

BYRON INITIAL LICENSE EXAM

**OCTOBER 29 and
NOVEMBER 5-9, 2001**

“The As-Given Scenarios”

Facility: Byron Scenario No.: 1 Op-Test No.: 2001
 Examiners: _____ Operators: _____ SRO
 _____ RO
 _____ BOP

Initial Conditions: IC-16; 50% power, BOL, equilibrium Xenon, steady state, 1B Diesel Generator (DG) OOS, 1C HD pump OOS, U-2 SAC OOS.

Turnover: The Unit is at 50% power, BOL, equilibrium Xenon, steady state. The 1B Diesel Generator is OOS for replacement of Turbo Charger. The DG has been OOS for 18 hours and is expected to be returned to service by the end of the shift. 1C Heater Drain Pump (HD) is OOS for motor bearing replacement. Unit 2 Station Air Compressor (SAC) is OOS for an oil change and is expected to be returned to service by the end of the shift. Electrical Operations has requested a ramp to full power at 5 MW/min.

Event No.	Malf. No.	Event Type*	Event Description
Preload	RF EG09 MAINT_O		1B DG OOS
1		N BOP SRO R RO	Raise turbine load to full power at 5 MW/min. Raise reactor power using rods and/or dilution.
2	RX13A	I RO SRO	Controlling Pressurizer (PZR) level channel fails low.
3	TP01B, RF TP14 OPEN	C BOP SRO	Stator Cooling (GC) Water Pump trip with failure of standby pump to auto start.
4	CC03B CC01C CC02A	I BOP SRO	Component Cooling (CC) Surge Tank level transmitter level tree leak results in auto makeup and 1B CC pump trip with failure of 1A CC pump auto start on low header pressure.
5	TH10A&B, OR ZDI1PK455C	C RO SRO	PZR Spray Valves 1RY455B&C failed open (TH10A&B, 100, 10) PZR Spray Valve controller failed in auto (IOR ZDI1PK455C AUTO with manual control for 1RY455B available).
6	RP02A&B TC03 RP35 & 61	M RO BOP SRO	ATWS with failure of main turbine to auto trip and failure of MSIVs to auto close. Coincident with next event.
7	OR ZDI1MS001B MS03B&F	M RO BOP SRO	Pressure transient causes steam break (1B MSIV fails closed causes Steam Break on the 1B SG - 2 MS safeties stuck open).

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

SCENARIO 2001-1 OVERVIEW

Unit 1 is at 50% power, BOL, equilibrium Xenon, steady state. The 1B Diesel Generator is OOS for Turbo Charger replacement. The Diesel Generator has been OOS for 18 hours and is expected to be returned to service by the end of the shift. 1C Heater Drain Pump is OOS for motor bearing replacement. Unit 2 SAC is OOS for an oil change and is expected to be returned to service by the end of the shift. Electrical Operations has requested a ramp up to full power at a rate of 5 MW/min.

Following clearly observable plant response from the reactivity changes, the controlling PZR Level Channel will fail low, 1LT-RY459, resulting in letdown isolation. The Crew should implement 1BOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL", and select an operable channel and restore letdown. Once actions are taken to trip the bistables for the failed PZR Level channel, the running Stator Cooling Water Pump will trip and the standby pump will fail to auto start. The BOP will need to manually start the standby pump within 45 sec to avoid a Main Generator Trip.

After the actions for the GC pump trip are complete, a Component Cooling (CC) Water Surge Tank level tree leak will result in low level indication resulting in auto makeup from demin water and auto trip of the 1B CC pump. The 1A CC pump will fail to auto start requiring the operators to manually start the pump. The crew should identify the failure and dispatch an operator to locally isolate demin water makeup to the surge tank. Local indication is available and the crew should instruct local operations to drain the surge tank to normal level and address operability concerns for 1B CC pump.

Once the actions are complete to stabilize Stator Cooling Water System the PZR Spray valves will both fail open due to a controller problem with the ability to manually close 1RY455B spray and not 1RY455C requiring the operators to trip the reactor. Upon either a manual or automatic trip the reactor trip breakers will not open resulting in an ATWS. 1BFR-S.1, "RESPONSE TO NUCLEAR POWER GENERATION/ATWS", should be implemented to respond to the failure of the reactor to trip. Coincident with the ATWS the main turbine will fail to auto trip and the 1B MSIV will fail closed resulting in high pressure in the 1B SG causing 2 safeties to lift and not reseal. Auto main steamline isolation will also fail to function. 1BFR-S.1 has actions to address a faulted SG. Transition to 1BEP-0 should occur at the end of 1BFR-S.1. During the performance 1BEP-0, "REACTOR TRIP OR SAFETY INJECTION", the SRO should transition to 1BEP-2, "FAULTED STEAM GENERATOR ISOLATION UNIT 1", to ensure isolation of the faulted Steam Generator is complete. From 1BEP-2 the operators will transition to 1BEP-1, "LOSS OF REACTOR OR SECONDARY COOLANT UNIT 1", and then to 1BEP ES-1.1, "SI TERMINATION", to terminate Safety Injection. The scenario can be terminated when the operators secure SI flow in 1BEP ES-1.1.

Critical Tasks

E-2--A: Isolate a faulted SG before transitioning out of 1BFR-S.1

FR-S.1--A: Manually trip the main turbine in 1BFR-S.1

**SCENARIO 2001-1
SIMULATOR OPERATOR NOTES**

Simulator Setup:

IC-16, 50% power, BOL, equilibrium Xenon, steady state.

Align switches:

1B DG C/S PTL and OOS

ACB 1423 PTL and OOS

1C HD pump C/S PLT and OOS

U-2 SAC C/S PTL and OOS, ensure U-1 and U-0 SAC running

Swap CC pumps start 1B CC pump and shutdown 1A CC pump

Perform "Ready for Training" checklist.

Insert PRELOAD Events:

MRF EG09, MAINT_O - 1B DG OOS

MRF TP14, OPEN - 1A GC pump auto start pressure switch failure

IMF RP02A - Rx Trip Breaker A fail to open

IMF RP02B - Rx Trip Breaker B fail to open

IMF TC03 - Auto trip failure of main turbine

MRF RP35, OUT - K616 train A MS Isol auto failure

MRF RP61, OUT - K616 train B Ms Isol auto failure

IMF CC02A, at current value - Auto start failure of 1A CC pump on low CC header pressure

Event 1 Power increase

Event 2 Controlling PZR level channel fails low (1LT-RY459).

SDG: RX6

Malf: RX13A, 0

Initiate event after clearly observing reactivity change/response of plant to requested power ramp and with lead examiners concurrence.

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:

Cabinet door #1 open

PZR hi water level rx trip

Cabinet door #1 Close

RF RP20 OPEN

LB459A C1-751 BS-1 RF RX029 TRIP

RF RP20 CLOSE

Event 3 1B Stator Cooling Water (GC) pump trip with failure of 1A GC pump to auto start.

SDG: TP1

Malf: TP01B

Remote Function (preload) MRF TP14, OPEN

Initiate event after actions for failed PZR level channel are completed or at the lead examiners concurrence.

If sent to locally investigate the 1B GC pump and breaker, wait 3 minutes, perform first check, and report phase overcurrent trip on the breaker.

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

Event 4 Component Cooling (CC) Surge Tank level transmitter level tree leak results in auto makeup and 1B CC pump trip with failure of the 1A CC pump to auto start.

SDG: CC2

Malf: CC03B, 0 and CC01B and (CC02A at current value, preload)

Initiate event after actions for the GC pump trip are complete.

Role play as Aux NLO to report a leak on the level tree and local Surge tank levels indicate high and take actions as directed to isolate Demin water (WM) makeup to CC tank.

Role play as Aux NLO to report that 1A CC pump is running normally.

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

Use Remote Function CC52 to close the manual isolation for demin water makeup to the CC surge tank 1CC183.

Event 5 PZR Spray valves fail open (controller malfunction).

EDG: TH7

Malf: TH10A&B, 100

OR: ZDI1PK455C Auto

Initiate event after actions for the failed CC Surge Tank level transmitter are complete.

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

Event 6 ATWS with failure of main turbine to auto trip and failure of MSIVs to auto close.

SDG: RP2 /TC7 /

Malf: (preload) RP02A and RP02B - ATWS

(preload) TC03 – Turbine auto trip failure

RF: (preload) MRF RP35, OUT – K616 train A MS Isol auto failure

(preload) MRF RP61, OUT – K616 train B MS Isol auto failure

NOTE: this event is coincident with the next malfunction

Acknowledge as Field Supervisor/ NLO when requested to locally trip Unit 1 reactor per 1BFR-S.1, wait 2 minutes from request and then delete malfunctions. Acknowledge as the Field Supervisor when requested to perform the isolation of dilution paths per step 10.c of 1BFR-S.1. Acknowledge all info passed to the SM, WEC, and maintenance.

Event 7 Pressure transient causes steam break (1B MSIV fails closed causes Steam Break on the 1B SG - 2 MS safeties stuck open).

SDG: MS2

OR: ZDI1MS001B, CLS – 1B MSIV closure

Trigger: When Reactor trip switch on 1PM05J is taken to trip.

SDG: MS2

Malf: MS03B, 100 – 1B SG safety stuck open

MS03F, 100 - 1B SG safety stuck open

Trigger: When 1B SG pressure reaches 1130 psig.

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

Scenario No.: 2001-1		Event No.: 1
Event Description: Power increase at 5 MW/min from 50% power.		
Time	Position	Applicant's Actions or Behavior
	CUE:	Request from system operator via turnover to increase power to 100%.
	US	Implement actions of 1BGP 100-3 "POWER ASCENSION 5% to 100%" Rev. 34, step 63.
	US	Direct load increase to 1120 MW at 5 MW/min. <ul style="list-style-type: none"> • Initiate load swing instruction sheet (1BGP-100-3T4 Load Change Instruction Sheet for Power Increase >15% in One Hour). • Contact Chemistry and Radiation Protection for load change > 15%/hr. o Contact Rad Waste for addition to HUT from dilution activities
	CREW	Review applicable Prerequisites, Precautions, and Limitations and Actions of 1BGP 100-3.

Comments: _____

Scenario No.: 2001-1		Event No.: 1
Event Description: Power increase at 5 MW/min from 50% power.		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Verify rod position and boron concentration.</p> <p>Initiate dilution, if required, to maintain Tave (BOP CV-5, Rev 16)</p> <p>Determine required PW volume by:</p> <ul style="list-style-type: none"> o Effects of previously performed dilutions o Byron Boration Dilution Tables <ul style="list-style-type: none"> • Determined desired amount of PW to add • Determine desired PW flow rate. • Place MAKE-UP CONT SWITCH to STOP position. • Set MU MODE SELECT to DIL or ALT DIL position. • Set 1FK-111 PW/Total Flow Control to desired dilution rate. • Set 1FY-0111 Primary Water Control Preset Counter to desired volume. • Press enter on the PW/Total Flow Totalizer • Insert the gallons desired • Press Reset on the PW/Total Flow Totalizer • Press Display and verify the correct gallons were entered • Adjust VCT level control valve POT to maintain VCT pressure as desired • Verify makeup system valves in AUTO 1CV111A, 1CV111B, 1CV110B • Place MAKE-UP CONT Switch to START o Verify proper operation of valves (1CV111A throttles open, 1CV111B open, 1CV110B open (ALT DIL), PW flow on recorder) <p>When desired amount of primary water added verify 1CV111A, 1CV111B, and 1CV110B close.</p>
	BOP	<p>Initiate turbine load increase:</p> <ul style="list-style-type: none"> • Depress LOAD RATE MW/MIN • Enter 5 MW/min • Depress ENTER • Depress REF • Enter power level 1120 MW • Depress ENTER • When ready to begin load reduction, depress GO • Verify load increases.

Comments: _____

Scenario No.: 2001-1		Event No.: 1
Event Description: Power increase at 5 MW/min from 50% power.		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Monitor power increase:</p> <ul style="list-style-type: none"> • Monitor reactor power, Tave, ΔI, Control Rod position • Verify rods move in AUTO to maintain Tave within $\pm 1.0^\circ\text{F}$ of Tref. <p>If diluting:</p> <ul style="list-style-type: none"> • Monitor VCT level • Verify RCS boron concentration decreasing • Monitor PW control counter • Verify dilution auto stops at preset value. • Return Reactor Makeup System to blended flow at current boron concentration. • If required to equalize born concentration between the PZR and the Loops, open PZR sprays by placing at least 2 B/U HTR GRPS A/B/D Contactor Control Switch to the 'ON' position.
		NOTE: Following clearly observable plant response from the reactivity changes and with lead examiners concurrence, Event 2 is entered.

Comments: _____

Scenario No.: 2001-1		Event No.: 2
Event Description: Controlling Pressurizer (PZR) level channel fails low (1LT-RY459)		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator: 1-12-A4 PZR LVL LOW HTRS OFF LTDWN SECURED 1-12-A5 PZR HTR TRIP 1-12-B4 PZR LEVEL CONT DEV LOW PZR level meter for 1LT-459 and PZR level recorder indicate level decrease to ZERO.
	RO/US	Identify/report failure of 1LT-459 PZR level channel failed low and letdown isolated.
	US	Enter and direct actions of IBOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL" Rev. 101 Attachment C "PRESSURIZER LEVEL CHANNEL."
	RO	Check PZR Level <ul style="list-style-type: none"> Check PZR Level Normal, restore manually. Selects operable channel for control, selects 461/460. Selects operable channel to level recorder.
	RO/BOP	Check Letdown and PZR heaters <ul style="list-style-type: none"> PZR level >17% Determine Letdown is isolated (1CV81489A/B/C and 1CV459 all closed) and re-establishes letdown per BOP CV-17. <ul style="list-style-type: none"> Verify/ close 1CV8149A, B, C, letdown orifice isolation valves Place 1CC130A/B flow controller in MANUAL at 20% demand Ensure 1CV131 controller in MANUAL at 20% demand Open 1CV459 and 1CV460 if closed Simultaneously perform the following: <ul style="list-style-type: none"> Open orifice isolation valves 1CV8149A/B/C for desired flow Adjust 1CV131 controller to maintain letdown header pressure at 370 psig and place in AUTO Ensure 1CC130A/B controller maintains letdown temperature 105° to 115°F and place in AUTO Adjust 1CV121 to match charging and letdown flow while establishing PZR level at program and place in AUTO. Determines PZR B/U heaters are normal Restores PZR Variable heaters functions
	RO	Check PZR level control in Auto <ul style="list-style-type: none"> Restore Auto PZR Level Control (Master Controller and 1CV121)

Comments: _____

Scenario No.: 2001-1		Event No.: 2
Event Description: Controlling Pressurizer (PZR) level channel fails low (1LT-RY459)		
Time	Position	Applicant's Actions or Behavior
	RO/US	Dispatch operator to trip bistable for 1LT-459 <ul style="list-style-type: none"> PZR Hi Wtr Lvl Rx Trip LB459A
	US	Refers to Tech Specs and informs SM/Maintenance: <ul style="list-style-type: none"> 3.3.1 (trip bistable within 6 hrs) 3.3.4 3.3.3
		NOTE: Once the proper bistables have been determined and operator dispatched and with lead examiners concurrence, Event 3 is entered.

Comments: _____

Scenario No.: 2001-1		Event No.: 3
Event Description: Stator Cooling Water Pump Trip (1B GC Pp) with failure of standby pump (1A GC Pp) to auto start.		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciator: 1-18-A14 STATOR CLG WTR PUMP TRIP 1-19-E6 GEN STATOR COIL WTR FLOW LO/LO-2 1-18-D13 H2/STATOR CLG PANEL TROUBLE 1B GC pump trip indication
	BOP/US	Identify/report trip of 1B GC Pump and failure to auto start of 1A GC Pump.
	BOP	Perform immediate operator action of BAR 1-19-E6: Manually start 1A GC pump <ul style="list-style-type: none"> • Verify annunciator 1-19-E6 clear
	CREW	Dispatch operator to investigate trip of 1B GC Pump and Hydrogen Stator Cooling panel trouble alarm.
		NOTE: After actions to restore stator cooling flow have been completed and with lead examiners concurrence, Event 4 is entered.

Comments: _____

Scenario No.: 2001-1		Event No.: 4
Event Description: Component Cooling (CC) Surge Tank level transmitter level tree leak results in auto makeup and 1B CC pump trip.		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-2-A5 CC SURGE TANK LEVEL HIGH/LOW 1-2-E4 CC SURGE TANK AUTO M/U ON 1-2-A4 CC PUMP TRIP 1B CC pump trip indication 1LT-CC676 indication at 0%
		NOTE: 1BOA PRI-6, "COMPONENT COOLING MALFUNCTION", may be referenced but is not written to address a level tree leak.
	BOP/US	Identify/report 1A CC pump did not auto start, 1B CC pump trip, and CC Surge level low and auto makeup from Demin Water 1CC183 open, refers to BARs
	CREW	Determine CC Surge tank level tree leak.
	BOP	Refer to BAR 1-2-E4 and manually control Surge Tank level.
	BOP	Dispatched operator to check 1A CC pump for proper operation.
	BOP/US	Dispatches operator to locally isolate make-up from Demin Water.
	BOP/US	Directs operator to locally drain CC surge level to normal range as appropriate.
	US	Refer to Tech Specs 3.7.7 CC system restore in 7 days for 1B CC pump trip If the crew decides to conservatively declare the 1A CC pump inoperable until further information is available then LCO 3.0.3 would apply.
		NOTE: Following local isolation of demin makeup and with lead examiners concurrence, Event 5 is entered.

Comments: _____

Scenario No.: 2001-1		Event No.: 5
Event Description: Pressurizer (PZR) Master controller failure and Spray Valves 1RY455C failed open		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciator: 1-12-C1 PZR PRESS CONT DEV LOW HTRS ON PZR Pressure indication decreasing. PZR Spray Valves indication full open.
	RO/US	Identify/report PZR Pressure decreasing and abnormal spray indication.
	RO	Attempt to control PZR spray valves in manual. <ul style="list-style-type: none"> • If NOT already in manual place both PZR spray valve controllers in manual. • Reduce PZR spray valve 1RY455B controller demand in manual.
	RO	Report PZR spray valve 1RY455C not responding.
	US	Direct Manual Reactor Trip and Safety Injection due loss of PZR pressure control.
	RO	Manually trip reactor from 1PM05J and then manually trip reactor from 1PM06J
	CREW	Identify/report failure of unit 1 reactor to trip ATWS condition. (NOTE: Continued with next event)
		NOTE: PZR pressure will decrease to Reactor Trip setpoint and eventually to the Safety Injection setpoint and the PZR spray valves will reclose on loss of instrument air from Phase A auto actuation.
		NOTE: The next events, Events 6 and 7, occur when the crew attempts a reactor trip, neither auto or manual Rx Trip will function.

Comments: _____

Scenario No.: 2001-1		Event No.: 6 and 7
Event Description: ATWS with failure of main turbine to auto trip and failure of MSIVs to auto close (6), and Pressure transient causes steam break (1B MSIV fails closed causes Steam Break on the 1B SG - 2 MS safeties stuck open) (7)		
Time	Position	Applicant's Actions or Behavior
	CUE:	Reactor trip RED FIRST OUT Reactor trip breakers closed 1B MSIV closed
	US	Transition to 1BFR-S.1 "RESPONSE TO NUCLEAR POWER GENERATION/ATWS" Rev. 100 WOG 1C.
	CREW	Dispatch operator to locally open reactor trip breakers. (NOTE: This may be done at any time and is procedurally directed later.)
	RO	Perform immediate operator actions of BFR-S.1: <ul style="list-style-type: none"> • Verify reactor trip NOT active <ul style="list-style-type: none"> • Rod Bottom lights NOT lit • Reactor trip breakers NOT open; Bypass breakers open (not racked in) • Neutron flux stable/NOT decreasing from Post Trip. o Manually trip reactor with reactor trip switch <ul style="list-style-type: none"> • 1PM05J • 1PM06J
	RO	<ul style="list-style-type: none"> • Allow control rods to insert in auto until ≤ 48 spm then place rods in Manual and manually insert rods.
	BOP [CT] FR-S.1-- A	Perform immediate operator actions of BFR-S.1: Verify turbine trip <ul style="list-style-type: none"> • Turbine throttle valves closed – valves are NOT closed • Turbine governor valves closed – valves are NOT closed • Manually trip the turbine
	BOP	Perform immediate operator actions of BFR-S.1: Check AF Pumps running <ul style="list-style-type: none"> • AF pump run lights lit <ul style="list-style-type: none"> • If NOT then Manually start the pumps

Comments: _____

Scenario No.: 2001-1		Event No.: 6 and 7
Event Description: ATWS with failure of main turbine to auto trip and failure of MSIVs to auto close (6), and Pressure transient causes steam break (1B MSIV fails closed causes Steam Break on the 1B SG - 2 MS safeties stuck open) (7)		
Time	Position	Applicant's Actions or Behavior
		NOTE: Upon ATWS, 1B MSIV will fail closed, Event 8 and the resulting increase in Steam Generator pressure will result in two safety valves lifting and sticking open, Event 10.
	RO/BOP	Perform subsequent actions of 1BFR-S.1: Initiate Emergency Boration of the RCS <ul style="list-style-type: none"> • Check at least one Cent CHG pump –RUNNING • Open emergency boration valve - 1CV8104 • Start boric acid transfer pump • Check emergency boration flow > 30 gpm • Verify Charging flow - > 30 GPM.
	RO	<ul style="list-style-type: none"> • Check PZR pressure – Less than 2335 psig • If NOT then Verify PZR PORVs and isolation valves are open and respond properly.
	BOP	Verify Containment Ventilation Isolation <ul style="list-style-type: none"> • Group 6 CNMT Vent Isol monitor lights –LIT
		NOTE: US may assign an operator to verify proper ESF Actuations per OAS if SI has actuated as time permits.
	RO/BOP	Verify reactor subcritical <ul style="list-style-type: none"> • PR channels less than 5% • IF NOT then continue to next step
	BOP	Isolate Steam Dumps <ul style="list-style-type: none"> • Place steam dump BYPASS INTERLOCK switches to OFF/RESET for both trains. <p>(NOTE: Reactor trip breakers will be locally opened after this point in the procedure.)</p>

Comments: _____

Scenario No.: 2001-1		Event No.: 6 and 7
Event Description: ATWS with failure of main turbine to auto trip and failure of MSIVs to auto close (6), and Pressure transient causes steam break (1B MSIV fails closed causes Steam Break on the 1B SG - 2 MS safeties stuck open) (7)		
Time	Position	Applicant's Actions or Behavior
	CREW	<p>Check trips have occurred:</p> <ul style="list-style-type: none"> Reactor trip <ul style="list-style-type: none"> If NOT, Dispatch an operator to locally open the trip breakers by depressing the manual trip buttons. <p>(NOTE: The crew may have dispatched an operator to locally trip the reactor upon entering 1BFR-S.1)</p> <ul style="list-style-type: none"> Turbine trip
	BOP	<p>Check SG levels</p> <ul style="list-style-type: none"> Level in at least one SG > 10% <ul style="list-style-type: none"> If NOT, verify > 900 gpm AF flow Control feed flow to maintain SG levels between 10% and 50% Check SG blowdown isol valves closed: 1SD002A-H <ul style="list-style-type: none"> If NOT then Manually close valves
	RO	<p>Verify all dilution path valves closed</p> <ul style="list-style-type: none"> Reactor Makeup dilution valves 1CV111A and 1CV111B closed Verify BTRS Mode Selector in OFF Dispatch operator to locally check valves closed per 1BFR S.1 step 10c: <ul style="list-style-type: none"> 1CV8841, PW to Emergency boration 1CV8435 & 1CV8453 CV chemical mixing tank 1AB8629A Recycle evap feed pumps to CENT CHG pumps suction
	CREW	<p>Stop reactivity insertion from RCS cooldown</p> <ul style="list-style-type: none"> RCS temperature NOT decreasing in uncontrolled manner SG pressure, none decreasing in uncontrolled manner <p>Identify report 1B steam generator pressure decreasing.</p>
	BOP	<p>Check Main Steamline isolation</p> <ul style="list-style-type: none"> All MSIVs and MSIV bypass valves closed – NO auto MS isol failed <ul style="list-style-type: none"> Manually actuate Main Steamline Isolation from 1PM05J or 1PM06J and verify valves close.

Comments: _____

Scenario No.: 2001-1		Event No.: 6 and 7
Event Description: ATWS with failure of main turbine to auto trip and failure of MSIVs to auto close (6), and Pressure transient causes steam break (1B MSIV fails closed causes Steam Break on the 1B SG - 2 MS safeties stuck open) (7)		
Time	Position	Applicant's Actions or Behavior
	BOP	Identify Faulted SG <ul style="list-style-type: none"> Check pressure in all SGs <ul style="list-style-type: none"> Any decreasing in an uncontrolled manner Identify/report 1B steam generator is faulted.
	BOP [CT] E-2--A	Isolate 1B S/G: <ul style="list-style-type: none"> Check FW to faulted SG isolated <ul style="list-style-type: none"> Associated row on FW isolation monitor lights panel LIT for faulted SG. <ul style="list-style-type: none"> If NOT manually close FW valves on faulted Steam Generator. <p>(NOTE: FW valves will auto close on FW isolation signal of Reactor trip breakers open and Tave of 564°F.)</p> <ul style="list-style-type: none"> Close 1AF013B & F <ul style="list-style-type: none"> Verify 1A S/G PORV closed 1MS018B Verify 1A S/G Blowdown valves closed 1SD002E and F Verify 1A S/G Blowdown sample isolation valves closed 1SD005C
	RO	Check CETCs < 1200°F
	RO	Verify reactor subcritical <ul style="list-style-type: none"> PR channels < 5% IR channels SUR < 0
	CREW	Transition to procedure and step in effect 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" Rev. 101 WOG-1C.
	US	Return to 1BEP-0 step 1 and direct operator actions
	RO	Perform immediate operator actions of 1BEP-0: <ul style="list-style-type: none"> Verify reactor trip Rod bottom lights LIT Reactor trip & bypass breakers open Neutron flux decreasing

Comments: _____

Scenario No.: 2001-1		Event No.: 6 and 7
Event Description: ATWS with failure of main turbine to auto trip and failure of MSIVs to auto close (6), and Pressure transient causes steam break (1B MSIV fails closed causes Steam Break on the 1B SG - 2 MS safeties stuck open) (7)		
Time	Position	Applicant's Actions or Behavior
	BOP	Perform immediate operator actions of 1BEP-0: Verify Turbine Trip <ul style="list-style-type: none"> • Turbine throttle valves closed • Turbine governor valves closed
	BOP	Perform immediate operator actions of 1BEP-0: Verify power to 4KV busses <ul style="list-style-type: none"> • Bus 141 alive light lit • Bus 142 alive light lit
	CREW	Check SI status <ul style="list-style-type: none"> • SI actuated <ul style="list-style-type: none"> • SI First OUT annunciator lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1) • SI ACTUATED lit (1-BP-4.1) • SI Equipment running (SI pumps running, CV Cold leg injection SI8801A/B open) Determine SI actuated <ul style="list-style-type: none"> • Manually Actuate SI by taking either SI switch to ACTUATE (1PM05J or 1PM06J)
	BOP	Verify FW isolated <ul style="list-style-type: none"> • FW pumps tripped • FW Isolation monitor lights lit • FW pumps discharge valves closed 1FW002A-C
	RO	Verify ECCS pumps running <ul style="list-style-type: none"> • CENT CHG pumps • RH pumps • SI pumps
	BOP	Verify RCFCs Accident Mode lights lit Verify Phase A isolation - Group 3 monitor lights lit Verify CNMT Ventilation isolation - Group 6 CNMT Vent Isol monitor lights lit

Comments: _____

Scenario No.: 2001-1		Event No.: 6 and 7
Event Description: ATWS with failure of main turbine to auto trip and failure of MSIVs to auto close (6), and Pressure transient causes steam break (1B MSIV fails closed causes Steam Break on the 1B SG - 2 MS safeties stuck open) (7)		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify AF system: <ul style="list-style-type: none"> • AF pumps running • AF isolation valves open 1AF13A-H except 1AF013B & F closed for faulted steam generator in 1BFR-S.1 • AF flow control valves throttled 1AF005A-H except 1AF005B&F for 1B SG. Verify 1A CC Pump running Verify SX Pumps running Check Main Steamline Isolation <ul style="list-style-type: none"> • Check SG pressure > 640 psig (1B SG depressurized) <ul style="list-style-type: none"> • Verify MSIVs and MSIV Bypass valves closed • Check CNMT pressure < 8.2 psig
	BOP/US	Check if CNMT Spray is required <ul style="list-style-type: none"> • Check if CNMT pressure has increased greater than 20 psig Determine CNMT Spray NOT required
	BOP	Verify Total AF flow: <ul style="list-style-type: none"> • AF flow > 500 gpm • SG levels maintained between 10% and 50% • SG levels NOT increasing in an uncontrolled manner
	BOP	Verify ECCS valve alignment <ul style="list-style-type: none"> • Group 2 Cold Leg Injection monitor lights lit
	BOP	Verify ECCS flow <ul style="list-style-type: none"> • HHSI flow >100 gpm • RCS pressure NOT <1700 psig
	RO	Check at least One PZR PORV Relief Path Available <ul style="list-style-type: none"> • PORV isol valve – ENERGIZED • PORV relief path – AVAILABLE and in AUTO • Isolation valve open

Comments: _____

Scenario No.: 2001-1		Event No.: 6 and 7
Event Description: ATWS with failure of main turbine to auto trip and failure of MSIVs to auto close (6), and Pressure transient causes steam break (1B MSIV fails closed causes Steam Break on the 1B SG - 2 MS safeties stuck open) (7)		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify Generator Trip <ul style="list-style-type: none"> • OCB 3-4 and 4-5 open • PMG output breaker open
	BOP	Verify 1A DG running, 1B DG OOS <ul style="list-style-type: none"> • SX valve open 1SX169A • Dispatch operator locally to check operation of 1A DG
	BOP	Verify Control Room ventilation aligned for emergency operations: <ul style="list-style-type: none"> • Check RM-11 Grid 2 Control Room outside air rad monitors less than alert alarm setpoint. • Operating VC train equipment running train A <ul style="list-style-type: none"> • Supply fan • Return fan • M/U fan • Chilled water pump • MCR chiller 0A • Operating VC train dampers <ul style="list-style-type: none"> • M/U fan outlet damper NOT full closed 0VC24Y • VC train M/U filter light LIT • Operating VC train Charcoal Adsorber aligned for train A <ul style="list-style-type: none"> • 0VC43Y closed • 0VC21Y open • 0VC22Y open • Control Room pressure greater than +0.125 inches water on 0PDI-VC038
	BOP	Verify Auxiliary Building ventilation aligned: <ul style="list-style-type: none"> • Two inaccessible filter plenums aligned <ul style="list-style-type: none"> • Plenum A fan 0VA03CB running <ul style="list-style-type: none"> • Damper 0VA023Y open • Damper 0VA436Y closed • Plenum C fan 0VA03CF running <ul style="list-style-type: none"> • Damper 0VA072Y open • Damper 0VA438Y closed

Comments: _____

Scenario No.: 2001-1		Event No.: 6 and 7
Event Description: ATWS with failure of main turbine to auto trip and failure of MSIVs to auto close (6), and Pressure transient causes steam break (1B MSIV fails closed causes Steam Break on the 1B SG - 2 MS safeties stuck open) (7)		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify FHB ventilation aligned <ul style="list-style-type: none"> • Train B fan 0VA04CB running • 0VA055Y open • 0VA062Y open • 0VA435Y closed
	RO	Check PZR sprays & PORVs closed <ul style="list-style-type: none"> • Normal spray valves closed 1RY455B and 1RY455C <ul style="list-style-type: none"> • If open Stop 1C and 1D RCPs • PORVs closed 1RY455A and 1RY456
	RO	Maintain RCS temperature control <ul style="list-style-type: none"> • Check at least 1 RCP running and RCS Tave trending to 557°F <ul style="list-style-type: none"> • Throttle AFW flow to SGs to control RCS Tave, maintaining 10% in at least 1 SG.
	RO	Check if RCP's should be stopped <ul style="list-style-type: none"> • Any RCP's running • Check if trip criteria applies <ul style="list-style-type: none"> o HHSI flow >100 gpm OR o SI pump discharge flow >200 gpm • RCS pressure < 1425 psig • Trip RCP's if controlled cooldown NOT in progress and above criteria satisfied
	BOP	Check if SG secondary pressure boundaries are intact: <ul style="list-style-type: none"> • Check pressure in all SGs: <ul style="list-style-type: none"> • None decreasing in an uncontrolled manner • None completely depressurized (1B SG completely depressurized)
	CREW	Transition to 1BEP-2 "FAULTED STEAM GENERATOR ISOLATION UNIT 1" Rev. 100 WOG-1C
	US	Implement 1BEP-2 and direct operator actions.
	BOP	Check main steamline isolation: <ul style="list-style-type: none"> • All MSIVs and MSIV Bypass valves closed

Comments: _____

Scenario No.: 2001-1		Event No.: 6 and 7
Event Description: ATWS with failure of main turbine to auto trip and failure of MSIVs to auto close (6), and Pressure transient causes steam break (1B MSIV fails closed causes Steam Break on the 1B SG - 2 MS safeties stuck open) (7)		
Time	Position	Applicant's Actions or Behavior
	BOP	Check if any SG secondary pressure boundary is intact: <ul style="list-style-type: none"> Check all steam generators for any SG pressure stable or increasing.
	BOP/US	Identify Faulted SG <ul style="list-style-type: none"> Check pressure in all SGs <ul style="list-style-type: none"> Any decreasing in an uncontrolled manner Identify/report 1B steam generator is faulted.
	BOP	Isolate 1B S/G: <ul style="list-style-type: none"> Close 1AF013B & F Check FW to faulted SG isolated <ul style="list-style-type: none"> Associated row on FW isolation monitor lights panel LIT for faulted SG. Verify 1A S/G PORV closed 1MS018B Verify 1A S/G Blowdown valves closed 1SD002E and F Verify 1A S/G Blowdown sample isolation valves closed 1SD005C
	BOP	Monitor AF pump suction pressure: <ul style="list-style-type: none"> AF PUMP SX SUCT VLVS ARMED alarm 1-3-E7 NOT lit
	BOP/US	Check secondary radiation trends normal for plant conditions: <ul style="list-style-type: none"> RM11 Grid 1 or HMI indications for: <ul style="list-style-type: none"> SJAE/ gland steam exhaust gas SG blowdown liquid radiation Main steamline MSIV rooms Reset CNMT Isol Phase A if necessary Request Chemistry dept to sample all SGs for activity
	CREW	Transition to 1BEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT UNIT 1" Rev. 101 WOG-1C
	US	Implement 1BEP-1 and direct operator actions.

Comments: _____

Scenario No.: 2001-1		Event No.: 6 and 7
Event Description: ATWS with failure of main turbine to auto trip and failure of MSIVs to auto close (6), and Pressure transient causes steam break (1B MSIV fails closed causes Steam Break on the 1B SG - 2 MS safeties stuck open) (7)		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Check status of RCPs and determine RCPs can remain running</p> <ul style="list-style-type: none"> If any running, apply trip criteria <ul style="list-style-type: none"> HHSI flow >100 gpm on 1FI-917 OR SI flow > 200 gpm on 1FI-918/922 RCS pressure < 1425 psig <p>Determine RCS pressure is greater than 1425 psig and RCPs can remain running</p>
	BOP	<p>Check if SG secondary pressure boundaries are intact:</p> <ul style="list-style-type: none"> Check pressure in all SGs: <ul style="list-style-type: none"> None decreasing in an uncontrolled manner None completely depressurized (1B SG completely depressurized) <p>Determine 1B SG faulted and isolation complete per 1BEP-2</p>
	BOP	<p>Check intact SG levels:</p> <ul style="list-style-type: none"> Narrow range levels > 10%. Control feed flow to maintain narrow range levels between 10% and 50%. Check narrow range levels not increasing in an uncontrolled manner.
	BOP/US	<p>Check secondary radiation trends normal for plant conditions:</p> <ul style="list-style-type: none"> RM11 Grid 1 indications for: <ul style="list-style-type: none"> SJAE/ gland steam exhaust gas SG blowdown liquid radiation Main steamline MSIV rooms Reset CNMT Isol Phase A if necessary Request Chemistry dept to sample all SGs for activity

Comments: _____

Scenario No.: 2001-1		Event No.: 6 and 7
Event Description: ATWS with failure of main turbine to auto trip and failure of MSIVs to auto close (6), and Pressure transient causes steam break (1B MSIV fails closed causes Steam Break on the 1B SG - 2 MS safeties stuck open) (7)		
Time	Position	Applicant's Actions or Behavior
	RO	Check PZR PORVs and isolation valves <ul style="list-style-type: none"> • Power to PORV Isol valves <ul style="list-style-type: none"> • 1RY8000A • 1RY8000B • PORVs closed <ul style="list-style-type: none"> • 1RY455A • 1RY456 • At least ONE PORV Isol valve OPEN <ul style="list-style-type: none"> o 1RY8000A o 1RY8000B
	BOP/RO	Check if ECCS flow should be terminated: <ul style="list-style-type: none"> • RCS subcooling acceptable <ul style="list-style-type: none"> • Iconic display • Attachment A • Secondary heat sink <ul style="list-style-type: none"> • Narrow range level in at least ONE SG >10% OR • >500 gpm total feed flow to SGs • RCS Pressure stable or increasing • PZR level >12%
	CREW	Transition to 1BEP ES-1.1 "SI TERMINATION" Rev. 100 WOG-1C, step 1
	US	Implement 1BEP ES-1.1 and direct operator actions.
		NOTE: Scenario is complete at this point with lead examiners concurrence

Comments: _____

Facility: <u>Byron</u>	Scenario No.: <u>2</u>	Op-Test No.: <u>2001</u>
Examiners: _____	Operators: _____	<u>SRO</u>
_____	_____	<u>RO</u>
_____	_____	<u>BOP</u>

Initial Conditions: IC-18; 75% power BOL, Equilibrium Xenon, 1B Diesel Generator OOS, 1C HD pump OOS, U-2 SAC OOS.

Turnover: The Unit is at 75% power. The 1B Diesel Generator is OOS for replacement of Turbo Charger. The DG has been OOS for 18 hours and is expected to be returned to service by the end of the shift. 1C Heater Drain Pump is OOS for motor bearing replacement. Unit 2 SAC is OOS for an oil change and is expected to be returned to service by the end of the shift. Directions have been received to increase power to 100% at 5 MW/min.

Event No.	Malf. No.	Event Type*	Event Description
Preload	RF EG09 MAINT_O		1B DG OOS
1		N BOP SRO R RO	Raise Turbine load to full power at 5 MW/min Raise reactor power using rods and/or dilution
2	NI09A	I RO SRO	Power Range N41 fails high Coincident with next event
3	RD09	I RO SRO	Auto Rod Speed failure to 0, Rods fail to move in AUTO
4	FW16	I BOP SRO	FW Header Discharge Pressure PT-508 fails low on a 5 second ramp
5	FW02B, FW01	C BOP SRO	1C Main Feedwater pump trips with failure of 1A Motor Driven Feedwater pump failure to start
6	RF TC03	M BOP RO SRO	Inadvertent turbine trip
7	ED15D	C BOP RO SRO	Loss of Offsite Power (Switchyard Bus 6 fault)
8	EG08A	M BOP RO SRO	Loss of all AC power due to 1A DG failure 90 sec after start

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

SCENARIO 2001-2 OVERVIEW

Unit 1 is at 75% power, BOL, Equilibrium Xenon, steady state. The 1B Diesel Generator is OOS for Turbo Charger replacement. The Diesel Generator has been OOS for 18 hours and is expected to be returned to service by the end of the shift. 1C Heater Drain Pump is OOS for motor bearing replacement. Unit 2 SAC is OOS for an oil change and is expected to be returned to service by the end of the shift. Electrical Operations has requested a ramp up to full power at a rate of 5 MW/min.

Following clearly observable plant response from the reactivity changes, Power Range N41 will fail coincident with rods failing to respond when automatic rod control is called for. The Power Range failure high will result in demanded rod inward motion. It is expected that the RO will recognize improper rod motion for this condition and place rod control in manual. Rod control functions normally in manual. 1BOA INST-1, "OPERATION WITH A FAILED NUCLEAR INSTRUMENT CHANNEL" Rev. 101 (Attachment A) will be entered to address the failed Nuclear Instrument channel. 1BOA ROD-2 may be entered, but is NOT required, in response to the rod control problem. The IM Department will not be able to repair the rod speed problem and manual rod control will be the only method to move control rods. The SRO will address ITS for actions for the failed Power Range Instrument.

After the bistables for the failed Power Range instrument are tripped, feedwater header pressure instrument, PT-508, will fail low. This results in a increase in main FW Pumps speed. The operator is expected to recognize this condition, take manual control of the Master FW Pumps Speed controller and restore FW discharge pressure to within its normal band. Once SG levels are stabilized, the 1C Main Feedwater Pump will trip and the operator should enter 1BOA SEC-1 "SECONDARY PUMP TRIP" Rev. 101, Attachment A "FW Pump Trip" and attempt a start of the 1A MDFW pump. The 1A MDFW pump will fail to start. Per 1BOA SEC-1, the RO is expected to borate and drive rods in manual as necessary to restore Tave to Tref at final load. Due to the rod speed malfunction and Main FW Pump speed in MANUAL during a transient, the crew may elect to trip the reactor.

Once the plant has stabilized, an inadvertent trip of the main turbine will occur. The crew will perform immediate actions of 1BEP-0 and transition will be made to 1BEP ES-0.1. At step 9 of 1BEP ES-0.1, a loss of all offsite power will occur due to weather conditions. The 1A DG will start and energize ESF Bus 141. Approximately 90 seconds later, the 1A DG will trip resulting in a loss of all AC power to Unit 1. Transition will be made to 1BCA-0.0. After power is restored to Bus 141, a transition will be made to either 1BCA-0.1 or 1BCA-0.2. The scenario ends following restoration of charging flow.

Critical Tasks

E-0--C: Energize at least one AC Emergency Bus before transition to Attachment B of CA-0.0.

ECA-0.0--H: Isolate RCP seal injection before a charging pump starts or is started.

ECA-0.0--C: Place loads in Pull out to limit loading on ESF xtie prior to energizing bus from opposite unit.

SCENARIO 2001-2
SIMULATOR OPERATOR NOTES

Simulator Setup:

IC-18, 75% power, BOL, Xenon Equilibrium, steady state.

Align switches:

1B DG C/S PTL and OOS

ACB 1423 PTL and OOS

1C HD pump C/S PLT and OOS

U-2 SAC C/S PTL and OOS, ensure U-1 and U-0 SAC running

Perform "Ready for Training" checklist.

Insert PRELOAD Events:

MRF EG09, MAINT_O - 1B DG OOS

IMF FW01 - 1A Motor Driven FW pump fail to start

Event 1 Power increase

Event 2 Power Range N-41 fails high.

SDG: NI5

Malf: NI09A, 120

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

NOTE: events 2 and 3 are coincident with each other

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

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

SDG: RX4 for bistables and RP2 for cabinet door

Cabinet door #1 open

OTΔT Trip

TB411C

C1-124

BS-3

RF

RP20 OPEN

OTΔT Runback

TB411D

C1-124

BS-4

RF

RX013 TRIP

RF

RX135 TRIP

Cabinet door #1 Close

RF

RP20 CLOSE

Event 3 Auto Rod speed failure to 0, rods fail to move in auto.

SDG: RD1

Malf: RD09, 0

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

Event 4 FW Header Discharge Pressure PT-508 fails low on a 5 second ramp.

SDG:

Malf: FW16

Initiate event after actions for the failed Power Range instrument and the rod control malfunction have been completed or at the lead examiners cue.

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

Event 5 1C Main Feedwater Pump trips with failure of the 1A motor Driven Feedwater pump to start

SDG: FW23 and FW7

Malf: FW02B and (preload) FW01

Initiate failure after steam generator levels are trending back to normal level.

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

Event 6 Indvertent turbine trip

SDG: TC1

Remote Function: TC03

Initiate turbine trip after actions are complete to stabilize plant from runback, or at lead examiners cue.

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

Event 7 Loss of Offsite Power (Switchyard Bus 6 fault).

SDG: ED1A

Malf: ED15D

Initiate Loss of offsite power at step 9 of 1BEP ES-0.1.

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

Event 8 Loss of all AC power due to 1A DG failure 90 sec after start

SDG: EG3

Malf: EG08A

Initiate event 90 sec after 1A DG has carried bus 141

Role play as U-2 admin or unit NSO to respond to requests of Unit 2 ESF busses energized and performance of 2BCA-0.3

Use the following to close the unit crosstie feeds from unit 2 ESF busses

RF ED006, close (Close U2 xtie brkr ACB 2414)

RF ED007, close (Close U2 xtie brkr ACB 2424)

When contacted as SM or TSC for evaluation of method to restore power to non-ESF bus inform Unit Supervisor the 1B DG is now available.

MRF EG09, REMOTE

Scenario No.: 2001-2		Event No.: 1
Event Description: Power increase at 5 MW/min.		
Time	Position	Applicant's Actions or Behavior
	US	Implement actions of 1BGP 100-3, Step F.63.
	US	<p>Direct load increase to 1120 MW (90% power) at 5 MW/min.</p> <ul style="list-style-type: none"> • Initiate load swing instruction sheet. • Contact Chemistry and Rad Protection for load change > 15%/hr. o Contact Rad Waste for addition to HUT from dilution activities
	CREW	Review applicable Prerequisites, Precautions, and Limitations and Actions of BGP 100-3.
	RO	<p>Verify rod position and boron concentration.</p> <p>Initiate dilution, if required, to maintain Tave (BOP CV-5, Rev 16)</p> <p>Determine required PW volume by:</p> <ul style="list-style-type: none"> o Effects of previously performed dilutions o Byron Boration Dilution Tables <ul style="list-style-type: none"> • Determined desired amount of PW to add • Determine desired PW flow rate. • Place MAKE-UP CONT SWITCH to STOP position. • Set MU MODE SELECT to DIL or ALT DIL position. • Set 1FK-111 PW/Total Flow Control to desired dilution rate. • Set 1FY-0111 Primary Water Control Preset Counter to desired volume. • Press enter on the PW/Total Flow Totalizer • Insert the gallons desired • Press Reset on the PW/Total Flow Totalizer • Press Display and verify the correct gallons were entered • Adjust VCT level control valve POT to maintain VCT pressure as desired • Verify makeup system valves in AUTO 1CV111A, 1CV111B, 1CV110B • Place MAKE-UP CONT Switch to START o Verify proper operation of valves (1CV111A throttles open, 1CV111B open, 1CV110B ALT DIL), PW flow on recorder) <p>When desired amount of primary water added verify 1CV111A, 1CV111B, and 1CV110B close.</p>

Comments: _____

Scenario No.: 2001-2		Event No.: 1
Event Description: Power increase at 5 MW/min.		
Time	Position	Applicant's Actions or Behavior
	BOP	Initiate turbine load increase: <ul style="list-style-type: none"> • Depress LOAD RATE MW/MIN • Enter 5 MW/min • Depress ENTER • Depress REF • Enter power level 1120 MW • Depress ENTER • When ready to begin load increase, depress GO • Verify load increases.
	RO	Monitor power increase: <ul style="list-style-type: none"> • Monitor reactor power, Tave, ΔI • Verify rods move in AUTO to maintain Tave within $\pm 1.0^\circ\text{F}$ of Tref. If diluting: <ul style="list-style-type: none"> • Monitor VCT level • Verify RCS boron concentration decreasing • Monitor PW 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 and with lead examiners concurrence, Event 2 and Event 3 concurrent events are entered.

Comments: _____

Scenario No.: 2001-2		Event No.: 2 and 3
Event Description: Power Range N41 fails high (2). Coincident with the power range failure, Rods fail to move (0 step/min) in AUTO (3)		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-10-A3 PWR RNG HIGH STPT RX TRIP ALERT 1-10-B5 PWR RNG FLUX HIGH ROD STOP 1-10-C3 PWR RNG FLUX RATE RX TRIP ALERT 1-10-C4 PWR RNG CHANNEL DEV Power Range channel indication for N41 increase full scale
	RO/US	Identify/report Power Range N41 failure and rod control/rod speed malfunction. NOTE: Rod Speed Indicator, 1SI-412, indicates low at 0 spm
	RO	Place rod control in MANUAL.
		NOTE: US may enter 1BOA ROD-2. This action is not required, in response to the rod control problem since manual rod movement is available and indications are normal when manual rod control is selected
	RO	Identify/report failed Power Range N41 o Determine N41 failed high • Maintain Rod Bank Select switch in MANUAL
	US	Implement 1BOA INST-1 "OPERATION WITH A FAILED NUCLEAR INSTRUMENT CHANNEL" Rev. 101, Attachment A "POWER RANGE CHANNEL FAILURE" and direct operator actions.
	RO	Check Rod Control status. • Rod Bank Select Switch in Manual
	RO/BOP	Check for Rod Stop • PWR RNG FLUX HIGH ROD STOP alarm 1-10-B5 LIT • Place Rod Stop Bypass Switch at 1PM07J in Bypass for the affected channel

Comments: _____

Scenario No.: 2001-2		Event No.: 2 and 3
Event Description: Power Range N41 fails high (2). Coincident with the power range failure, Rods fail to move (0 step/min) in AUTO (3)		
Time	Position	Applicant's Actions or Behavior
	RO	Check Tave-Tref deviation. <ul style="list-style-type: none"> • Check Tave-Tref stable and within 1°F <ul style="list-style-type: none"> • Restore to within 1°F <ul style="list-style-type: none"> o Adjust rods o Adjust turbine load o Adjust RCS boron concentration
	BOP	Check SG Levels: <ul style="list-style-type: none"> • Normal and Stable
	BOP	Bypass/defeat PR channel functions at 1PM07J <ul style="list-style-type: none"> • Detector Current Comparator <ul style="list-style-type: none"> • Upper Section • Lower Section • Misc Control and Indications <ul style="list-style-type: none"> • Power Mismatch Bypass <ul style="list-style-type: none"> o Rod Stop Bypass • Comparator and Rate <ul style="list-style-type: none"> • Comparator Channel Defeat
	BOP	Trip Bistables for affected PR channel: <ul style="list-style-type: none"> • Remove control power fuses for affected channel at 1PM07J to trip the following bistable: <ul style="list-style-type: none"> • Lo Rx Trip NC41P (NOT LIT) • Hi Rx Trip NC41R (LIT) • Positive/Negative flux rate NC41U/K (LIT)
	CREW	Dispatch an operator to Unit 1 AEER protection cabinet 1PA01J <ul style="list-style-type: none"> • Locally trip bistables for N41 by placing in TEST <ul style="list-style-type: none"> • TB411C C1-124 BS-3 • TB411D C1-124 BS-4
	RO	Select operable channel for ΔT recorder. Check if Rod Control System can be placed in Auto: <ul style="list-style-type: none"> • Turbine Low Power Intlk, C-5, NOT lit • Check Tave-Tref stable and within 1°F <ul style="list-style-type: none"> o Place Rod Control in AUTO – maintain in manual if rod control problem was identified.

Comments: _____

Scenario No.: 2001-2		Event No.: 2 and 3
Event Description: Power Range N41 fails high (2). Coincident with the power range failure, Rods fail to move (0 step/min) in AUTO (3)		
Time	Position	Applicant's Actions or Behavior
	US	Refer to Technical Specifications: <ul style="list-style-type: none"> • 3.3.1 – Rx Trip Instrumentation Condition D & E - place inop channel in TRIP within 6 hours o 3.2.4 – QPTR o TRM 3.3.h - PDMS
	US	Inform SM/Maint of Power Range N41 failure and of auto control rod speed failure.
		NOTE: Following actions to respond to failed power range instruemnt and with lead examiners concurrence, Event 4 is entered.

Comments: _____

Scenario No.: 2001-2		Event No.: 4
Event Description: Feedwater Header transmitter PT-508 fails LOW causing the main feed pumps speed to increase		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-15-A9/B9/C9/D9 S/G 1_ LEVEL DEVIATION HIGH LOW 1-15-A4/B4/C4/D4 S/G 1_ FLOW MISMATCH FW FLOW LOW PI-508 indication low SG levels increasing Feedwater flow increasing Main FW pumps speed increasing
	BOP/US	Identify/report failure of feedwater header pressure instrument PT-508
	BOP	Response per BAR 1-15-A9/B9/C9/D9 and 1-15-A4/B4/C4/D4: <ul style="list-style-type: none"> • Take MANUAL control of FW Pump speed controller (Feedwater Pumps Master Controller) and lower speed to decrease FW flow o If required, take MANUAL control of FW Reg valves 1FW510/520/530/540 and close to restore level. • Recover SG levels to normal • Monitor SG levels and FW flows, adjusting feed pump speed as necessary • Return FW Reg valves to AUTO if required
	US	Inform SM/Maint of PT-508 failure/status.
		NOTE: Following actions to stabilize SG levels and feedwater system and with lead examiners concurrence, Event 5 is entered

Comments: _____

Scenario No.: 2001-2		Event No.: 5
Event Description: 1C Main Feedwater Pump trips. 1A Main Feedwater Pump will fail to start.		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: 1-16-C1 FW PUMP 1C TRIP 1-16-D4 FW PUMP DSCH FLOW HIGH 1C Main FW Pump speed decreasing Decreasing FW flows
	BOP/US	Identify/report trip of Main FW pump 1C
	US	Implement 1BOA SEC-1 "SECONDARY PUMP TRIP" Rev. 101, Attachment A "FW Pump Trip" and direct operator actions.
	BOP	Close FW pump recirc valve (1FW012C) on tripped pump Check Turbine Load <ul style="list-style-type: none"> • Turbine load > 700 MW • Check at least ONE FW pump running Restore Feed Flow <ul style="list-style-type: none"> • Check FW pump 1A available • Start aux oil pump for FW pump 1A by taking control switch to START • Verify 1FW016 controller In MANUAL at 20% demand • Start FW pump 1A by taking its control switch to START (fails to start) Identify/report failure to start of FW pump 1A
	BOP	Reduce Turbine Load <ul style="list-style-type: none"> • Depress TURBINE RUNBACK • Check turbine load decreasing
	RO	<ul style="list-style-type: none"> o Verify rod control in AUTO (may be in manual due to previous failure) <ul style="list-style-type: none"> • Maintain Tave and Tref within 3°F • Initiate boration as necessary <ul style="list-style-type: none"> • Place rods in manual (if not previously performed) and adjust rod height as necessary

Comments: _____

Scenario No.: 2001-2		Event No.: 5
Event Description: 1C Main Feedwater Pump trips. 1A Main Feedwater Pump will fail to start.		
Time	Position	Applicant's Actions or Behavior
	BOP	<p>Raise FW Pump Suction Pressure</p> <ul style="list-style-type: none"> • If NPSH low alarm 1-16-E1 is Lit <ul style="list-style-type: none"> • Check CP bypass valves open 1CD210A & B • Check standby CD/CB Pump • Verify HD pump disch valves responding as necessary 1HD046A & B • Check 1CB113A,B,C,D in Auto • Check CD pumps recirc valve 1CD152 closed • Open Gland Steam condenser bypass valves 1CD157A & B <p>Check feed flow restored</p> <ul style="list-style-type: none"> • Feed flow \geq steam flow • SG levels stable at or trending to normal <ul style="list-style-type: none"> o Adjust Master Feed Pump Speed Controller o Adjust FW Reg valves o Adjust turbine driven pump 1B speed • Depress TURBINE RUNBACK pushbutton • Check 1-16-D2 FW PUMP DSCH FLOW HIGH alarm NOT LIT <ul style="list-style-type: none"> o If 1-16-D2 is LIT then reduce turbine load at 20 MW/min as required to reduce FW pump discharge flow.
	RO	<p>Check plant status</p> <ul style="list-style-type: none"> • Check PDMS Operable by annunciator 1-10-E8 NOT LIT • Check PDMS limits NOT exceeded annunciator 1-10-D7 NOT LIT • Control ΔI near target • Control rods > Rod Bank Low Insertion Limit by annunciator 1-10-B6 NOT LIT
	BOP	<ul style="list-style-type: none"> • Check LOSS OF TURBINE LOAD INTLK C7 Bypass permissive (1-BP-4.6) light <ul style="list-style-type: none"> • If lit, when steam dumps closed, place Steam Dump Mode Selector to RESET

Comments: _____

Scenario No.: 2001-2		Event No.: 5
Event Description: 1C Main Feedwater Pump trips. 1A Main Feedwater Pump will fail to start.		
Time	Position	Applicant's Actions or Behavior
	RO/BOP	Restore plant conditions <ul style="list-style-type: none"> • Adjust boron concentration as necessary • Balance FW flows as necessary • Verify FW pump recirc valves on running FW pumps in Modulate • Verify valve controls in AUTO <ul style="list-style-type: none"> • HD pump discharge valves • CB pump recirc valves • CD pump recirc valves • GS condenser bypass • Shutdown unnecessary CD/CB pumps • Complete shutdown of tripped FW pump • Adjust SG blowdown flows and calorimetric inputs as necessary • Place DEH feedback loops in service
	CREW	<ul style="list-style-type: none"> • Contact Chemistry and Rad Protection <ul style="list-style-type: none"> • >15% in one hour sampling requirements • secondary chemistry parameter transient
		NOTE: When the plant has been stabilized and with lead evaluators concurrence, Event 6 is entered, if the plant tripped during this event then Event 6 initiation is not required.

Comments: _____

Scenario No.: 2001-2		Event No.: 6
Event Description: Inadvertent turbine trip		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator: 1-11-A9 TURB TRIP ABOVE P8 RX TRIP
	US	Implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" Rev. 101 WOG 1C and direct operator actions.
	RO	Perform immediate operator actions of 1BEP-0: <ul style="list-style-type: none"> • Verify reactor trip <ul style="list-style-type: none"> • Rod bottom lights LIT • Reactor trip & bypass breakers open • Neutron flux decreasing
	BOP	Perform immediate operator actions of 1BEP-0: <ul style="list-style-type: none"> • Verify Turbine Trip <ul style="list-style-type: none"> • Turbine throttle valves closed • Turbine governor valves closed • Verify power to 4KV busses <ul style="list-style-type: none"> • Bus 141 energized • Bus 142 energized
	CREW	Perform immediate operator actions of 1BEP-0: Determine Safety Injection NOT actuated/required <ul style="list-style-type: none"> • SI First OUT annunciator NOT lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1) • SI ACTUATED NOT lit (1-BP-4.1) • SI Equipment NOT actuated (SI pumps NOT running, CV Cold leg injection 1SI8801A/B not open) • PZR pressure > 1829 psig • Steamline pressure > 640 psig • CNMT pressure < 3.4 psig • PZR level > 4%
	US	Review immediate operator actions and determine Safety Injection not required <ul style="list-style-type: none"> • Transition to 1BEP ES-0.1 " REACTOR TRIP REPSONSE "

Comments: _____

Scenario No.: 2001-2		Event No.: 6
Event Description: Inadvertent turbine trip		
Time	Position	Applicant's Actions or Behavior
	US	Implement 1BEP ES-0.1 "REACTOR TRIP RESPONSE" Rev. 100 WOG-1C and direct operator actions.
	BOP	Verify generator tripped: <ul style="list-style-type: none"> • Output breakers open <ul style="list-style-type: none"> • OCB 3-4 • OCB 4-5 • PMG output breaker open
	RO	Maintain RCS average temperature stable or trending to 557°F.
	BOP	Check FW isolation <ul style="list-style-type: none"> • Monitor lights lit • Trip all HD pumps • Check feed flow to SGs (AF pumps) >500 gpm • Check SG blowdown valves isolated 1SD002 A-H
	RO	Verify ALL control rods inserted Check PZR level control <ul style="list-style-type: none"> • >17%, trending to program • Charging and letdown in service • PZR level trending to program Check PZR pressure control <ul style="list-style-type: none"> • Pressure > 1829 psig • Stable at or trending to 2235 psig
	BOP	Check SG levels <ul style="list-style-type: none"> • Narrow range levels > 10% • Maintained between 10% and 50%

Comments: _____

Scenario No.: 2001-2		Event No.: 6
Event Description: Inadvertent turbine trip		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify ALL AC busses powered from offsite power (SATs) <ul style="list-style-type: none"> • ESF Busses 141 and 142 • NON-ESF Busses 143 and 144 • 6.9 KV Busses <ul style="list-style-type: none"> • Bus 156 • Bus 157 • Bus 158 • Bus 159
		NOTE: At step nine of 1BEP ES-0.1, a Loss of offsite power will occur, Event 7 and 90 seconds after starting the 1A DG will trip resulting in a loss of ALL AC, Event 8.

Comments: _____

Scenario No.: 2001-2		Event No.: 7 & 8
Event Description: Loss of Offsite Power (7) Failure of EDG1A 90 sec after start.(8)		
Time	Position	Applicant's Actions or Behavior
	CUE:	Reactor Coolant Pumps tripped All non-ESF Busses de-energized All secondary pumps tripped
	CREW	Identify/report a Loss of Offsite Power.
		NOTE: US may enter IBOA ELEC-3 "LOSS OF 4KV ESF BUS UNIT 1" and IBOA ELEC-4 "LOSS OF OFFSITE POWER UNIT 1" but should exit when 1A DG is lost.
	CREW	Identify/ report the loss of All AC when the 1A DG trips 90 seconds after starting
	US	Transition to 1BCA-0.0 "LOSS OF ALL AC POWER UNIT 1", Rev. 100 WOG 1C
	US	Implement 1BCA-0.0 "LOSS OF ALL AC POWER" and direct operator actions.
	RO	Perform Immediate Operator Action of 1BCA-0.0 Verify reactor tripped <ul style="list-style-type: none"> • Reactor trip and bypass breakers open • Neutron flux decreasing
	BOP	Perform Immediate Operator Action of 1BCA-0.0 Isolate Steamlines <ul style="list-style-type: none"> • Actuate Main Steamline Isolation • Verify all MSIVs and MISV bypass valves closed
	RO	Actuate SI
	BOP	Verify AF flow: <ul style="list-style-type: none"> • >500 gpm (1B AF only)
	RO	Verify RCS isolated: <ul style="list-style-type: none"> • Check PZR PORVs closed 1RY455A and 1RY456 • Close letdown orifice valves 1CV8149A/B/C • Close letdown line isolation valves 1CV459 & 1CV460 • Close excess letdown isol valves 1CV8153A/B

Comments: _____

Scenario No.: 2001-2		Event No.: 7 & 8
Event Description: Loss of Offsite Power (7) Failure of EDG1A 90 sec after start.(8)		
Time	Position	Applicant's Actions or Behavior
	BOP	Try to restore power to any/both Unit 1 4KV ESF busses: <ul style="list-style-type: none"> • Check DGs both running
	BOP/US	Identify/report 1A DG not running and 1B OOS <ul style="list-style-type: none"> • Reset SI • Attempt to start 1A DG
	BOP	Prepare for ESF Bus crosstie: <ul style="list-style-type: none"> • Dispatch operator to locally depress EMERGENCY STOP pushbutton at 1A DG • Reset CNMT Isol Phase A • Reset SI if necessary
	US	Check status of Unit 2 ESF busses <ul style="list-style-type: none"> • Any Unit 2 4KV ESF bus energized • Notify Unit 2 to implement 2BCA-0.3 • Both Unit 2 4KV ESF busses energized
	BOP/US	Crosstie bus 141 to Unit 2 <ul style="list-style-type: none"> • Bus 241 energized • Check Bus 141 not faulted <ul style="list-style-type: none"> • ACB 1413 (DG feed) in PULL OUT • ACB 1411 (Non-ESF feed tie) in PULL OUT • ACB 1412 (SAT feed) in PULL OUT • ACB 1414 (Reserve feed) in PULL OUT • Verify Bus 141 alarms NOT LIT (Not faulted) <ul style="list-style-type: none"> • Annunciator 1-21-A7 BUS 141 FD BRKR ACB 1412 TRIP • Annunciator 1-21-B8 BRKR 1414 CROSS-TIE OVERCURRENT • Annunciator 1-21-B9 DG 1A OVERLOAD
	BOP	<ul style="list-style-type: none"> • Verify following train A loads available <ul style="list-style-type: none"> • Bus 131X • Cent Chg Pump 1A • CC Pump 1A or 0 • SX Pump 1A • MCR Chiller 0A

Comments: _____

Scenario No.: 2001-2		Event No.: 7 & 8
Event Description: Loss of Offsite Power (7) Failure of EDG1A 90 sec after start.(8)		
Time	Position	Applicant's Actions or Behavior
	BOP/RO [CT] ECA- 0.0--C	<ul style="list-style-type: none"> Place loads in PULL OUT <ul style="list-style-type: none"> Cent Chg Pumps RH Pumps SI Pumps AF Pump 1A RCFCs (Hi & Lo) CS Pumps CC pumps (1A, 1B, and 0) SX Pumps MCR Chillers SX fans (0A, 0B, 0E, and 0F Hi and Lo)
	BOP/US	<ul style="list-style-type: none"> Check Unit 2 reserve feed breaker closed <ul style="list-style-type: none"> ACB 2414
	BOP [CT] E-0--C	<ul style="list-style-type: none"> Synch and Close Bus 141/241 reserve feeder breakers <ul style="list-style-type: none"> Close ACB 1414
	BOP	<ul style="list-style-type: none"> Check Bus 141 energized Check Bus 131X and 131Z energized
	BOP	Restore Unit 1 SX cooling: <ul style="list-style-type: none"> Check valves for available SX pump open: <ul style="list-style-type: none"> 1SX001A 1SX016A 1SX027A Start available Unit 1 SX pump 1A Check open SX crosstie valves 1SX033 and 1SX034 Monitor crosstied power source load capacity
	BOP	Verify following equipment loaded on energized 4KV ESF bus: <ul style="list-style-type: none"> Check battery charger 111 energized <ul style="list-style-type: none"> 125V DC BATT CHGR 111 TROUBLE (1-21-E8) not lit Check associated instrument inverters energized: <ul style="list-style-type: none"> BUS 111 INVERTER TROUBLE (1-4-A5) not lit BUS 113 INVERTER TROUBLE (1-4-C5) not lit

Comments: _____

Scenario No.: 2001-2		Event No.: 7 & 8
Event Description: Loss of Offsite Power (7) Failure of EDG1A 90 sec after start.(8)		
Time	Position	Applicant's Actions or Behavior
	BOP	Align equipment for Unit 1 restoration <ul style="list-style-type: none"> • Verify AF pump 1B Running • Check both Unit 2 ESF busses energized from SAT • Check deenergized ESF bus not faulted <ul style="list-style-type: none"> • ACB 1423 (DG feed) in PULL OUT • ACB 1421 (Non-ESF feed tie) in PULL OUT • ACB 1422 (SAT feed) in PULL OUT • ACB 1424 (Reserve feed) in PULL OUT • Verify Bus 142 alarms NOT LIT (not faulted): <ul style="list-style-type: none"> • Annunciator (1-22-A7) BUS 142 FD BRKR ACB 1422 TRIP • Annunciator (1-22-B8) BRKR 1424 CROSS-TIE OVERCURRENT • Annunciator (1-22-B9) DG 1B OVERLOAD • Check deenergized Unit 1 ESF bus Unit 2 reserve feed breaker closed <ul style="list-style-type: none"> • ACB 2424 • Sync and Close ACB 1424 o Dispatch EO to start 1A DG per 1BOA ELEC-3
	RO	<ul style="list-style-type: none"> • Close 1CV8100 and 1CV8112.
	BOP	<ul style="list-style-type: none"> • Check energized SG PORVs in AUTO
	BOP	<ul style="list-style-type: none"> • Check VC fans – one train running <ul style="list-style-type: none"> • Supply fan • Return fan • M/U fan

Comments: _____

Scenario No.: 2001-2		Event No.: 7 & 8
Event Description: Loss of Offsite Power (7) Failure of EDG1A 90 sec after start.(8)		
Time	Position	Applicant's Actions or Behavior
	CREW	<p>Select proper recovery procedure:</p> <ul style="list-style-type: none"> • Check RCS subcooling acceptable per ICONIC DISPLAY • Check PZR level > 12% • Verify Safety Injection Equipment NOT automatically actuated upon AC power restoration <p>Determine proper recovery procedure:</p> <ul style="list-style-type: none"> • 1BCA-0.1 if all the following satisfied: <ul style="list-style-type: none"> • RCS subcooling acceptable <ul style="list-style-type: none"> o Iconic Display OR <ul style="list-style-type: none"> o Attachment A • Pzr level > 4% (38% ADVERSE) • NO SI equipment auto actuation on AC restoration: <ul style="list-style-type: none"> o SI pump running o Cent Chrg pump to cold leg isolation valves 1SI8801A/B open when energized • 1BCA-0.2 if any of the above conditions NOT satisfied
	US	<p>Transition to 1BCA-0.1 "LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED" Rev. 100 WOG-1C (Begin below) OR 1BCA-0.2 "LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED" Rev. 100 WOG-1C(Begin at marker ♦ on page 22)</p>
	US	<p>Implement 1BCA-0.1 " LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED ", Rev. 100 WOG 1C and direct operator actions.</p>
	RO [CT] ECA-0.0--H	<p>Check RCP Seal Isolation Status</p> <ul style="list-style-type: none"> o Check CENT CHG pumps STOPPED • Close RCP Seal Injection isol valves 1CV8355A/B/C/D o Check CC pumps STOPPED • Close RCPs thermal barrier isol valve 1CC9438 or 1CC685

Comments: _____

Scenario No.: 2001-2		Event No.: 7 & 8
Event Description: Loss of Offsite Power (7) Failure of EDG1A 90 sec after start.(8)		
Time	Position	Applicant's Actions or Behavior
	BOP/US	Reset CNMT Isol Phase A if necessary Manually load following equipment on 4KV ESF buses: <ul style="list-style-type: none"> • Check SAC any running (none running, U-2 SAC OOS) <ul style="list-style-type: none"> • Crosstie NON-ESF buses to ESF buses <ul style="list-style-type: none"> • Verify all breakers on affected buses open • Place all non-running WS pumps in PTL on affected buses • Reset SI recirc sump isol valves 1SI8811A and B if necessary • Open all 480 V transformer low side breakers at 1PM01J for affected buses • Open 480 V PZR heater transformer low side breakers at 1PM05J for affected buses • Consult TSC/EMD for method to restore power to non-ESF bus. • Restore power to non-ESF bus. • Start a SAC • Start a WS pump • Open instrument air CNMT isol valves 1IA065 and 1IA066 when instrument air pressure is restored.
	BOP	<ul style="list-style-type: none"> • Manually Load following equipment on 4KV bus <ul style="list-style-type: none"> • Start one CC pump • Align CENT CHG pump suction to RWST <ul style="list-style-type: none"> • Open at least one RWST to CENT CHG pump suction valve • Close at least one VCT outlet isol valve • Close at least one charging line CNMT isol valve • Check CENT CHG pumps to cold legs injection isol valves CLOSED • Reset SI recirc sump isol valves • Reset SI CENT CHG pump miniflow isol valves • Verify available CENT CHG pump miniflow isol valves OPEN • Start one CENT CHG pump • Start RCFCs (lo speed) • Start available VC Train Equipment
		NOTE: If actions of 1BCA-0.1 are being performed, scenario may be terminated at this point with lead examiners concurrence.
♦	US	Implement 1BCA-0.2 " LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED " Direct operator actions of 1BCA-0.2

Comments: _____

Scenario No.: 2001-2		Event No.: 7 & 8
Event Description: Loss of Offsite Power (7) Failure of EDG1A 90 sec after start.(8)		
Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> • Check RWST level > 46%
	CREW	<ul style="list-style-type: none"> • Manually establish "A" Train ECCS injection alignment • Verify RH pump miniflow valves 1RH610 and 1RH611 OPEN • Open CENT CHG pumps to cold leg isolation valves 1SI8801A and 1SI8801B • Open RWST to CENT CHG pumps suction valves 1CV112D and 1CV112E • Close VCT outlet Isol valves 1CV112B and 1CV112C • Close charging line CNMT isol valves 1CV8106 and 1CV8105 • Verify RH Bypass flow control valves 1RH618 and 1RH619 in MANUAL with ZERO demand
	RO	<ul style="list-style-type: none"> • Check RCP Thermal Barrier CC Isolation Status • Check CC Pumps all stopped, if NOT go to next step • Check CC from RCP Thermal Barrier isol valves closed <ul style="list-style-type: none"> o 1CC685 (Grp 6: 6.2) o 1CC9438 (Grp 6: 5.2)
	RO/BOP	<ul style="list-style-type: none"> • Load safeguards equipment as necessary on energized ESF busses • CC pump (s) • RH Pump (s) • SI Pump (s) • RCFCs in LO speed • SX pump (s) • VC Train <ul style="list-style-type: none"> • Chilled Water pump • MCR Chiller
	RO [CT] ECA- 0.0--H	<ul style="list-style-type: none"> • Check if CENT CHG should be started: <ul style="list-style-type: none"> o Check CENT CHG pumps stopped • Check RCP seal injection valves 1CV8355A/B/C/D closed o Start a CV pump
		NOTE: Scenario may be terminated at this point with lead examiners concurrence.

Comments: _____

Facility: Byron Scenario No.: 3 Op-Test No.: 2001

Examiners: _____ Operators: _____ SRO

_____ RO

_____ BOP

Initial Conditions: IC-21; 100% power, BOL, equilibrium Xenon, steady state, 1B Diesel Generator OOS, 1C HD pump OOS, U-2 SAC OOS.

Turnover: 100% power, BOL, equilibrium Xenon, steady state. The 1B Diesel Generator is OOS for replacement of Turbo Charger. The DG has been OOS for 18 hours and is expected to be returned to service by the end of the shift. 1C Heater Drain Pump is OOS for motor bearing replacement. Unit 2 SAC is OOS for an oil change and is expected to be returned to service by the end of the shift.

Event No.	Malf. No.	Event Type*	Event Description
Preload	RF EG09 MAINT_O		1B DG OOS
1	TH03C	C RO BOP SRO	Steam Generator 1C Tube Leak (25 gpm)
2		N BOP SRO R RO	Reduce Turbine Load for Unit Shutdown due to SG leakage > Tech Spec Lower reactor power using rods and/or boration
3	RX18A	I RO SRO	1A RCS loop Tcold RTD failed High
4	EG03	C BOP SRO	Voltage Regulator malfunction Field Forcing
5	RX06L	I BOP SRO	Steam Generator 1C controlling level channel 1LT558 Failed High on a 3 sec ramp.
6	CV01A	C RO SRO	Centrifugal Charging Pump Trip
7	TH03C	M RO BOP SRO	Steam Generator 1C Tube Rupture (460 gpm)
8	ED11A	C RO BOP SRO	Loss of Instrument Bus 111 coincident with Reactor Trip
9	RF RP84 RP15D	<i>OK</i> RO BOP SRO	1B SI Pump fails to start automatically, Manually start an SI pump and Manually Align train A ECCS for Injection due to failure to auto start from loss of instrument bus 111

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

SCENARIO 2001-3 OVERVIEW

The unit is at 100% power, BOL, equilibrium Xenon, steady state. The 1B Diesel Generator is OOS for Turbo Charger replacement. The Diesel Generator has been OOS for 18 hours and is expected to be returned to service by the end of the shift. 1C Heater Drain Pump is OOS for motor bearing replacement. Unit 2 SAC is OOS for an oil change and is expected to be returned to service by the end of the shift.

Four minutes into the scenario, a 25 gpm steam generator tube leak occurs on the 1C S/G. The crew will recognize the symptoms of excessive primary plant leakage due to decreasing PZR level and pressure with increased charging flow, and primary to secondary leakage based on abnormal offgas and main steam line radiation. The crew should implement 1BOA SEC-8, "Steam Generator Tube Leak". A unit shutdown will be commenced in accordance with 1BOA SEC-8 step 10 and Tech Spec 3.4.13, "Operational Leakage".

Once the ramp has been initiated a failure of the 1A Tcold narrow range RTD instrument high will occur. The US will enter BOA INST-2 for the failed Nuclear Instruments. The crew should identify the failed Tcold instrument by abnormal rod motion and place rod control in manual. The crew should identify bistables to be tripped within 6 hours for the failed RTD channel.

After an adequate power change is observed and the actions for failed RTD are completed, a Voltage Regulator malfunction will result in field forcing. The BOP should take the Voltage Regulator to OFF and use the Base Adjuster to reduce Exciter field current to less than 100 amps. The Voltage Regulator should remain OFF and control will be manual operation of the Base Adjuster to control main generator voltage.

After the actions for the Voltage Regulator failure are complete, 1C Steam Generator Level Channel 1LT-558 will fail high causing 1FW530 (1C FRV) to close. After with the SG level channel failure a trip of the running centrifugal pump will occur requiring the reactor operator to start the standby pump after verifying a suction path. The BOP should take manual control of the 1C FRV and restore feedwater flow to normal. The US will enter BOA INST-2 and direct actions for failed SG Level channel and establish normal automatic steam generator level control.

After actions are complete for the level channel failure, the 1A CV pump will trip. The operators will perform the actions of the BAR to isolate letdown, restore charging and restore letdown.

After the actions are complete for the CV pump trip, the 1C S/G tube leak will increase to 460 gpm requiring a Reactor Trip and Safety Injection. Coincident with the reactor trip and safety injection a fault of instrument bus 111 will result in de-energization of the bus. The crew will enter BEP-0 and manually align A train of ECCS due to the de-energized instrument bus. The 1B Safety injection pump will fail to auto start and the crew will take actions to manually start 1A and 1B SI pumps.

The US will transition to 1BEP-3 at step 28 of 1BEP-0. The crew should take actions of 1BEP-3 to stabilize the plant by cooling down and depressurizing the RCS.

Completion criteria is the performance of 1BEP-3 through ECCS termination step 21.

Critical Tasks

1. E-3--A: Isolate feedwater flow into and steam flow from the ruptured S/G before transition to ECA-3.1 occurs.
2. E-3--B: Establish/maintain RCS temperature so that transition from E-3 does not occur because temperature is either of the following: Too high to maintain minimum required subcooling OR Below the RCS temperature that cause an extreme or severe challenge to the subcriticality and/or the integrity CSF.
3. E-3--C: Depressurize RCS to meet SI termination criteria before water enters the steamlines.

SCENARIO 2001-3
SIMULATOR OPERATOR NOTES

Simulator Setup:

IC-21, 100% power, BOL, equilibrium Xenon, steady state.

Align switches:

1B DG C/S PTL and OOS

ACB 1423 PTL and OOS

1C HD pump C/S PLT and OOS

U-2 SAC C/S PTL and OOS, ensure U-1 and U-0 SAC running

Ensure 1C SG level control selected to LT558

Perform "Ready for Training" checklist.

Insert PRELOAD Events:

RF EG09, MAINT_O - 1B DG OOS

RF RP84 - Auto start failure of 1B SI pump

IMF RP15D - Auto start failure of 1B SI pump

Event 1 Steam Generator 1C Tube Leak (25 gpm)

SDG: TH5

Malf: TH03C, 25 gpm

NOTE: The SG tube leak in 1C SG is intended to cause the SRO to make a decision to shutdown based on exceeding allowable limits per Tech Specs and the procedure.

Initiate the event immediately after turnover or at the lead examiners cue.

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

Event 2 Power reduction.

Event 3 1A RCS loop Tcold narrow range RTD failed high

EDG: RX1

Malf: RX18A, 630

Initiate event after clearly observing reactivity change/response of plant to requested power ramp and with lead examiners concurrence.

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

Cabinet door #1 open				RF	RP20	OPEN
OPDT Trip	TB411G	C1-124	BS-1	RF	RX014	TRIP
OPDT Runback	TB411H	C1-124	BS-2	RF	RX136	TRIP
OTDT Trip	TB411C	C1-124	BS-3	RF	RX013	TRIP
OTDT Runback	TB411D	C1-124	BS-4	RF	RX135	TRIP
Low Tave	TB412G	C1-121	BS-2	RF	RX016	TRIP
Lo-Lo Tave	TB412D	C1-121	BS-1	RF	RX015	TRIP
Cabinet door #1 Close				RF	RP20	CLOSE

Event 4 Voltage Regulator malfunction Field Forcing.

SDG: EG1

Malf: EG03, 94%

Initiate malfunction after actions are taken for the failed RTD and with lead examiners concurrence.

If asked role play as U-2 admin and/or extra NSO for Unit 2 Main Generator VARs have decreased.

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

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

Event 5 SG 1C controlling level channel 1LT-558 fails high.

SDG: RX19

Malf: RX06L, 100%

Initiate malfunction after actions are taken to manually control main generator exciter field current and with lead examiners concurrence.

Use the following to trip bistables for the failed channel

Cabinet door #2 open

RF RP21 OPEN

P14

LB558B

C2-769

BS-2

RF

RX126 TRIP

Lo-2 Rx Trip/AF Pump Start

LB558C

C2-769

BS-1

RF

RX073 TRIP

Cabinet door #2 Close

RF

RP21 CLOSE

AMS in test for SG 1C level channel input:

RF RX147 TRIP

Event 6 Centrifugal Charging Pump trip

SDG: CV5

Malf: CV01A

Initiate this event after actions for SG level channel failure are completed and with lead examiners concurrence.

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 11).

If sent to check the 1B CV pump, wait 3 minutes, perform first check, and report "normal operating conditions".

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

RF

Event 7 SGTR 1C SG. Leakage increases to 460 gpm over 3 minutes.

SDG: TH5

Malf: TH03C, 460 gpm, 3 minute ramp.

Initiate failure after tech specs are investigated for the CV pump and with lead examiners concurrence.

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

Event 8 Loss of Instrument Bus 111

SDG: ED6

Malf: ED11A

Trigger: When Reactor trip breakers are open

The loss of Instrument Bus 111 occurs after the reactor trip and prior to initiation of Safety Injection. This will prevent the auto actuation of Train A ESFAS. The loss of the instrument bus is non-recoverable for the duration of the scenario and probably won't be pursued by the crew. If requested to investigate as NLO wait 3 minutes, perform first check and report that Instrument Bus 111 indicates evidence of electrical damage.

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

Event 9 1B SI pump fails to start automatically pump and Manually Align train A ECCS for Injection due to failure to auto start from loss of instrument bus 111

SDG:

Malf: (preload) RP15D

RF: (preload) RP84

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

Scenario No.: 2001-3		Event No.: 1
Event Description: S/G Tube Leak in 1C S/G		
Time	Position	Applicant's Actions or Behavior
	CUE:	Secondary radiation monitors alarming Main steamline rad monitors SJAE rad monitor PZR level decreasing
	US	Implement IBOA SEC-8 "STEAM GENERATOR TUBE LEAK" Rev. 101 and direct operator actions
	RO	Maintain PZR level: <ul style="list-style-type: none"> Throttle Charging header as needed <ul style="list-style-type: none"> 1CV121 1CV182 Check PZR level stable or increasing <ul style="list-style-type: none"> If no, establish 75 gpm letdown
	RO	Monitor VCT level <ul style="list-style-type: none"> Verify makeup adequate to maintain VCT level
	BOP/US	Minimize secondary contamination: <ul style="list-style-type: none"> Perform BOP MS-11 Notify Radiation Protection to: <ul style="list-style-type: none"> Monitor secondary systems Monitor condensate polisher area Monitor area radiation turbine and aux buildings Initiate OBOSR 11.i.1-1
	BOP	Identify leaking Steam Generator: <ul style="list-style-type: none"> Increasing trend on 1C S/G Main Steamline radiation monitors 1RT-AR023 and 1RT-AR022 Decreasing feed flow on 1C S/G Unexpected rise in 1C S/G narrow range level
	CREW	Determine SG tube leak rate: <ul style="list-style-type: none"> Estimate SG tube leak rate: <ul style="list-style-type: none"> Observe difference between charging flow and seal injection flow plus letdown flow Change in VCT level <p>Determine primary to secondary leak rate >10 gpm</p>

Comments: _____

Scenario No.: 2001-3		Event No.: 1
Event Description: S/G Tube Leak in 1C S/G		
Time	Position	Applicant's Actions or Behavior
	CREW	Confirm S/G Leak Rate by two independent indications trend in the same direction <ul style="list-style-type: none"> o Main Steamline radiation monitors o SJAE/Gland Steam Exhaust radiation monitors o SG Blowdown radiation monitor
	CREW	Determine that leak rate is not changing by 30 gpd/hr. <ul style="list-style-type: none"> • SJAE rad monitor operable • Leakage greater than 150 gpd • Determine that shutdown to MODE 3 within 6 hours of exceeding 150 GPD leakage is required
	US	Inform SM of unit status/potential GSEP event.
		NOTE: Step 10 of IBOA SEC-8 remains in effect during the unit shutdown until the reactor trip breakers are open then the operators will continue with step 11 if conditions don't change.

Comments: _____

Scenario No.: 2001-3		Event No.: 2
Event Description: Plant shutdown due too excessive S/G leakage		
Time	Position	Applicant's Actions or Behavior
	CUE:	As a result of the excessive steam Generator tube leakage, 1BOA SEC-8 dictates a power reduction to Hot Shutdown within 6 hours of exceeding 150 gpd.
	US	Implement actions of BGP 100-4T1.1 Rev. 2
	US	Direct load reduction to MODE 3 within 6 hours
	CREW	Review applicable Prerequisites, Precautions, Limitations and Actions of 1BGP 100-4
	RO	<p>Verify rod position and boron concentration.</p> <p>Initiate boration, if required. (BOP CV-6, Rev. 17.)</p> <ul style="list-style-type: none"> • Determine required boric acid volume by: <ul style="list-style-type: none"> o Effects of previously performed borations o Byron Boration Dilution Tables • Determine required boric acid flow rate. • Set 1FK-110 BA Flow Cont to desired boration rate. • Set 1FY-0110 BA Blender Preset 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 o Flush BA line. • Close CV110B.

Comments: _____

Scenario No.: 2001-3		Event No.: 2
Event Description: Plant shutdown due too excessive S/G leakage		
Time	Position	Applicant's Actions or Behavior
	BOP	Initiate turbine load reduction: <ul style="list-style-type: none"> • Depress LOAD RATE MW/MIN • Enter desired value for rate • Depress REF • Enter power level 620 MW. • When ready to begin load decrease, depress GO • Verify load decreases.
	RO/BOP	Monitor power/load decrease: <ul style="list-style-type: none"> • Monitor reactor power, Tave, ΔI
	RO	During boration: <ul style="list-style-type: none"> • Monitor VCT level • Verify RCS boron concentration increasing • Monitor BA blender counter • Verify boration stops at preset value
		NOTE: Following clearly observable plant response from the reactivity changes and with lead examiners cue, Event 3 is entered.

Comments: _____

Scenario No.: 2001-3		Event No.: 3
Event Description: 1A RCS loop Tcold failed high		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: 1-14-D1 TAVE CONTROL DEV HIGH 1-14-B1 OTAT HIGH RX TRIP ALERT 1-14-E2 AUCT TAVE HIGH 1-14-A5 LOOP 1A ΔT DEV LOW 1-14-B3, C3, D3 LOOP 1B,C,D TAVE DEV LOW Control rods stepping in 1A Tave indication high
	RO/US	Identify /report 1A Tave channel failure
	RO	Determine turbine load stable and place rods in Manual.
	US	Implement 1BOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL" Rev. 101, Attachment A and direct operator actions.
	RO	Verify rod bank select switch in manual
	RO	Manually defeat failed RTD channel: <ul style="list-style-type: none"> Select failed Tave channel with TAVE DEFEAT switch Select failed ΔT channel with ΔT DEFEAT switch
	RO	Select an operable RTD channel to the ΔT recorder
	RO	Check if rod control can be placed in auto <ul style="list-style-type: none"> TURBINE LOW POWER INTLK C5 – NOT lit Tave-Tref deviation – Stable and within 1°F <ul style="list-style-type: none"> IF NOT restore Tave-Tref deviation to within 1°F <ul style="list-style-type: none"> Adjust rods Place ROD BANK SELECT switch in AUTO
	RO	Check PZR level <ul style="list-style-type: none"> PZR level NORMAL and STABLE
	RO/US	Dispatch operator to locally trip bistables for failed channel by placing switches to "TEST"

Comments: _____

Scenario No.: 2001-3		Event No.: 3
Event Description: 1A RCS loop Tcold failed high		
Time	Position	Applicant's Actions or Behavior
	RO	Check P12 interlock <ul style="list-style-type: none"> • Tave greater than 550°F • LO-2 TAVE STM DUMP INTLK P12 - NOT LIT
	US	Refer to Tech Spec <ul style="list-style-type: none"> • 3.3.1 Reactor Trip Instrumentation • 3.3.2 ESFAS Instrumentation • TRM 3.3.h
	US	Inform SM/Maint of RCS loop 1A Tcold RTD failure/status.
		NOTE: After actions are complete for failed Tave channel and lead examiners concurrence, Event 4 is entered.

Comments: _____

Scenario No.: 2001-3		Event No.: 4
Event Description: Voltage Regulator malfunction Field Forcing		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-19-B6 GENERATOR FIELD FORCING 1-19-C8 GENERATOR VOLT REG TROUBLE 1-19-E8 TGTMS ALARM SETPOINT EXCEEDED Increasing Exciter Field Current
	BOP	Identify/report main generator field forcing.
	BOP/US	Perform immediate actions of 1BAR 1-19-B6: <ul style="list-style-type: none"> • If Voltage Regulator failure is suspected then, <ul style="list-style-type: none"> • SHIFT Voltage Regulator to OFF • Using the Base Adjuster, Reduce exciter field current to <100 amps • Notify Electric Operations
	BOP/US	Perform subsequent operator actions of 1BAR 1-19-B6: <ul style="list-style-type: none"> • Refer to BCB-1, Figure 20b for MW and VAR limits with the regulator out of service
	US	Inform SM/Electrical Operations of Voltage Regulator failure.
		NOTE: IF Exciter field is NOT reduced far enough Turbine Generator Temperature monitoring System may alarm and the following actions would be required.
	CUE:	Annunciators: 1-19-E3 TGTMS GEN TEMP TRIP STPT EXCEEDED 1-19-E8 TGTMS GEN TEMP ALARM STPT EXCEEDED
	US	Implement 1BOA TG-2 rev 101, "TGTMS TROUBLE" Attachment E and direct operator actions.
	CREW	Verify Main Generator operating within limits. <ul style="list-style-type: none"> • Refer to BCB-1, Figure 20b for MW and VAR limits with the regulator out of service
	BOP	Dispatch operator to check proper operation of the following turbine generator support systems: <ul style="list-style-type: none"> • Stator water • Hydrogen cooling • Hydrogen seal oil • Exciter cooling • Bus duct cooling • Turbine oil

Comments: _____

Scenario No.: 2001-3		Event No.: 4
Event Description: Voltage Regulator malfunction Field Forcing		
Time	Position	Applicant's Actions or Behavior
	BOP/US	Determine that problem is due to excessive VARs and reduce Exciter field current with Base adjuster to clear condition.
		NOTE: When actions are complete for voltage regulator failure and with lead evaluators concurrence, Events 5 is entered

Comments: _____

Scenario No.: 2001-3		Event No.: 5
Event Description: Steam Generator 1C controlling level channel 1LT558 Failed High on a 3 sec ramp		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-15-C4, "S/G 1C FLOW MISMATCH FW FLOW LOW" 1-15-C8, "S/G 1C LVL HI-2 TURB TRIP P-14 ALERT" 1-15-C9, "S/G 1C LEVEL DEVIATION HIGH LOW" FRV 1W530 closed 1LT-558 meter indicating full scale Feedwater flow decreasing
	BOP/US	Identify/report failure of 1LT-558 1C SG Narrow Range Level Channel
	US	Implement 1BOA INST-2 rev 101, "OPERATION WITH A FAILED INSTRUMENT" Attachment E and direct operator actions.
	BOP	Take manual control of 1C SG Feedwater Regulating Valve 1FW530 Reduce demand to control feedwater flow less than steam flow to restore level to normal
	BOP	Check affected SG level: <ul style="list-style-type: none"> SG level normal <ul style="list-style-type: none"> If NOT <ul style="list-style-type: none"> Place feed reg valve in manual Restore SG level to a stable condition Operable SG level control channel selected <ul style="list-style-type: none"> Select 1LT539 as control
	BOP	Dispatch operator to locally trip bistable for failed channel by placing indicated switches to test <ul style="list-style-type: none"> 1LT-558 1C SG Narrow Range Level Channel <ul style="list-style-type: none"> P14 LB558B Lo-2 Rx Trip/AF pump start LB 558C
	BOP	Dispatch operator to locally Check Status of AMS System <ul style="list-style-type: none"> AMS channel 1LT-558 failed Locally check OPERATING BYPASS switch (SW12) at 1PA54J OFF
	BOP	Dispatch operator to locally trip AMS system bistables for failed channel <ul style="list-style-type: none"> AMS Level trip LIS-FW433 at 1PA54J <ul style="list-style-type: none"> Operating Bypass (SW12) to LSGC OPERATING BYPASS TEST INPUT (SW11) to TEST-TRIP

Comments: _____

Scenario No.: 2001-3		Event No.: 5
Event Description: Steam Generator 1C controlling level channel 1LT558 Failed High on a 3 sec ramp		
Time	Position	Applicant's Actions or Behavior
	US	Refer to Technical Specifications <ul style="list-style-type: none"> • 3.3.1 trip bistables within 6 hours • 3.3.2 trip bistables within 6 hours • 3.3.3 PAM Instrumentation
	US	Inform SM/Maint of 1LT-558 failure/status.
		NOTE: After the actions for failed level channel are complete and with lead examiners concurrence, Event 6 is entered.

Comments: _____

Scenario No.: 2001-3		Event No.: 6
Event Description: Centrifugal Charging Pump Trip		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator: 1-9-A3 CHG PUMP TRIP 1-9-D3 CHG LINE FLOW HIGH LOW Charging pump trip indication Loss of seal injection flow indication
	RO	Identify/report trip of the 1A CV pump
	RO/US	Refer to BAR for charging pump trip for immediate operator actions:
	RO	Perform BAR 1-9-A3 Immediate operator actions: <ul style="list-style-type: none"> • Verify/close 1CV8149A, B & C, Letdown Orifice Valves • Close 1CV459 and 1CV460, Letdown Line Isolation Valves • Ensure suction flowpath from VCT to standby CV pump <ul style="list-style-type: none"> • 1CV112B open • 1CV112C open • Verify miniflow recirculation path for standby CV pump • Place in manual 1CV121 and adjust to 10% open • Start 1B CV pump • Throttle charging flow to establish approximately 70 gpm
	RO/US	Refer to BAR for charging pump trip for subsequent operator actions:
	BOP	Restore letdown per BOP CV-17 "Establishing and Securing Normal and RH letdown Flow" <ul style="list-style-type: none"> • Verify/ close 1CV8149A, B, C, letdown orifice isolation valves • Place 1CC130A/B flow controller in MANUAL at 20% demand • Ensure 1CV131 controller in MANUAL at 20% demand • Open 1CV459 and 1CV460 if closed • Simultaneously perform the following: <ul style="list-style-type: none"> • Open orifice isolation valves 1CV8149A/B/C for desired flow • Adjust 1CV131 controller to maintain letdown header pressure at 370 psig and place in AUTO • Ensure 1CC130A/B controller maintains letdown temperature 105° to 115°F and place in AUTO • Adjust 1CV121 to match charging and letdown flow while establishing PZR level at program and place in AUTO.
	RO/US	Dispatch operator to investigate cause of 1A CV pump trip.

Comments: _____

Scenario No.: 2001-3		Event No.: 6
Event Description: Centrifugal Charging Pump Trip		
Time	Position	Applicant's Actions or Behavior
	US	Refer to Tech Specs for tripped CV pump. <ul style="list-style-type: none"> • 3.5.2 Restore in 72 hours • TRM 3.1.a thru d • 3.8.1 DG Required Action B.3 declare both CV pumps inop if condition of DG and opposite train CV pump exists for 4 hours.
	US	Inform SM/Maint of 1A CV pump trip/status.
		NOTE: After the actions for charging pump trip are complete and with lead examiners concurrence, Event 7 is entered.

Comments: _____

Scenario No.: 2001-3		Event No.: 7, 8 and 9
Event Description: Steam Generator 1C Tube Rupture (460 gpm).(7) Instrument Bus 111 fault when the reactor is tripped (8) 1B SI Pump fails to start automatically, Manually start an SI pump and Manually Align train A ECCS for Injection due to failure to auto start from loss of instrument bus 111 (9)		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-12-B4 PZR LEVEL CONT DEV LOW 1-12-C1 PZR PRESS CONT DEV LOW HTRS ON SG blowdown radiation monitor 1PR08J increasing SJAE/Gland Steam Exhauster radiation monitor 1PR 27J increasing Increased charging flow PZR level dropping PZR pressure dropping FW flow/Steam flow mismatch for 1D SG Feed Reg Valves and FW Isol valves will remain open Main FW Pumps continue to run (fail to trip)
	CREW	Identify/report increase in RCS leakage
	RO	Report inability to maintain PZR level > 17%
	US	Direct reactor trip and Safety Injection initiation
	RO	Manually trip reactor Manually actuate SI
	US	Implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" Rev. 101 WOG 1C and direct operator actions.
	RO	Perform immediate operator actions of 1BEP-0: Verify reactor trip <ul style="list-style-type: none"> Rod bottom lights LIT Reactor trip & Bypass breakers open Neutron flux decreasing

Comments: _____

Scenario No.: 2001-3		Event No.: 7, 8 and 9
Event Description: Steam Generator 1C Tube Rupture (460 gpm).(7) Instrument Bus 111 fault when the reactor is tripped (8) 1B SI Pump fails to start automatically, Manually start an SI pump and Manually Align train A ECCS for Injection due to failure to auto start from loss of instrument bus 111 (9)		
Time	Position	Applicant's Actions or Behavior
	BOP	Perform immediate operator actions of 1BEP-0: Verify turbine trip <ul style="list-style-type: none"> • Turbine throttle valves closed • Turbine governor valves closed
	BOP	Verify power to 4KV busses <ul style="list-style-type: none"> • Bus 141 alive light lit • Bus 142 alive light lit
	CREW	Check SI status: <ul style="list-style-type: none"> • SI First OUT annunciator lit (1-11-C1) • SI ACTUATED lit (1-BP-4.1) • SI Equipment actuated (CV Cold leg injection SI8801B open) Determine SI actuated Identify/report train A ESFAS components did NOT actuate due to instrument bus 111 de-energized. Actuate SI by taking either SI switch to ACTUATE <ul style="list-style-type: none"> o 1PM05J o 1PM06J
	BOP	Verify FW isolated <ul style="list-style-type: none"> • FW pumps tripped • FW Isolation Monitor lights lit • FW pump discharge valves stroking closed 1FW002A-C
	RO	Verify ECCS pumps running <ul style="list-style-type: none"> • CENT Chg pumps – 1A CV pump is unavailable • RH pumps – manually start 1A RH pump • SI pumps – manually start 1A SI pump and 1B SI pump

Comments: _____

Scenario No.: 2001-3		Event No.: 7, 8 and 9
Event Description: Steam Generator 1C Tube Rupture (460 gpm).(7) Instrument Bus 111 fault when the reactor is tripped (8) 1B SI Pump fails to start automatically, Manually start an SI pump and Manually Align train A ECCS for Injection due to failure to auto start from loss of instrument bus 111 (9)		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify RCFCs running in Accident Mode <ul style="list-style-type: none"> Group 2 RCFC Accident Mode Status lights NOT lit <ul style="list-style-type: none"> Manually align RCFCs in accident mode as necessary: <ul style="list-style-type: none"> Stop A and C RCFC high speed Close 1SX112A and 1SX114A Open 1SX147A Verify open 1SX016A and 1SX027A Start A and C RCFCs in low speed
	BOP	Verify Phase A isolation <ul style="list-style-type: none"> Group 3 Monitor lights NOT lit Manually actuate Phase A <ul style="list-style-type: none"> Close train A valves as required: <ul style="list-style-type: none"> 1PR001A 1PR066 1PS228A 1PS228B 1WO006A 1WO020A 1WO056B 1CV8152 1CV8100 1IA065
	BOP	Verify CNMT Ventilation isolation <ul style="list-style-type: none"> Group 6 Monitor lights lit

Comments: _____

Scenario No.: 2001-3		Event No.: 7, 8 and 9
Event Description: Steam Generator 1C Tube Rupture (460 gpm).(7) Instrument Bus 111 fault when the reactor is tripped (8) 1B SI Pump fails to start automatically, Manually start an SI pump and Manually Align train A ECCS for Injection due to failure to auto start from loss of instrument bus 111 (9)		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify AF system: <ul style="list-style-type: none"> 1B AF pumps running <ul style="list-style-type: none"> Manually start 1A AF pump AF isolation valves open (AF13A-H) AF flow control valves throttled (AF005E-H) <p>NOTE: The A train AF005A-D will be closed due to loss of instrument bus 111.</p> Verify CC Pumps running <ul style="list-style-type: none"> Manually start 1A CC pump Verify SX Pumps running <ul style="list-style-type: none"> Manually start 1A SX pump Check Main Steamline Isolation NOT required <ul style="list-style-type: none"> Check SG pressure > 640 psig Check CNMT pressure <8.2 psig
	BOP	Check if CNMT Spray is required <ul style="list-style-type: none"> CNMT pressure < 20 psig <p>Determine/report CNMT Spray NOT required</p>
	BOP	Verify total AF flow <ul style="list-style-type: none"> AF flow > 500 gpm SG levels maintained between 10% and 50%
	BOP/US [CT] E-3--A	Check for NR level NOT increasing in uncontrolled manner Identify/report 1C as ruptured SG. <ul style="list-style-type: none"> If ruptured SG suspected, isolate AF Isol valves: <ul style="list-style-type: none"> 1AF013C 1AF013G

Comments: _____

Scenario No.: 2001-3		Event No.: 7, 8 and 9
Event Description: Steam Generator 1C Tube Rupture (460 gpm).(7) Instrument Bus 111 fault when the reactor is tripped (8) 1B SI Pump fails to start automatically, Manually start an SI pump and Manually Align train A ECCS for Injection due to failure to auto start from loss of instrument bus 111 (9)		
Time	Position	Applicant's Actions or Behavior
	RO	Verify ECCS valve alignment <ul style="list-style-type: none"> Group 2 CL Injection monitor lights NOT all lit <ul style="list-style-type: none"> Manually align train A valves as required: <ul style="list-style-type: none"> 1CV112B 1CV112D 1CV8106 1SI8801A
	RO	Verify ECCS flow: <ul style="list-style-type: none"> HHSI flow >100 gpm RCS pressure is NOT <1700 psig
	RO	Check at least ONE PZR PORV relief path available: <ul style="list-style-type: none"> PORV Isol valves at least one energized PORV relief path at least one available <ul style="list-style-type: none"> PORV in auto and isolation open
	BOP	Verify Generator trip <ul style="list-style-type: none"> Main Transformer output breakers open <ul style="list-style-type: none"> OCB 3-4 OCB 4-5 PMG output breaker open
	BOP	Verify DG running <ul style="list-style-type: none"> Both DGs running – Manually start 1A DG, 1B DG OOS SX valve open 1SX169A Dispatch operator locally to check operation

Comments: _____

Scenario No.: 2001-3		Event No.: 7, 8 and 9
Event Description: Steam Generator 1C Tube Rupture (460 gpm).(7) Instrument Bus 111 fault when the reactor is tripped (8) 1B SI Pump fails to start automatically, Manually start an SI pump and Manually Align train A ECCS for Injection due to failure to auto start from loss of instrument bus 111 (9)		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify Control Room ventilation aligned for emergency operations: <ul style="list-style-type: none"> • Check RM-11 Grid 2 Control Room outside air rad monitors less than alert alarm setpoint. • Operating VC train equipment running Train A <ul style="list-style-type: none"> • Supply fan • Return fan • M/U fan – manually start 0A VC M/U fan • Chilled water pump • MCR chiller 0A • M/U fan outlet damper NOT full closed 0VC24Y • VC train M/U filter light LIT • Operating VC train Charcoal Adsorber aligned for train A <ul style="list-style-type: none"> • Place Recirc Charcoal Adsorber selector switch to Adsorb <ul style="list-style-type: none"> • 0VC43Y closed • 0VC21Y open • 0VC22Y open • Control Room pressure greater than +0.125 inches water on 0PDI-VC038
	BOP	Verify Auxiliary Building ventilation aligned <ul style="list-style-type: none"> • Two inaccessible filter plenums aligned <ul style="list-style-type: none"> • Plenum A fan 0VA03CB running <ul style="list-style-type: none"> • Damper 0VA023Y open • Damper 0VA436Y closed • Plenum C fan 0VA03CE running <ul style="list-style-type: none"> • Damper 0VA067Y open • Damper 0VA052Y closed
	BOP	Verify FHB ventilation aligned <ul style="list-style-type: none"> • Train B fan 0VA04CB running • 0VA055Y open • 0VA062Y open • 0VA435Y closed
	RO	Check PZR spray valves and PORVs <ul style="list-style-type: none"> • Normal spray valves closed • PORVs closed

Comments: _____

Scenario No.: 2001-3		Event No.: 7, 8 and 9
Event Description: Steam Generator 1C Tube Rupture (460 gpm).(7) Instrument Bus 111 fault when the reactor is tripped (8) 1B SI Pump fails to start automatically, Manually start an SI pump and Manually Align train A ECCS for Injection due to failure to auto start from loss of instrument bus 111 (9)		
Time	Position	Applicant's Actions or Behavior
	RO	Maintain RCS temperature control <ul style="list-style-type: none"> • Check RCPs any running • Tave Stable or trending to 557 °F
	RO/US	Check status of RCPs and determine RCPs can remain running <ul style="list-style-type: none"> • If any running, apply trip criteria <ul style="list-style-type: none"> o HHSI flow >100 gpm on 1FI-917 OR <ul style="list-style-type: none"> o SI flow > 200 gpm on 1FI-918/922 o RCS pressure < 1425 psig – NO RCS pressure is greater than 1425 psig
	BOP	Check if SG secondary pressure boundaries are intact <ul style="list-style-type: none"> • Check pressure in all SGs <ul style="list-style-type: none"> • No SG pressure decreasing in an uncontrolled manner • No SG completely depressurized
	CREW	Identify ruptured SG <ul style="list-style-type: none"> o Unexpected rise in NR level on 1C Steam Generator o Main steamline rad monitors NOT normal for plant conditions on 1C Steam Line <ul style="list-style-type: none"> o RT-AR022 Grid 1 4AD322 o RT-AR023 Grid 1 4AD323 o High activity for any SG sample
	CREW	Identify/report 1C SG as ruptured
	US	Implement 1BEP-3 "STEAM GENERATOR TUBE RUPTURE" Rev. 100 WOG-1C and direct operator actions.
	RO/US	Check status of RCPs and determine RCPs can remain running <ul style="list-style-type: none"> • If any running, apply trip criteria <ul style="list-style-type: none"> o HHSI flow >100 gpm on 1FI-917 OR <ul style="list-style-type: none"> o SI flow > 200 gpm on 1FI-918/922 o RCS pressure < 1425 psig – NO RCS pressure is greater than 1425 psig

Comments: _____

Scenario No.: 2001-3		Event No.: 7, 8 and 9
Event Description: Steam Generator 1C Tube Rupture (460 gpm).(7) Instrument Bus 111 fault when the reactor is tripped (8) 1B SI Pump fails to start automatically, Manually start an SI pump and Manually Align train A ECCS for Injection due to failure to auto start from loss of instrument bus 111 (9)		
Time	Position	Applicant's Actions or Behavior
	CREW	Identify ruptured SG <ul style="list-style-type: none"> o Unexpected rise in NR level o Main steamline rad monitor <ul style="list-style-type: none"> o 1RT-AR022 Grid 1 4AD322 o 1RT-AR023 Grid 1 4AD323 o High activity for any SG sample Identify/report 1C SG as ruptured SG
	BOP	Isolate flow from rupture SG <ul style="list-style-type: none"> • SG PORV 1MS018C in AUTO • Check SG PORV 1MS018C closed <ul style="list-style-type: none"> • Verify closed when SG pressure < 1115 psig • Verify SG blowdown isolation valves closed <ul style="list-style-type: none"> • 1SD002G • 1SD002H • Close MSIV and MSIV bypass valves for 1C SG • Check PORVs on intact SGs available for RCS cooldown
	BOP/US [CT] E-3--A	Check ruptured SG level <ul style="list-style-type: none"> • Narrow Range >10% • Verify/close AF isol valves (should have been closed in 1BEP-0) <ul style="list-style-type: none"> • 1AF013C • 1AF013G
	BOP	Check Rupture SG pressure <ul style="list-style-type: none"> • Ruptured SG pressure greater than 320 psig <ul style="list-style-type: none"> • If NOT go to 1BCA 3.1

Comments: _____

Scenario No.: 2001-3		Event No.: 7, 8 and 9
Event Description: Steam Generator 1C Tube Rupture (460 gpm).(7) Instrument Bus 111 fault when the reactor is tripped (8) 1B SI Pump fails to start automatically, Manually start an SI pump and Manually Align train A ECCS for Injection due to failure to auto start from loss of instrument bus 111 (9)		
Time	Position	Applicant's Actions or Behavior
	BOP [CT] E-3--B	Initiate RCS Cooldown <ul style="list-style-type: none"> Determine required core exit temperature from table based on current ruptured SG pressure Check PZR pressure < 1930 psig <ul style="list-style-type: none"> PZR LOW PRESS SI BLOCK PERMISSIVE P-11 Lit <ul style="list-style-type: none"> If NOT continue with procedure until P-11 Lit before blocking STM LINE SI Block Steamline Isol SI <ul style="list-style-type: none"> Place STM LINE SI BLOCK switches to BLOCK for train A and B Dump Steam to condenser from intact SGs at maximum rate <p>NOTE: After cooldown is initiated the operators may hold the Steam Dump Interlock switches in Bypass as temperature approaches the P-12 setpoint to prevent interruption of the cooldown. If the interlock occurs the operator will have to place the main steam pressure controller in manual and at minimum demand, bypass P-12 using both switches and then re-establish the cooldown.</p> <ul style="list-style-type: none"> Check average of ten highest CETCs less than required temperature <ul style="list-style-type: none"> If NOT continue with procedure and stop cooldown when less than required temperature Stop RCS cooldown continuous action in effect
	BOP	Check intact SG levels: <ul style="list-style-type: none"> Narrow range levels > 10%. Control feed flow to maintain narrow range levels between 18% and 50%. Check narrow range levels not increasing in an uncontrolled manner.
	RO	Check PZR PORVs and isolation valves <ul style="list-style-type: none"> Power to PORV Isol valves <ul style="list-style-type: none"> 1RY8000A 1RY8000B PORVs closed <ul style="list-style-type: none"> 1RY455A 1RY456 At least ONE PORV Isol valve OPEN <ul style="list-style-type: none"> 1RY8000A 1RY8000B
	BOP/RO	Reset SI if necessary

Comments: _____

Scenario No.: 2001-3		Event No.: 7, 8 and 9
Event Description: Steam Generator 1C Tube Rupture (460 gpm).(7) Instrument Bus 111 fault when the reactor is tripped (8) 1B SI Pump fails to start automatically, Manually start an SI pump and Manually Align train A ECCS for Injection due to failure to auto start from loss of instrument bus 111 (9)		
Time	Position	Applicant's Actions or Behavior
	BOP	Reset CNMT Isolation: <ul style="list-style-type: none"> • Reset CNMT Isolation Phase A. • Check SACs – any running • Open instrument air CNMT isolation valves. • 1IA065 • 1IA066
	BOP	Verify all AC busses energized by offsite power
	BOP	Check if RH pumps should be stopped: <ul style="list-style-type: none"> • Suction aligned to RWST • RCS pressure greater than 325 psig • Stop RH pumps and place in standby
	RO	Check if RCS cooldown should be stopped <ul style="list-style-type: none"> • Check average of ten highest CETCs less than required temperature <ul style="list-style-type: none"> • If NOT then do NOT proceed until required temperature achieved. • Stop RCS cooldown • Maintain average of ten highest CETCs less than required temperature
	BOP	Check ruptured SG pressure: <ul style="list-style-type: none"> • Stable or increasing
	RO	Check RCS subcooling: <ul style="list-style-type: none"> • Acceptable per Attachment A and Figure 1BEP 3-2 (+20°F)

Comments: _____

Scenario No.: 2001-3		Event No.: 7, 8 and 9
Event Description: Steam Generator 1C Tube Rupture (460 gpm).(7) Instrument Bus 111 fault when the reactor is tripped (8) 1B SI Pump fails to start automatically, Manually start an SI pump and Manually Align train A ECCS for Injection due to failure to auto start from loss of instrument bus 111 (9)		
Time	Position	Applicant's Actions or Behavior
	RO [CT] E-3--C	Depressurize RCS using PZR sprays to minimize break flow and refill PZR: <ul style="list-style-type: none"> • Normal sprays available • Spray PZR with maximum spray until any of the following are satisfied <ul style="list-style-type: none"> o BOTH: <ul style="list-style-type: none"> • RCS pressure less than ruptured pressure • PZR level greater than 12% o PZR level greater than 69% o RCS subcooling NOT acceptable • Close normal spray valves • Check PZR Aux spray valve closed Use ONE PZR PORV if normal PZR spray is inadequate
	RO/BOP	Check if ECCS flow should be terminated <ul style="list-style-type: none"> • RCS subcooling acceptable • Secondary heat sink <ul style="list-style-type: none"> • Narrow range level in at least ONE SG >10% OR • >500 pgm total feed flow to SGs • RCS Pressure stable or increasing • PZR level >12%
	RO/BOP	Stop ECCS pumps and place in standby <ul style="list-style-type: none"> • SI pumps • All but one CV pump
		NOTE: The scenario can be terminated once ECCS termination steps are complete with lead examiners concurrence

Comments: _____

Facility: Byron Scenario No.: 4 Op-Test No.: 2001

Examiners: _____ Operators: _____ SRO

_____ RO

_____ BOP

Initial Conditions: IC-21; 100% power, BOL, equilibrium Xenon, steady state, 1B Diesel Generator OOS, 1C HD pump OOS, U-2 SAC OOS. PZR PORV 1RY456 control switch is in CLOSE and Block Valve 1RY8000B is closed and deenergized.

Turnover: The Unit is at 100%, BOL, equilibrium Xenon, steady state. The block valve 1RY8000B) for Pressurizer (PZR) PORV 1RY456 is closed and deenergized. A leak had developed on PORV 1RY456. When the block valve was closed it tripped after the closed indication was observed. Electrical Maintenance is investigating. The Block valve has been de-energized closed for 11 hours. The 1B Diesel Generator is OOS for replacement of Turbo Charger. The DG has been OOS for 18 hours and is expected to be returned to service by the end of the shift. 1C Heater Drain (HD) Pump is OOS for motor bearing replacement. Unit 2 Station Air Compressor (SAC) is OOS for an oil change and is expected to be returned to service by the end of the shift.

Event No.	Malf. No.	Event Type*	Event Description
Preload	RF EG09 MAINT_O		1B DG OOS
Preload	RF ED065D OPEN		PZR PORV 1RY456 Block Valve 1RY8000B breaker tripped.
1	TH11A & RF ED058C OPEN	C RO SRO	PZR PORV 1RY455A fails open requiring the block valve 1RY8000A to be closed and the breaker for 1RY8000A will trip when closed.
2	CV16	I RO SRO	Volume Control Tank (VCT) level channel 1LT-CV112 fails high
3		N BOP SRO R RO	Reduce Turbine Load for Unit Shutdown due to inoperable PZR PORVs Lower reactor power using rods and/or boration
4	RX01K	I BOP SRO	Steam Generator 1D controlling Steam Pressure channel fails low.
5	SW01A 01P PA0123 1/1/01	C BOP SRO RO	Essential Service Water Pump oil pressure malfunction.
6	TH03D	M RO BOP SRO	Steam Generator 1D Tube Rupture – 400 gpm ramped over 60 sec. requiring a reactor trip and SI.
7	RF RP78, 79, RF FW150 & FW151, REMOVED	I BOP SRO	Feedwater Isolation signal fails requiring manual operation of FW components
8	MS07D	M BOP SRO	1D SG faulted (steam break) inside containment on Reactor trip

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

SCENARIO 2001-4 OVERVIEW

The scenario will begin at 100% power, BOL, equilibrium Xenon, steady state. The block valve (1RY-8000B) for PCV-456 is closed and deenergized. A leak had developed on PCV-456. When the block valve was closed it tripped after the closed indication was observed. Electrical Maintenance is investigating. Electrical Maintenance is investigating. The Block valve has been de-energized closed for 11 hours. The 1B Diesel Generator is OOS for replacement of Turbo Charger. The DG has been OOS for 18 hours and is expected to be returned to service by the end of the shift. 1C Heater Drain Pump is OOS for motor bearing replacement. Unit 2 SAC is OOS for an oil change and is expected to be returned to service by the end of the shift.

A failure of the control circuit for PORV PCV-455A will cause the valve to open. Failure of PORV 455A to close will require closure of its block valve MOV-RY8000A. SRO will address Technical Specification 3.4.11 (Condition E) and TRM 3.3.k and 3.4.d.

Unit shutdown and cooldown to less than 500°F within 6 hours is initiated due to the inoperability of TWO PORVs.

After pressurizer pressure is returned to the normal band using manual control, Volume Control Tank (VCT) level channel 1LT-CV112 will fail high resulting in diverting letdown to the Holdup Tank (HUT). The failure of 1LT-CV112 level channel will result in the loss of auto makeup level control to the VCT.

After actions have been taken to address the failure of VCT level channel, the 1D SG controlling steam pressure channel will fail low requiring manual control of the 1D SG main feedwater regulating valve. The SRO will enter 1BOA INST-2, for the failed SG Steam pressure channel and direct actions to restore the 1D main feedwater regulating valve to automatic control.

A Steam Generator Tube Rupture will occur requiring a Reactor trip and Safety Injection. Upon Reactor Trip the ruptured SG will fault inside containment. Actions of 1BEP-0, 1BEP-2 and 1BEP-3 will be performed. In 1BEP-0, the feedwater system will not isolate due to a failure of the feedwater isolation signal requiring manual action to isolate feedwater. In 1BEP-3 the crew will identify the ruptured SG pressure less than 320 psig. This will require that 1BCA-3.1, "SGTR With Loss of Reactor Coolant – Subcooled Recovery Desired", be performed during actions for the SGTR. The scenario ends with the establishment of RCS cooldown in 1BCA-3.1.

ERG Based Critical Tasks:

1. EP-3 – A: Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.
2. EP-3 – B: Establish/maintain and RCS temperature so that transition from EP-3 does not occur because RCS temperature is in either of the following conditions.
 - Too high to maintain minimum required subcooling
OR
 - Below the RCS temperature that causes an extreme (red-path) or a severe (orange path) challenge to the subcriticality and/or integrity CSF.

**SCENARIO 2001-4
SIMULATOR OPERATOR NOTES**

Simulator Setup:

IC-21; 100% power, BOL, equilibrium Xenon, steady state.

Align switches:

1B DG C/S PTL and OOS

ACB 1423 PTL and OOS

1C HD pump C/S PLT and OOS

U-2 SAC C/S PTL and OOS, ensure U-1 and U-0 SAC running

Ensure 1D SG selected to control from steam pressure channel 1PT545

Perform "Ready for Training" checklist.

Insert PRELOAD Events:

MRF EG09, MAINT_O - 1B DG OOS

MRF ED065D, OPEN - Block Valve MOV-RY8000B breaker tripped

MRF RP78, REMOVED - FW isolation failure

MRF RP79, REMOVED - FW isolation failure

MRF FW150, REMOVED - FW isolation failure

MRF FW151, REMOVED - FW isolation failure

Event 1 PZR PORV 1RY455A fails open requiring the block valve 1RY8000A to be closed and the breaker for 1RY8000A will trip when closed.

SDG: TH7

Malf: TH11A, 100

RF ED058C OPEN

Initiate event 2 minutes after turnover is complete and with the lead examiners concurrence.

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

Event 2 VCT level channel 1LT-CV112 fails high.

SDG: CV3

Malf: CV16, 100

Initiate event after actions for failed Pressurizer PORV are completed and with the lead examiners concurrence.

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

Event 3 Power decrease for unit shutdown due to inoperable Pressurizer PORV's.

Event 4 Steam Generator 1D controlling Steam Pressure channel fails low (1PT545A).

SDG: RX16

Malf: RX01K, 0

Initiate event after clearly observing reactivity changes/ response of plant to required power reduction and with the lead examiners concurrence.

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

Event 5 Essential Service Water Pump oil pressure malfunction.

EDG: SW1 *off 11/10/01*

Malf: ~~SW01A~~ *PA0123*

Initiate event after actions for the failed steam generator pressure channel have been addressed and with the lead examiners concurrence.

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

Event 6 Steam Generator 1D Tube Rupture – 400 gpm ramped over 60 sec. requiring a reactor trip and SI.

SDG: TH6

Malf: TH03D, 400 gpm, 1 minute ramp

Initiate malfunction after actions are taken to start the standby Essential Service Water pump and with the lead examiners concurrence.

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

Event 7 Feedwater Isolation signal fails requiring manual operation of FW components

SDG:

RF: (preload) RP78, RP79, FW150, FW151, REMOVED

Event 8 1D SG faulted (steam break) inside containment on Reactor trip.

SDG:

Malf: MS07D, 3 1 120

Initiate malfunction upon reactor trip cause a steam break of 1MLB and ramp to 3MLB over 2 minutes on 1D SG.

Scenario No.: 2001-4		Event No.: 1
Event Description: PORV 1RY455A fails open requiring the block valve 1RY8000A to be closed		
Time	Position	Applicant's Actions or Behavior
	CUES:	Annunciators: 1-12-B2 PZR PORV OR SAF VLV OPEN 1-12-C1PZR PRESS CONT DEV LOW HTRS ON 1-12-C6 PZR PORV DSCH TEMP HIGH 1-12-D2 PZR PESS CONT DEV LOW PZR PORV 1RY455A OPEN
	RO/US	Identify/report failure of 1RY455A to close (either AUTO or when C/S taken to CLOSE) <ul style="list-style-type: none"> Close 1RY8000A PZR PORV Block valve
	RO/US	Perform actions of 1BAR 1-12-D2: <ul style="list-style-type: none"> Restore PZR pressure to normal Monitor PZR pressure and level
	RO	Check PZR pressure: <ul style="list-style-type: none"> Take manual control to restore PZR pressure Check PORVs closed, then if PZR pressure < 2315 psig, Manually close PORV <ul style="list-style-type: none"> If PORV will NOT close, manually close PORV Isolation valve 1RY8000A Check spray valves 1RY455B & 455C closed, then manually close if open Manually operate PZR heaters
	US	Check Technical Specifications: <ul style="list-style-type: none"> 3.4.1 - RCS Pressure, Temp, and Flow DNB Limits. 3.4.11 - PZR PORVs; CONDITION E (TWO PORVs inop) with ACTION to immediate initiate actions to restore ONE, CLOSE Block Valves within ONE hour, Remove Block Valve power within ONE hour, and be in MODE 3 with RCS Tavg < 500°F in 6 hours. Check TRM: <ul style="list-style-type: none"> 3.4.d – PORVs; CONDITION A – BOTH PORVs unable to automatically perform a pressure relief actuation, restore the automatic pressure relief function to at least ONE PORV in 72 hours.

Comments: _____

Scenario No.: 2001-4		Event No.: 1
Event Description: PORV 1RY455A fails open requiring the block valve 1RY8000A to be closed		
Time	Position	Applicant's Actions or Behavior
	US	Inform SM/Maint of PZR PORV PCV-455A failure to close
	US	Inform SM of unit status/potential GSEP event (TWO PORVs inoperable).
		NOTE: When actions have been completed to respond to failed open PZR PORV and lead evaluators concurrence, Event 2 is entered.

Comments: _____

Scenario No.: 2001-4		Event No.: 2
Event Description: VCT level channel 1LT-CV112 fails high.		
Time	Position	Applicant's Actions or Behavior
	CUES:	Annunciators: 1-9-A2 VCT LEVEL HI 1LT112 VCT level indicator full scale 1CV112A VCT Inlet valve Diverting to HUT
	RO/US	Identify/report failure of 1LT-CV112
	RO/US	Refer to BAR 1-9-A2 for operator actions
	RO	Place 1LCV CV-112A to VCT position to restore letdown flowpath to VCT
	CREW	<ul style="list-style-type: none"> Identify loss of auto makeup capabilities to VCT Identify loss of auto suction swapover to RWST on low level
		NOTE: When actions have been completed to respond to failed VCT level channel and lead evaluators concurrence, Event 3 is entered.

Comments: _____

Scenario No.: 2001-4		Event No.: 3
Event Description: Power decrease for plant shutdown due to inoperable PORVs.		
Time	Position	Applicant's Actions or Behavior
	US	Identify Technical Specification REQUIRED ACTION requiring plant shutdown due to inoperable PORVs.
	US	Implement actions of 1BGP 100-4, Step F.1: <ul style="list-style-type: none"> Implement flowpath 1BGP 100-4T1.1, Rapid Power Descension Flowchart. Direct initiation of Reference Reactivity Data as per 1BGP 100-7.
	US	Direct decrease from 100% power at 5 MW/minute.
	CREW	Review applicable Prerequisites, Precautions, and Limitations and Actions.
	BOP	Initiate turbine load decrease to 620 MW: <ul style="list-style-type: none"> DEPRESS the LOAD RATE MW/MIN Pushbutton VERIFY/ENTER the desired load rate of 5.0 DEPRESS the REF Pushbutton Using the number Pushbuttons, SET in 620 MW on the REFERENCE DEMAND window When ready to begin load decrease, depress GO Verify load decreases.
	RO	Initiate boration: (BOP CV-6) <ul style="list-style-type: none"> Place MU MODE CONT SWITCH to STOP position. Set MU MODE SELECT to BOR position. Set 1FK-110 BA Flow Cont to desired boration rate. Fill out Boration/Dilution/Rod Motion Log
	RO	<ul style="list-style-type: none"> Verify 1CV110A in AUTO Set 1FY-0110 BA Blender Preset Counter to desired volume. Verify 1CV110B in AUTO Verify BA Transfer Pump in START or AUTO Place MAKE-UP CONTROL Switch to START Verify proper operation of valves & BA transfer pump (CV110B open, BA pump is running, CV110A throttles open) Verify BA flow on recorder Verify B/U Heaters ON and spray valves 1RY455B/C modulates OPEN.

Comments: _____

Scenario No.: 2001-4		Event No.: 3
Event Description: Power decrease for plant shutdown due to inoperable PORVs.		
Time	Position	Applicant's Actions or Behavior
	CREW	<p>Monitor power decrease:</p> <ul style="list-style-type: none"> • Monitor reactor power, Tave • Verify rods move in AUTO to maintain Tave within $\pm 2.0^{\circ}\text{F}$ of Tref. <p>If borating:</p> <ul style="list-style-type: none"> • Monitor VCT level • Verify RCS concentration increasing • Monitor B/A Control counter countdown. • Verify boration auto stops at preset value. • Return Reactor Makeup System to blended flow for current boron concentration.
		NOTE: When actions have been completed to respond to failed VCT level channel and lead evaluators concurrence, Event 4 is entered.

Comments: _____

Scenario No.: 2001-4		Event No.: 4
Event Description: Steam Generator 1D controlling steam pressure channel fails low (1PT545A)		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-15-D1 S/G 1D LOW PRESS STEAMLINE ISOL ALERT 1-15-D3 S/G 1D FLOW MISMATCH STM FLOW LOW 1-15-D4 S/G 1D FLOW MISMATCH FW FLOW LOW 1-15-D9 S/G 1D LEVEL DEVIATION HIGH LOW 1-15-E1 MS PRESS RATE STM LINE ISOL ALERT 1D SG steam pressure indication low on 1PT545A 1D SG feedwater flow decreasing
	BOP/US	Identify/report failure of 1PT-545A, 1D steam generator steam pressure channel.
	US	Enter and direct actions of 1BOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL" Attachment C, rev. 101.
	BOP	Check affected SG level: <ul style="list-style-type: none"> • SG level normal • Operable steam flow channel selected <ul style="list-style-type: none"> • Select an operable channel • Automatic level control established
	CREW	Dispatch operator to locally trip bistables for the affected channel: Place following switches to TEST for 1PT-545: Lo Press SI/ Stm Line Isol Hi Stm Rate Isol
	US	Refer to Tech Specs 3.3.2 ESFAS Instrumentation
		NOTE: When actions have been completed for the failed SG steam pressure channel and lead evaluators concurrence, Event 5 is entered.

Comments: _____

Scenario No.: 2001-4		Event No.: 5
Event Description: Essential Service Water (SX) Pump trips (1A SX pump)		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-2-D1 SX PUMP LUBE OIL PRESS LOW
	BOP/US	Identify/report 1A SX pump low oil pressure
	BOP	Refer to BAR 1-2-D1 and perform immediate operator action to swap pumps
	BOP	Start the 1B SX pump
	BOP	Shutdown the affected pump, 1A SX pump
	US	Refer to Tech Specs 3.7.8 SX system 72 hours restore 3.8.1 DG Required Action B.3 declare both SX pumps inop if condition of DG and opposite train SX pump exists for 4 hours.
		NOTE: When actions have been completed for the SX pump problem and lead evaluators concurrence, Event 6 and 7 are entered.

Comments: _____

Scenario No.: 2001-4		Event No.: 6 and 7
Event Description: Steam Generator Tube Rupture (SGTR) on 1D SG (6). This will require a manual reactor trip and SI. The FWI signal will fail to actuate and operator action is required to trip the feed pumps and isolate FW flow to the SGs.(7)		
Time	Position	Applicant's Actions or Behavior
	CUE:	<p>Annunciators: 1-12-B4 PZR LEVEL CONT DEV LOW 1-12-C1 PZR PRESS CONT DEV LOW HTRS ON</p> <p>SG blowdown radiation monitor 1PR08J increasing SJAEGland Steam Exhauster radiation monitor 1PR 27J increasing Increased charging flow PZR level dropping PZR pressure dropping FW flow/Steam flow mismatch for 1D SG</p> <p>Feed Reg Valves and FW Isol valves will remain open Main FW Pumps continue to run (fail to trip)</p>
	CREW	Identify/report RCS leakage indications and decrease in feed flow and increase in level on 1D steam generator
	RO	Report inability to maintain PZR level > 17%
	US	Direct reactor trip and SI initiation
	RO	Manually trips reactor Manually actuates SI
	US	Implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" Rev. 101 and directs operator actions.
	RO	Perform immediate operator actions of 1BEP-0: Verify reactor trip <ul style="list-style-type: none"> Rod bottom lights LIT except TWO Reactor trip & Bypass breakers open Neutron flux lowering

Comments: _____

Scenario No.: 2001-4		Event No.: 6 and 7
Event Description: Steam Generator Tube Rupture (SGTR) on 1D SG (6). This will require a manual reactor trip and SI. The FWI signal will fail to actuate and operator action is required to trip the feed pumps and isolate FW flow to the SGs.(7)		
Time	Position	Applicant's Actions or Behavior
	BOP	Perform immediate operator actions of 1BEP-0: Verify Turbine Trip <ul style="list-style-type: none"> • Turbine throttle valves closed • Turbine governor valves closed
	BOP	Perform immediate operator actions of 1BEP-0: Verify power to 4KV busses <ul style="list-style-type: none"> • Bus 141 alive light lit • Bus 142 alive light lit
	CREW	Perform immediate operator actions of 1BEP-0: Check SI status <ul style="list-style-type: none"> • SI actuated <ul style="list-style-type: none"> • SI First OUT annunciator lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1) • SI ACTUATED lit (1-BP-4.1) • SI Equipment running (SI pumps running, CV Cold leg injection SI8801A/B open) Determine SI actuated Actuate SI by taking either SI switch to ACTUATE (1PM05J or 1PM06J)
	BOP	Verify FW isolated <ul style="list-style-type: none"> • FW pumps tripped <ul style="list-style-type: none"> • FW PUMPS TRIPPED alarms NOT lit • Manually trip FW pumps • Isolation monitor lights lit <ul style="list-style-type: none"> • FW Isolation Monitor lights NOT lit • Manually close valves to get all FW Isolation Monitor lights lit • FW pumps discharge valves closed 1FW002A-C <ul style="list-style-type: none"> • Close valves
	RO	Verify ECCS pumps running <ul style="list-style-type: none"> • CENT CHG pumps • RH pumps • SI pumps

Comments: _____

Scenario No.: 2001-4		Event No.: 6 and 7
Event Description: Steam Generator Tube Rupture (SGTR) on 1D SG (6). This will require a manual reactor trip and SI. The FWI signal will fail to actuate and operator action is required to trip the feed pumps and isolate FW flow to the SGs.(7)		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify RCFCs Accident Mode lights lit Verify Phase A isolation - Group 3 monitor lights lit Verify CNMT Ventilation isolation - Group 6 CNMT Vent Isol monitor lights lit
	BOP	Verify AF system: <ul style="list-style-type: none"> • AF pumps running • AF isolation valves open 1AF13A-H • AF flow control valves throttled 1AF005A-H Verify CC Pumps running Verify SX Pumps running Check if Main Steamline Isolation required <ul style="list-style-type: none"> • Check SG pressure < 640 psig • Check CNMT pressure > 8.2 psig <ul style="list-style-type: none"> • If either condition met then verify MSIVs and MSIV Bypass valves closed

Comments: _____

Scenario No.: 2001-4		Event No.: 6 and 7
Event Description: Steam Generator Tube Rupture (SGTR) on 1D SG (6). This will require a manual reactor trip and SI. The FWI signal will fail to actuate and operator action is required to trip the feed pumps and isolate FW flow to the SGs.(7)		
Time	Position	Applicant's Actions or Behavior
	BOP	<p>Check if CNMT Spray is required</p> <ul style="list-style-type: none"> • Check if CNMT pressure has increased greater than 20 psig <p>NOTE: When CNMT Spray Actuation occurs during the performance of 1BEP-0 the following steps need to be performed. If actuation occurs after passing this step and during the performance of another Emergency procedure, it is expected that the crew verify proper actuation, commensurate with other priorities. The Crew is to reference this step (1BEP-0 step 14) or may use 1BFR Z.1 for guidance to assure all auto and manual alignments have been made.</p> <ul style="list-style-type: none"> • Check Group 6 CS monitor lights LIT • Check Group 6 Phase B isol monitor lights LIT • Stop ALL RCPs • Check CS eductor suction flow on running pumps greater than 15 gpm • Check CS eductor additive flow on running pumps greater than 5 gpm • Align SX Cooling towers: <ul style="list-style-type: none"> • All 8 riser valves open 0SX163A thru H • All 4 Hot Water Bypass valves closed 0SX162A thru D • All 8 SX Cooling Tower hi speed fans running
	BOP	<p>Verify Total AF flow:</p> <ul style="list-style-type: none"> • AF flow > 500 gpm • SG levels maintained between 10% (31% Adverse) and 50% • SG levels NOT increasing in an uncontrolled manner
	BOP/US [CT] E-3--A	<p>Check for NR level NOT increasing in uncontrolled manner</p> <p>Identify 1D SG as ruptured.</p> <ul style="list-style-type: none"> • If ruptured SG suspected, isolate AF Isol valves: <ul style="list-style-type: none"> • 1AF013D • 1AF013H
	BOP	<p>Verify ECCS valve alignment</p> <ul style="list-style-type: none"> • Group 2 Cold Leg Injection monitor lights lit
	BOP	<p>Verify ECCS flow</p> <ul style="list-style-type: none"> • HHSI flow >100 gpm • RCS pressure NOT <1700 psig

Comments: _____

Scenario No.: 2001-4		Event No.: 6 and 7
Event Description: Steam Generator Tube Rupture (SGTR) on 1D SG (6). This will require a manual reactor trip and SI. The FWI signal will fail to actuate and operator action is required to trip the feed pumps and isolate FW flow to the SGs.(7)		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Check at least ONE PZR PORV relief path available:</p> <ul style="list-style-type: none"> • PORV isol valve – ENERGIZED (1RY800A is still energized) • PORV relief path – AVAIALBE and in AUTO • Isolation valve open <p>Determine NO PZR PORV Isolation valve open and can NOT perform RNO steps</p> <ul style="list-style-type: none"> o Establish PORV relief path for any PORV NOT failed open
	BOP/US	<p>Verify Generator Trip</p> <ul style="list-style-type: none"> • OCB 3-4 and 4-5 open • PMG output breaker open
	BOP	<p>Verify 1A DG running, 1B DG OOS</p> <ul style="list-style-type: none"> • SX valve open 1SX169A • Dispatch operator locally to check operation
	BOP	<p>Verify Control Room ventilation aligned for emergency operations:</p> <ul style="list-style-type: none"> • Check RM-11 Grid 2 Control Room outside air rad monitors less than alert alarm setpoint. • Operating VC train equipment running Train A <ul style="list-style-type: none"> • Supply fan • Return fan • M/U fan • Chilled water pump • MCR chiller 0A • Operating VC train dampers <ul style="list-style-type: none"> • M/U fan outlet damper NOT full closed 0VC24Y • VC train M/U filter light LIT • Operating VC train Charcoal Adsorber aligned for train A <ul style="list-style-type: none"> • 0VC43Y closed • 0VC21Y open • 0VC22Y open • Control Room pressure greater than +0.125 inches water on 0PDI-VC038

Comments: _____

Scenario No.: 2001-4		Event No.: 6 and 7
Event Description: Steam Generator Tube Rupture (SGTR) on 1D SG (6). This will require a manual reactor trip and SI. The FWI signal will fail to actuate and operator action is required to trip the feed pumps and isolate FW flow to the SGs.(7)		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify Auxiliary Building ventilation aligned <ul style="list-style-type: none"> Two inaccessible filter plenums aligned <ul style="list-style-type: none"> Plenum A fan 0VA03CB running <ul style="list-style-type: none"> Damper 0VA023Y open Damper 0VA436Y closed Plenum C fan 0VA03CF running <ul style="list-style-type: none"> Damper 0VA072Y open Damper 0VA438Y closed
	BOP	Verify FHB ventilation aligned <ul style="list-style-type: none"> Train B fan 0VA04CB running 0VA055Y open 0VA062Y open 0VA435Y closed
	RO	Check PZR sprays & PORVs closed <ul style="list-style-type: none"> Normal spray valves closed 1RY455B and 1RY455C (NOTE: valves are failed closed due to loss of IA) PORVs closed 1RY455A and 1RY456 (NOTE: PORVs isolated due to faults earlier)
	RO	Maintain RCS temperature control <ul style="list-style-type: none"> Check at least 1 RCP running <ul style="list-style-type: none"> Throttle AFW flow to all SGs maintaining 10% in at least 1 SG.
	RO	Check if RCP's should be stopped <ul style="list-style-type: none"> Any RCP's running Check if trip criteria applies <ul style="list-style-type: none"> HHSI flow >100 gpm OR SI pump discharge flow >200 gpm RCS pressure < 1425 psig Trip RCP's if controlled cooldown NOT in progress and above criteria satisfied
	BOP	If RCPs stopped, place steam dumps in STEAM PRESSURE Mode

Comments: _____

Scenario No.: 2001-4		Event No.: 8
Event Description: 1D SG faulted (steam break) inside containment on Reactor trip		
Time	Position	Applicant's Actions or Behavior
	BOP	Check if SG secondary pressure boundaries are intact: <ul style="list-style-type: none"> • Check pressure in all SGs: <ul style="list-style-type: none"> • None decreasing in an uncontrolled manner • None completely depressurized (1D SG completely depressurized)
	CREW	Transition to 1BEP-2 "FAULTED STEAM GENERATOR ISOLATION UNIT 1" Rev. 100 WOG-1C
	US	Implement 1 BEP-2 and direct operator actions.
	BOP	Check main steamline isolation: <ul style="list-style-type: none"> • All MSIVs and MSIV Bypass valves closed
	BOP	Check if any SG secondary pressure boundary is intact: <ul style="list-style-type: none"> • Check all steam generators for any SG pressure stable or increasing.
	BOP/US	Identify Faulted SG <ul style="list-style-type: none"> • Check pressure in all SGs <ul style="list-style-type: none"> • Any decreasing in an uncontrolled manner Identify/report 1D steam generator is faulted.
	BOP	Isolate 1D S/G: <ul style="list-style-type: none"> • Close 1AF013D & H • Check FW to faulted SG isolated <ul style="list-style-type: none"> o Associated row on FW isolation monitor lights panel LIT for faulted SG. o Verify 1D S/G PORV closed 1MS018D o Verify 1D S/G Blowdown valves closed 1SD002C and D o Verify 1D S/G Blowdown sample isolation valves closed 1SD005B
	BOP	Monitor AF pump suction pressure: <ul style="list-style-type: none"> • AF PUMP SX SUCT VLVS ARMED alarm 1-3-E7 NOT lit

Comments: _____

Scenario No.: 2001-4		Event No.: 8
Event Description: 1D SG faulted (steam break) inside containment on Reactor trip		
Time	Position	Applicant's Actions or Behavior
	BOP/US	Check secondary radiation trends normal for plant conditions: <ul style="list-style-type: none"> • RM11 Grid 1 indications for: <ul style="list-style-type: none"> • SJAE/ gland steam exhaust gas • SG blowdown liquid radiation • Main steamline MSIV rooms • Reset CNMT Isol Phase A if necessary • Request Chemistry dept to sample all SGs for activity
	CREW	Diagnose SGTR on 1D SG <ul style="list-style-type: none"> • Secondary area rad monitors levels increasing or in ALERT
	CREW	Transition to BEP-3 "STEAM GENERATOR TUBE RUPTURE" Rev. 100 WOG-1C
	US	Implement 1BEP-3 and direct operator actions.
	RO/US	Check status of RCPs and determine RCPs can remain running <ul style="list-style-type: none"> • If any running, apply trip criteria <ul style="list-style-type: none"> o HHSI flow >100 gpm on 1FI-917 OR o SI flow > 200 gpm on 1FI-918/922 o RCS pressure < 1425 psig – NO RCS pressure is greater than 1425 psig
	CREW	Identify ruptured SG <ul style="list-style-type: none"> o Unexpected rise in NR level o Main steamline rad monitor <ul style="list-style-type: none"> o 1RT-AR022 Grid 1 4AD422 o 1RT-AR023 Grid 1 4AD423 o High activity for any SG sample <ul style="list-style-type: none"> • Reset CNMT isol Phase A • Notify Chem to locally sample • Open SG blowdown sample valves at Chem request
	CREW	Identify/report 1D SG as ruptured

Comments: _____

Scenario No.: 2001-4		Event No.: 8
Event Description: 1D SG faulted (steam break) inside containment on Reactor trip		
Time	Position	Applicant's Actions or Behavior
	BOP [CT] E-3--A	Isolate flow from rupture SG <ul style="list-style-type: none"> • SG PORV MS018D in AUTO • Check SG PORV MS018D closed <ul style="list-style-type: none"> • Verify closed when SG pressure < 1115 psig • Verify SG blowdown valves closed unless open for sampling <ul style="list-style-type: none"> • 1SD002C • 1SD002D • Close MSIV and MSIV bypass valves for 1D SG • Check PORVs on intact SGs available for RCS cooldown
	BOP [CT] E-3--A	Check ruptured SG level <ul style="list-style-type: none"> • Narrow Range >10% • Close AF isol valves (should have been closed in 1BEP-0) <ul style="list-style-type: none"> • 1AF013D • 1AF013H
	BOP	Check Rupture SG pressure <ul style="list-style-type: none"> • Ruptured SG pressure greater than 320 psig • If NOT go to 1BCA 3.1
	US	Transition to 1BCA-3.1 "SGTR LOSS OF REACTOR COOLANT – SUBCOOLED RECOVERY DESIRED" Rev. 100 WOG-1C.
	US	Implement 1BCA-3.1 and direct operator actions.
	BOP	<ul style="list-style-type: none"> • Reset SI • Reset CNMT isolation • Restore Instrument Air to CNMT
	BOP/US	Verify all AC buses powered from offsite

Comments: _____

Scenario No.: 2001-4		Event No.: 8
Event Description: 1D SG faulted (steam break) inside containment on Reactor trip		
Time	Position	Applicant's Actions or Behavior
	RO/BOP	Check if CS should be stopped: <ul style="list-style-type: none"> • CS pump run lights LIt • Reset CS signal • Spray Additive Tank LO-2 lights – NOT LIT • CS Termination requirements ACHIEVED <ul style="list-style-type: none"> • Spray operating time of 2 hours and Spray Additive Tank LO-2 lights LIT: <ul style="list-style-type: none"> • Stop CS pumps and place in standby • Verify 1CS019A and B closed • Close 1CS007A and B
	BOP/US	Check ruptured SG level <ul style="list-style-type: none"> • Narrow Range >10% (31% Adverse) Abide by caution to maintain feedflow isolated to faulted ruptured SG
	CREW	Check if RH pumps should be stopped: <ul style="list-style-type: none"> • Check RCS pressure: <ul style="list-style-type: none"> • RCS pressure greater than 325 psig • RCS pressure stable or increasing • Stop RH pumps and place in standby
	CREW	<ul style="list-style-type: none"> • Initiate evaluation of plant status • Place hydrogen monitors in service per BOP PS-9
	BOP	Check if SG secondary pressure boundaries are intact <ul style="list-style-type: none"> • Check pressure in all SGs <ul style="list-style-type: none"> • No SG pressure decreasing in an uncontrolled manner • No SG completely depressurized
	BOP	Check intact SG levels: <ul style="list-style-type: none"> • Narrow range levels > 10% (31% Adverse). • Control feed flow to maintain narrow range levels between 18% (31% Adverse) and 50%. • Check narrow range levels not increasing in an uncontrolled manner.

Comments: _____

Scenario No.: 2001-4		Event No.: 8
Event Description: 1D SG faulted (steam break) inside containment on Reactor trip		
Time	Position	Applicant's Actions or Behavior
	BOP	Initiate RCS Cooldown to 200°F <ul style="list-style-type: none"> • Maintain cooldown rate in RCS cold legs <100°F in any 1 hour • Use RH if in Shutdown cooling • Check PZR pressure < 1930 psig <ul style="list-style-type: none"> • PZR LOW PRESS SI BLOCK PERMISSIVE P-11 Lit <ul style="list-style-type: none"> • If NOT continue with procedure until P-11 Lit before blocking STM LINE SI • Block Steamline Isol SI <ul style="list-style-type: none"> • Place STM LINE SI BLOCK switches to BLOCK for train A and B • Dump Steam to condenser from intact SGs at maximum rate <ul style="list-style-type: none"> • Check C-9 Permissive NOT LIT • Place main steam header pressure controller in manual and zero demand • Place in steam pressure mode • Adjust MS header pressure controller in manual or auto to initiate cooldown
	BOP	Check if subcooled recovery is appropriate: <ul style="list-style-type: none"> • Check RWST level greater than 67% • Check ruptured SG level less than 93% (81% Adverse)
	RO/US	Check RCS subcooling: <ul style="list-style-type: none"> • Acceptable per ICONIC or Attachment A and Figure 1BCA-3.1-1
	RO	Check if ECCS is in service: <ul style="list-style-type: none"> o Any SI pump running o 1SI 8801A or B open o Any RH pump running in ECCS mode
	RO	Deenergize PZR heaters: <ul style="list-style-type: none"> • Place B/U heater contactors in OFF • Place variable heaters control switch in AFTER TRIP
	RO	Depressurize RCS to refill PZR <ul style="list-style-type: none"> • Use normal sprays <ul style="list-style-type: none"> • Determine NOT available due to no instrument air to CNMT • Use PZR PORV <ul style="list-style-type: none"> • Determine NOT available due to block valves closed and deenergized • Use Aux spray <ul style="list-style-type: none"> • Determine NOT available due to no instrument air to CNMT

Comments: _____

Scenario No.: 2001-4		Event No.: 8
Event Description: 1D SG faulted (steam break) inside containment on Reactor trip		
Time	Position	Applicant's Actions or Behavior
	RO	Check if an RCP should be started
		NOTE: Scenario may be terminated at this point with lead examiners concurrence.

Comments: _____
