing PZR Porv 1RY455A to open and stick open, requiring closure of the Porv Block Valve, 1RY8000A.		
Time	Position	Applicant's Actions or Behavior
	US	<p>Refers to Tech Specs, and determines the following:</p> <ul style="list-style-type: none"> • 3.3.1. Conditions E and K apply – Trip channel within 6 hrs. • 3.3.2 Condition D applies – Trip channel within 6 hrs. • 3.3.4 Condition A applies – Restore within 30 days • 3.4.1 Condition A applies – Restore DNB within 2 hrs. • 3.4.11. Condition B applies for PORV. Power needs to be removed from the Block Valve within 1 hr.
	BOP	<p>Perform actions as directed:</p> <ul style="list-style-type: none"> o Assist Unit NSO in monitoring panels and parameters. o Investigate BwARs. o Make phone calls as directed to WEC and maintenance. o Control load ramp o Coordinates removal of power from block valve 1RY8000A.
		Note: Following Tech Spec determination, initiate Event 4.

Comments: _____

Scenario No: 01-4		Event No. 4
Event Description: 1A CV pump trip.		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: 1-9-A3 CHG PUMP TRIP 1-7-B2 RCP SEAL WTR INJ FLOW LOW Charging flow and seal injection flow decreasing to zero. Letdown Temperature increasing.
	RO/US	Diagnose/Announce Trip of 1A CV pump.
	US	Implement 1BwOA PRI-15, "LOSS OF NORMAL CHARGING" and direct actions: <ul style="list-style-type: none"> • Get acknowledgements from RO and BOP. • Inform SM of plant status and evaluate for GSEP. • Inform WEC, Write AR, CR, and get maintenance involved.

Comments: _____

Scenario No: 01-4		Event No. 4
Event Description: 1A CV pump trip.		
Time	Position	Applicant's Actions or Behavior
	RO	Perform actions as directed: <ul style="list-style-type: none"> • Determine NO CV pumps are operating. • Place 1A CV pump control Switch in Pull Out. • Isolate Letdown by closing 1CV8149A, B, and C. • Close 1CV459 and 1CV460. • Check VCT suction Valves Open 1CV112B and 1CV112C. • Maintain VCT level > 20 %. • Check VCT Temp HIGH (1-9-C2) NOT LIT. • Check for Gas Binding of 1A CV pump: <ul style="list-style-type: none"> • RCP #1 Seal leakoff flow fluctuating on all RCPs prior to pump trip. • CV pump flow trend fluctuating prior to pump trip. (Pt. F0128, or HMI group TR048) • CV pump discharge Pressure Trend fluctuating prior to pump trip (Pt. P0103, or HMI group TR048). • CV pump amps observed to be fluctuating prior to trip. • Determines 1A CV pump is NOT Gas bound. • Restore CV pump flow: <ul style="list-style-type: none"> • Check 1CV8110 and 1CV8116 Open. • Check RCS at NOP. • Start 1B CV pump. • Check CV system Alignment: <ul style="list-style-type: none"> • 1CV8146 or 1CV8147 Open • 1CV8324A Open • 1CV8105 and 1CV8106 open • Charging flow established.
	RO	Check Normal Letdown Isolated.
	BOP	Perform actions as directed: <ul style="list-style-type: none"> • Dispatch operator to tripped pump and breaker to investigate cause. • Dispatch operator to Standby pump to check out start. • Trend group TR048 on HMI • Investigate BwARs

Comments: _____

Scenario No: 01-4		Event No. 6
Event Description: Main Generator Field Forcing Alarm. Voltage Regulator Failure causing increased excitation of main generator.		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: 1-19-C8 GENERATOR VOLT REG TROUBLE Exciter Field voltage increasing.
	BOP/US	Diagnose/Announce Generator Field Forcing Alarm.
	US	Direct actions for Generator Field Force Alarm. <ul style="list-style-type: none"> • Get acknowledgements from RO and BOP. • Inform SM of plant status and evaluate for GSEP. • Contact WEC for AR, CR, and maintenance. • Inform Bulk Power and OAD of Voltage Regulator failure. • Refer to figures 1BwGP 100-3A6 and 1BwGP 100-3A7 for MW and VAR limits.
	BOP	Perform actions as directed: <ul style="list-style-type: none"> • Report exciter field current is increasing. • Take Voltage Regulator to OFF. • Reduce exciter field current to < 100 amps by driving the base adjuster in the Lower direction.
	RO	Perform actions as directed: <ul style="list-style-type: none"> • Monitor reactor power and primary parameters. • Monitor secondary parameters as directed. • Investigate BwARs
		Note: After stabilizing the generator, initiate major accident sequence.

Comments: _____

Scenario No: 01-4		Event No. 7 and 8 and 9
Event Description: 1D SG Tube Leak increases to 500 gpm (SGTR). 1A SI pump fails to auto start, 1D MSIV fails to Manually close, and subsequent MS safety opens on 1D SG.		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: 1-15-D9 S/G 1D LEVEL DEVIATION HIGH LOW 1-12-B4 PZR LEVEL CONT DEV LOW Feed Flow decreasing on 1D SG, with constant or increasing level. RM-11 alarms. Decreasing PZR level. Steam Flow indication after MSIV closes on 1D SG
	BOP/US	Diagnose/Announce increasing leakage into 1D SG.
	US	Based on Operator Action Summary Page of 1BwOA SEC-8, "STEAM GENERATOR TUBE LEAK", orders Manual Reactor Trip and SI, implements 1BwEP-0, "REACTOR TRIP OR SI", and directs actions: <ul style="list-style-type: none"> • Get acknowledgements from RO and BOP. • Informs SM of plant status, evaluate for GSEP.
	RO	Performs Immediate Actions of 1BwEP-0, "REACTOR TRIP OR SI": <ul style="list-style-type: none"> • Verify Reactor Trip: <ul style="list-style-type: none"> • Rod Bottom Lights ALL LIT. • Reactor Trip and Bypass Breakers OPEN. • Neutron Flux DECREASING. • Check SI Status: <ul style="list-style-type: none"> o Determines PZR Pressure is decreasing abnormally o Determines PZR level can NOT be maintained > 4%. • Manually Actuates SI.
	BOP	Performs Immediate Actions of 1BwEP-0, "REACTOR TRIP OR SI": <ul style="list-style-type: none"> • Verify Turbine Trip: <ul style="list-style-type: none"> • All Turbine throttle valves CLOSED. • All Turbine governor valves CLOSED. • Verify Power to 4KV ESF Buses: <ul style="list-style-type: none"> • Bus 141 ENERGIZED. • Bus 142 ENERGIZED.

Comments: _____

Scenario No: 01-4		Event No. 7 and 8 and 9
Event Description: 1D SG Tube Leak increases to 500 gpm (SGTR). 1A SI pump fails to auto start, 1D MSIV fails to Manually close, and subsequent MS safety opens on 1D SG.		
Time	Position	Applicant's Actions or Behavior
	BOP	<p>Performs subsequent automatic actions of 1BwEP-0, as directed:</p> <ul style="list-style-type: none"> • Verify FW Isolation: <ul style="list-style-type: none"> • FW pumps TRIPPED. • FW Isolation monitor lights LIT. • FW pumps discharge valves (1FW002A, B, and C) CLOSED. • Verify RCFCs Running in Accident Mode: <ul style="list-style-type: none"> • Group 2 RCFC Accident Mode status lights LIT. • Verify Cnmt Isolations: <ul style="list-style-type: none"> • Cnmt Isolation Phase A: <ul style="list-style-type: none"> • Group 3 CNMT Isol monitor lights LIT. • Cnmt Ventilation Isolation: <ul style="list-style-type: none"> • Group 6 CNMT Vent Isol monitor lights LIT. • Verify AF System: <ul style="list-style-type: none"> • AF Pumps BOTH RUNNING. • AF Isol valves (1AF013A-H) OPEN • AF Flow Control valves (1AF005A-H) THROTTLED. • Verify CC Pumps BOTH RUNNING. • Verify SX Pumps BOTH RUNNING. • Determine MSIVs DO NOT need to be Closed: <ul style="list-style-type: none"> • All SG Pressures > 640 psig. • CNMT Pressure < 8.2 psig. • Determine CS DOES NOT need to be actuated: <ul style="list-style-type: none"> • CNMT Pressure has remained < 20 psig. • Verify Total AF Flow: <ul style="list-style-type: none"> • AF Flow > 500 gpm. • Control feed flow to maintain narrow range level BETWEEN 10% and 50%. • Determine 1D SG level INCREASING IN AN UNCONTROLLED MANNER: <ul style="list-style-type: none"> • Identifies 1D SG as Ruptured, and CLOSES 1AF013D and 1AF013H.
	Partial CT: E.3--A	

Comments: _____

Scenario No: 01-4		Event No. 7 and 8 and 9	
Event Description: 1D SG Tube Leak increases to 500 gpm (SGTR). 1A SI pump fails to auto start, 1D MSIV fails to Manually close, and subsequent MS safety opens on 1D SG.			
Time	Position	Applicant's Actions or Behavior	
	RO CT: E-0—J.	Performs subsequent automatic actions of 1BwEP-0, as directed: <ul style="list-style-type: none"> • Verify ECCS Pumps Running: <ul style="list-style-type: none"> • CV Pumps ONLY 1B RUNNING. • SI Pumps: <ul style="list-style-type: none"> • Determines NEITHER RUNNING, and MANUALLY STARTS 1A SI pump. (1B SI pump fails to start.) • RH Pumps BOTH RUNNING ○ Reports pump failures to US. ○ Dispatches operators to investigate 1B SI pump and breaker. 	
	RO	Performs subsequent actions of 1BwEP-0, as directed: <ul style="list-style-type: none"> • Verify ECCS Valve Alignment: <ul style="list-style-type: none"> • Group 2 Cold Leg Injection monitor lights LIT. • Verify ECCS Flow: <ul style="list-style-type: none"> • High head SI Flow (1FI-917) > 100 gpm. • IF RCS Pressure < 1700 psig (1PI-403A/405), THEN verify 1B SI Pump Discharge Flow (1FI-922) > 200 gpm. ○ IF RCS Pressure < 325 psig, THEN verify RH Pump Discharge Flow (1FI-618/619) > 1000 gpm. • Check at Least One PZR PORV Relief Path Available: <ul style="list-style-type: none"> • PORV Isol valves (1RY8000A and 1RY8000B) AT LEAST ONE ENERGIZED. • PORV Relief Path AT LEAST ONE AVAILABLE: <ul style="list-style-type: none"> • PORV in AUTO. • Associated isol valve OPEN. 	
	BOP	Performs subsequent actions of 1BwEP-0, as directed: <ul style="list-style-type: none"> • Verify Generator Trip: <ul style="list-style-type: none"> • Main Transformer output breakers (OCB1-8 and OCB7-8) OPEN. • PMG Output Breaker OPEN. • Verify DGs Running: <ul style="list-style-type: none"> • DGs BOTH RUNNING. • DGs BOTH SX Cooling Valves (1SX169A and 1SX169B) OPEN. • Dispatch operator to LOCALLY check operation. 	

Comments: _____

Scenario No: 01-4		Event No. 7 and 8 and 9
Event Description: 1D SG Tube Leak increases to 500 gpm (SGTR). 1A SI pump fails to auto start, 1D MSIV fails to Manually close, and subsequent MS safety opens on 1D SG.		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify Control Room Ventilation Aligned for Emergency Operation: <ul style="list-style-type: none"> • Checks RM-11, Grid 2, 0PR31J-0PR34J < high alarm setpoint. • Checks operating VC train equipment running: <ul style="list-style-type: none"> • Supply fan • Return fan • M/U fan • Chilled Water pump • MCR Chiller • Checks Operating VC train dampers aligned: <ul style="list-style-type: none"> • M/U fan outlet damper (0VC024Y/0VC08Y) NOT FULLY CLOSED. • VC train M/U Filter Light Lit • Checks Operating VC Train Charcoal Absorber Aligned: <ul style="list-style-type: none"> • Bypass damper closed (0VC43Y/0VC44Y) • Inlet damper Open (0VC21Y/0VC05Y) • Outlet Damper Open (0VC22Y/0VC06Y) • Control Room pressure (MCR/TB DP, 0PDI-VC038) > +0.125" H2O.
	BOP	Verify Aux Bldg Ventilation Aligned for Emergency Operation: <ul style="list-style-type: none"> • Inaccessible Filter Plenums – Only TWO Aligned with Charcoal Absorbers On Line: <ul style="list-style-type: none"> ○ Plenum A: <ul style="list-style-type: none"> ○ Fan 0VA03CA Running with Flow Control Damper (0VA022Y) Open and Byp Isol Damper (0VA020Y) Closed. ○ Fan 0VA03CB Running with Flow Control Damper (0VA023Y) Open and Byp Isol Damper (0VA436Y) Closed. ○ Plenum B: <ul style="list-style-type: none"> ○ Fan 0VA03CC Running with Flow Control Damper (0VA024Y) Open and Byp Isol Damper (0VA021Y) Closed. ○ Fan 0VA03CD Running with Flow Control Damper (0VA025Y) Open and Byp Isol Damper (0VA437Y) Closed. ○ Plenum C: <ul style="list-style-type: none"> ○ Fan 0VA03CE Running with Flow Control Damper (0VA067Y) Open and Byp Isol Damper (0VA052Y) Closed. ○ Fan 0VA03CF Running with Flow Control Damper (0VA072Y) Open and Byp Isol Damper (0VA438Y) Closed.

Comments: _____

Scenario No: 01-4		Event No. 7 and 8 and 9
Event Description: 1D SG Tube Leak increases to 500 gpm (SGTR). 1A SI pump fails to auto start, 1D,MSIV fails to Manually close, and subsequent MS safety opens on 1D SG.		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify FHB Ventilation Aligned for Emergency Operation: <ul style="list-style-type: none"> • FHB Charcoal Absorbers -One Train Aligned: <ul style="list-style-type: none"> ○ Train A: <ul style="list-style-type: none"> • Fan 0VA04CA Running • 0VA060Y Charcoal Absorber Inlet Isol Damper – Open. • 0VA057Y Filter Flow Control Damper – Open. • 0VA051Y Charcoal Absorber Bypass Isolation Damper – Closed. ○ Train B: <ul style="list-style-type: none"> • Fan 0VA04CB Running • 0VA055Y Charcoal Absorber Inlet Isol Damper – Open. • 0VA062Y Filter Flow Control Damper – Open. • 0VA435Y Charcoal Absorber Bypass Isolation Damper – Closed.
	RO	Check PZR Spray Valves and Porvs: <ul style="list-style-type: none"> • Spray valves (1RY455B and 1RY455C) Closed. • Porvs: 1RY455A open but isolated, and 1RY456 Closed.
	RO	Maintain RCS Temperature Control: <ul style="list-style-type: none"> • With ANY RCPs running – RCS average temperature STABLE AT OR TRENDING TO 557 Degrees F. ○ Maintains > 500 gpm AF flow until at least one SG is 10% (31% Adverse).
	RO	Check RCP Status: <ul style="list-style-type: none"> • Determines RCPs RUNNING. • Check If RCPS should be Stopped: <ul style="list-style-type: none"> • ECCS Flow > 100 gpm on 1FI-917 or SI pump Flow > 200 gpm on 1FI-922. • RCS Pressure NOT LESS THAN 1425 psig. • DOES NOT STOP RCPs.
	BOP	Check Secondary Pressure Boundaries Intact: <ul style="list-style-type: none"> • NO SG Pressure DECREASING IN AN UNCONTROLLED MANNER. • NO SG COMPLETELY DEPRESSURIZED.

Comments: _____

Scenario No: 01-4		Event No. 7 and 8 and 9
Event Description: 1D SG Tube Leak increases to 500 gpm (SGTR). 1A SI pump fails to auto start, 1D MSIV fails to Manually close, and subsequent MS safety opens on 1D SG.		
Time	Position	Applicant's Actions or Behavior
	BOP	Check if SG Tubes are Intact: <ul style="list-style-type: none"> • SJAE/GS Exhaust Gas radiation (1PR27J) NOT LESS THAN ALERT ALARM SETPOINT. • SG Blowdown Liquid Radiation (1PR08J) NOT LESS THAN ALERT ALARM SETPOINT. • MS Line radiation (1RT-AR022 or 1RT-AR023) NOT LESS THAN ALERT ALRM SETPOINT. • Reports any of the above to US.
	US	Diagnoses/Announces SGTR, Transitions to 1BwEP-3, "SGTR", and directs actions: <ul style="list-style-type: none"> • Gets acknowledgement from RO and BOP. • Informs SM of plant status, and evaluates for GSEP. • Contacts WEC to have the STA commence monitoring Status Trees.
	RO	Performs actions of 1BwEP-3, "SGTR" as directed: <ul style="list-style-type: none"> • Check RCP Status: <ul style="list-style-type: none"> • Determines RCPs RUNNING. • Check If RCPS should be Stopped: <ul style="list-style-type: none"> • ECCS Flow > 100 gpm on 1FI-917 or SI pump Flow > 200 gpm on 1FI-922. • RCS Pressure NOT LESS THAN 1425 psig. • DOES NOT STOP RCPs.
	BOP	Performs actions of 1BwEP-3, "SGTR", as directed: <ul style="list-style-type: none"> • Identify Ruptured SG fom any of the following means: <ul style="list-style-type: none"> • Unexpected level rise in 1D SG. • MS Line Rad 1D MSL/ MSIV room (4AD422/4AD423) NOT NORMAL FOR PLANT CONDITIONS. • High Activity from 1D SG sample.
	BOP	Isolate Flow from 1D SG: <ul style="list-style-type: none"> o Verify 1D SG PORV Controller in AUTO. (SG 1D PORV is Isolated per turnover info) o WHEN 1D SG Pressure < 1115 psig, Verify 1D SG PORV (1MS018D) CLOSED. • Verify 1D SG Blowdown isolation valves (1SD002C and 1SD002D) CLOSED.
	BOP CT: E-3—A.	Isolate 1D SG Main Steam from at least one other SG: <ul style="list-style-type: none"> • Attempt Closure of 1MS001D (1D MSIV). • Report 1D MSIV did not CLOSE. • Actuate MSIV Isolation. • Report ALL MSIVs are CLOSED.

Comments: _____

Scenario No: 01-4		Event No. 7 and 8 and 9
Event Description: 1D SG Tube Leak increases to 500 gpm (SGTR). 1A SI pump fails to auto start, 1D MSIV fails to Manually close, and subsequent MS safety opens on 1D SG.		
Time	Position	Applicant's Actions or Behavior
	US	Identifies successful isolation of 1D SG from at least 1 intact SG. Directs stabilization of RCS Temperature at 557 degrees F via steaming 1A, 1B, or 1C SGs.
	BOP	Performs subsequent actions of 1BwEP-3, "SGTR", as directed: <ul style="list-style-type: none"> • Determines 1A, 1B, and 1C SG PORVS are available for RCS COOLDOWN. • Determines 1D SG level is > 10% narrow range. • Verifies 1AF013D and 1AF013H are CLOSED. • Checks 1D SG Pressure > 320 psig.
	US	Directs actions of 1BwEP-3: <ul style="list-style-type: none"> • Determines required CETC temperature by obtaining 1D SG Pressure, Noting Normal Containment conditions, and selecting target temperature from table. (1100-1199 psig < 516 deg; 1000-1099 psig < 505 deg; 900-999 psig < 491 deg.)
	RO	Performs actions as directed: <ul style="list-style-type: none"> • Checks PZR Pressure: <ul style="list-style-type: none"> • WHEN PZR pressure < 1930, Verifies P-11 LIT, THEN Blocks both trains of Steam Line Isolation SI.
	BOP	Performs Actions as directed: <ul style="list-style-type: none"> • Initiates RCS Cooldown at MAXIMUM Rate from 1A, 1B and 1C SGs: <ul style="list-style-type: none"> • Manually dumps steam from 1A and 1C SG by opening 1MS018A, 1MS018B, and 1MS018C (SG PORVS) • Stops Cooldown when Target RCS Temperature reached. • Maintains average of 10 highest CETCs < target temperature.
	US	Continues directing actions after RCS Cooldown is initiated while awaiting CETCs to reach the required RCS Temperature.
		Note: The MS safety on 1D SG will open when the step to stop RH pumps is reached.

Comments: _____

Scenario No: 01-4		Event No. 7 and 8 and 9
Event Description: 1D SG Tube Leak increases to 500 gpm (SGTR). 1A SI pump fails to auto start, 1D MSIV fails to Manually close, and subsequent MS safety opens on 1D SG.		
Time	Position	Applicant's Actions or Behavior
	BOP	<p>Performs actions as directed while RCS is Cooling down to Required Temperature:</p> <ul style="list-style-type: none"> • Controls feed flow to maintain INTACT SGs Between 10% and 50% narrow range level. • Determines NO narrow range levels are increasing in an uncontrolled manner. • Reset CNMT Isolation signals: <ul style="list-style-type: none"> • Phase A o Phase B • Check SACs – ANY RUNNING. • Restore Instrument Air to CNMT –OPEN 1IA065 and 1IA066. • Verify All AC Buses Energized: <ul style="list-style-type: none"> • Buses 141 and 142 • Buses 143 and 144 • Buses 156, 157, 158, and 159. • Determine RH pumps may be Stopped: <ul style="list-style-type: none"> • RH pumps suction aligned to RWST. • RCS Pressure > 325 psig. • Stop RH pumps and place in Standby.
	RO	<p>Performs actions as directed while RCS is Cooling down to Required Temperature:</p> <ul style="list-style-type: none"> • Checks PZR PORVs and Isolation valves: <ul style="list-style-type: none"> • PZR PORV 1RY455A Open and Isolated; 1RY456 Closed with block valve open and energized. • Reset SI: <ul style="list-style-type: none"> • Depress Both SI Reset pushbuttons. • Verify SI ACTUATED permissive light NOT LIT. • Verify AUTO SI BLOCKED permissive light LIT.
	RO	<p>Check if RCS Cooldown Should be Stopped:</p> <ul style="list-style-type: none"> • Average of 10 highest CETCs < Required Temperature.
	BOP	<p>Stop RCS Cooldown:</p> <ul style="list-style-type: none"> • Maintain average of 10 highest CETCs < Required Temperature. o Notes/Reports steam flow on 1D SG. • Reports 1D SG pressure DECREASING.

Comments: _____

Scenario No: 01-4		Event No. 7 and 8 and 9
Event Description: 1D SG Tube Leak increases to 500 gpm (SGTR). 1A SI pump fails to auto start, 1D MSIV fails to Manually close, and subsequent MS safety opens on 1D SG.		
Time	Position	Applicant's Actions or Behavior
	US	Evaluates Decreasing 1D SG Pressure Trend/ BOP report of Steam Flow from 1D SG, and Transitions to 1BwCA-3.1, "SGTR WITH LOSS OF REACTOR COOLANT – SUBCOOLED RECOVERY DESIRED", and directs actions: <ul style="list-style-type: none"> • Gets acknowledgement from RO and BOP. • Informs SM of plant status, and evaluate for GSEP.
	RO/BOP:	Perform actions of 1BwCA-3.1 as directed: <ul style="list-style-type: none"> o Reset SI (Previously performed) o Reset Cnmt Isolations (Previously performed) o Verify all AC buses Energized (previously performed) • Check if CS should be stopped (CS is not initiated)
	BOP	Perform actions as directed: <ul style="list-style-type: none"> • Check ruptured SG (1D) Narrow Range level > 10%. • DOES NOT Initiate feed to 1D SG Level. • Reports RH pumps are already Stopped.
	BOP	Perform subsequent actions as directed to initiate plant status evaluation: <ul style="list-style-type: none"> • Check Aux Bldg Rad Trends for both Unit 1 and Unit 2 on RM-11 or HMI: <ul style="list-style-type: none"> • Vent Stack effluent 1PR28J, 1PR30J, 2PR28J, 2PR30J. • ECCS Pump Cubicles – 1PR13J through 1PR18J. • Grid 4 Aux Bldg Area. • Place Hydrogen Monitors in service per BwOP PS-9, POST LOCA CNMT H2 MONITORING SYSTEM OPERATION.
	US	Perform actions of 1BwCA-3.1: <ul style="list-style-type: none"> • Call Chemistry for samples: <ul style="list-style-type: none"> • RCS Activity • RCS Boron Concentration • RCS Hydrogen Concentration • Ruptured SG (1D) Activity • Cnmt Atmosphere • Evaluate equipment needed in CC and RH systems to assist in plant recovery.

Comments: _____

Scenario No: 01-4		Event No. 7 and 8 and 9
Event Description: 1D SG Tube Leak increases to 500 gpm (SGTR). 1A SI pump fails to auto start, 1D MSIV fails to Manually close, and subsequent MS safety opens on 1D SG.		
Time	Position	Applicant's Actions or Behavior
	US	Get Concurrence from SM that the Hydrogen Recombiners DO NOT need to be run.
	US	Determines that 1D SG pressure is decreasing in an uncontrolled manner and Transitions to 1BwEP-2, "FAULTED SG ISOLATION", and directs actions: <ul style="list-style-type: none"> • Gets acknowledgement from RO and BOP. • Informs SM of plant status, and GSEP evaluation.
		Note: Crew may decide that they have accomplished the Isolation of the Faulted 1D SG in accordance with 1BwEP-2, "FAULTED SG ISOLATION", without actually transitioning to 1BwEP-2. If they do go to 1BwEP-2, the procedure loop will eventually bring them back to 1BwCA-3.1.
	RO/BOP	Performs actions to Isolate 1D SG per 1BwEP-2 as directed: <ul style="list-style-type: none"> • Verifies MSIVs and Bypasses Closed, with MS Isolation Actuated. • Determines 1A, 1B, and 1C SGs are Intact, and 1D SG is Faulted • Verifies AF and main feed is Isolated to 1D SG. • Verifies 1D SG Porv CLOSED. • Verify 1D SG Blowdown Isolation and Sample valves are CLOSED (1SD002's and 1SD005's). • Confirms AF pump suction is adequate. • Confirms 1D SG is Ruptured.
	US	Transitions back to 1BwEP-3, "SGTR", and determines 1D SG Pressure will decrease to < 320 psig if it has not already. Transitions to 1BwCA-3.1, "SGTR with LOCA- SUBCOOLED RECOVERY DESIRED", and directs actions:
	BOP	Performs actions as directed to continue in 1BwCA-3.1: <ul style="list-style-type: none"> • Controls Intact SG levels between 10% and 50%. • Verifies NO INTACT SG level INCREASING IN AN UNCONTROLLED MANNER.
	RO CT: CA3.1— B.	Performs actions as directed to continue in 1BwCA-3.1: <ul style="list-style-type: none"> • Determines Cooldown in RCS Cold Legs is NOT LESS THAN 100 Degrees F in any 1 hr period. • DOES NOT Initiate any further Operator Controlled Cooldown of the RCS until the Cooldown rate in the RCS Cold Legs is < 100 degrees F in any 1 hr.

Comments: _____

Scenario No: 01-4		Event No. 7 and 8 and 9
Event Description: 1D SG Tube Leak increases to 500 gpm (SGTR). 1A SI pump fails to auto start, 1D MSIV fails to Manually close, and subsequent MS safety opens on 1D SG.		
Time	Position	Applicant's Actions or Behavior
	BOP	Check if Subcooled Recovery is appropriate: <ul style="list-style-type: none"> • Determines RWST level is > 67%. • Determines 1D SG level < 93%
	RO/US	Checks RCS Subcooling: <ul style="list-style-type: none"> • Determines RCS Subcooling is acceptable by Iconic or Attachment A.
		Scenario is complete at this point or at the Chief examiners discretion

Comments: _____
