

Byron June 2000 Examination

**NRC-Developed
Scenarios**

Final, As-Administered

Facility: BYRON Scenario No.: 1 Op-Test No.: 00-301
 Examiners: _____ Operators: _____

Objectives:

In accordance with plant procedures: Decrease reactor power, Respond to a failure of the steamline pressure transmitter for MFW pump, Respond to a failure of the controlling pressurizer level channel, Respond to a failure of the Auctioneering Tave circuit, Respond to a Rod Control Urgent Failure alarm, Respond to a faulted S/G, Respond to an ATWS, Respond to a failure of the emergency boration valve, Respond to a S/G tube rupture.

Initial Conditions:

Reactor power is 100%, MOL, Pressurizer level control is selected to 459/460, 1A D/G is OOS, 1A AFW pump is OOS.

Turnover:

Reactor Power is 100%, MOL 529 ppm Cb. Lower Reactor Power to 90% for TV-GV testing. The power decrease will occur at 3MW/min using boration. The 1A D/G is OOS due to scheduled maintenance activities on the control system. It has been OOS for the last 10 hours. The offsite power source surveillance is complete. The D/G is expected to be returned to service within the next 12 hours. The 1A AFW pump is OOS due to bearing replacement. It has been OOS for the last 6 hours. The pump is expected to be returned to service within the next 10 hours. A severe thunderstorm warning is in effect for Stephenson, Winnebago, and Ogle counties for the next 6 hours.

Event No.	Malf. No.	Event Type*	Event Description
1 <u>2</u>		R (RO)	POWER DECREASE (BORATE)
2 <u>3</u>		N (BP)	POWER DECREASE (TURBINE)
3 <u>4</u>	RX05	I (BP)	S/G STM PRESSURE FOR FEED PUMP CONTROL FAILS LOW (CONTROL OF FP)
4 <u>5</u>	RX13A	I (RO)	CONTROLLING PZR LEVEL CHANNEL FAILS LOW (RESTORE LETDOWN)
5 <u>1</u>	RX17	I (RO)	AUCT TAVE CKT FAILS HIGH FOR ROD CONTROL
6	RD11A	C (RO)	ROD CONTROL URGENT FAILURE (POWER CABINET 1AC)
7 <u>6</u>	TP01A+B	C (BP)	1B STATOR COOLING PUMP FAILS TO AUTO START
8 <u>7</u>	MS03A,E	M (E)	1A S/G STEAM LEAK S/G SAFETIES STICK OPEN
9 <u>8</u>	RP02A +B	C (RO)	RX TRIP FAILURE ATWAS
10 <u>9</u>	zdi1cv8 104	C (BP)	EMERGENCY BORATE VALVES FAILS
11 <u>10</u>	TH03B	M (E)	1/B S/G TUBE RUPTURE

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

Event No.: <u>_1/2_</u>		
Event Description: <u>Power Decrease by borating and using the turbine</u>		
Time	Position	Applicant's Actions or Behavior
	SRO	Implement actions of 1BGP 100-4, step F.1: Implement flowpath 1BGP 100-4T1, Power Descension Flowchart Direct initiation of Reference Reactivity Data as per 1BGP 100-7
	SRO	Direct decrease from 100% power
	CREW	Review applicable precautions, limitations, and actions
	RO	Initiate boration: (BOP CV-6) 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 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
	BOP	Initiate turbine load decrease: DEPRESS the LOAD RATE MW/MIN Pushbutton Verify/Enter the desired load rate Depress the REF Pushbutton Using the number Pushbuttons, SET in MW on the REFERENCE DEMAND window When ready to begin the load decrease, depress GO Verify load decreases

Event No.: _1/2_		
Event Description: <u>Power Decrease by borating and using the turbine</u>		
Time	Position	Applicant's Actions or Behavior
	CREW	Monitor power decrease: Monitor reactor power, Tave Verify rods move in AUTO to maintain Tave within $\pm 2F$ of Tref Borating 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

Event No.: _3_

Event Description: Steamline pressure transmitter PT-MS507 fails LOW causing FW Pump speeds to decrease. Manual control of the FW Pump Master controller is expected. The steam dumps are affected if operated in STM PRESS mode, the dumps will not open in AUTO since measured pressure is ZERO.

Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator 1-15-A9/B9/C9/D9 S/G 1 LEVEL DEVIATION HIGH LOW 1-15-A3/B3/C3/D3 S/G 1 FLOW MISMATCH STM FLOW LOW PI-507 INDICATION AT BOTTOM OF SCALE PI-507 COMPUTER INPUT LOW DECREASING S/G LEVELS DUE TO DECREASING FEEDWATER FLOW SINCE FW PUMPS DECREASE SPEED
	BOP	Identify/report PT-507 failed low
	BOP	Response per AR 1-15-A9 and 1-15-A3 Take MAN control of Master FW Pump Speed Controller and raise speed to increase FW flow If required, take MAN control of FW REG VALVES and open to restore level Recover S/G levels and FW flows. Adjusting feed pump speed as necessary Return FW REG VALVES to AUTO if required
	SRO	Inform SM/MAINT of PT-507 failure/status May refer to 1BOA INST-2 per ARP, but are not in it

Event No.: <u> 4 </u> Event Description: <u>Selected controlling PZR level channel 1LT-459 fails low. The result is isolation of CVCS letdown, rising charging flow, PZR heaters denenergize, and rising PZR level.</u>		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators 1-12-A4 PZR LVL LOW HTRS OFF LETDOWN SECURED 1-12-B4 PZR LEVEL CONT DEV LOW PZR heaters tripped off Letdown Isolation Valve LCV-459 & Orifice Isolation valves 1CV8149A/B/C close Charging flow control CV-121 throttles open to increase flow
	RO	Identify/report failed PZR level channel LT-459
	BOP	Hold on turbine ramp
	SRO	Implement 1BOA INST-2 "Operation with a failed instrument channel", attachment C "Pressurizer level channel failure" and direct operator action, BOP hold on turbine ramp
	RO	Check PZR Level Verify level normal (56-60%) If not take manual control of either the master level controller LK-459 or 1CV121 (FK-121) valve and adjust charging flow to minimum while maintaining RCP seal injection flow within required limits Select operable channel on LEVEL CHANNEL SELECTOR by placing to 461/460 position Verify channel 460 or 461 selected on PZR level recorder
	RO	Reestablish normal letdown per 1BOPO CV-17 Place letdown pressure controller PCV-CV131 in MAN and raise demand Place letdown Hx Out temperature controller TCV-CC130A to MAN and raise demand to 60% Open Letdown Line Isolation valve LCV-CV460 Verify open inservice regen Hx isolation valves CV8324A/B & CV8389A/B Verify Letdown Line CNMT isolation valves CV8160 & 8152 When plant conditions are stable and PZR level at normal (58-60%), place FCV-121 in AUTO Adjust in MAN Cent Chg Pump Flow controller FK-121 to establish 100 gpm charging flow with 8-10 gpm seal injection flow Open the selected letdown orifice isolation valves CV8149 A/B/C to establish desired letdown flow Restore PZR heaters

Event No.: _4_		
Event Description: <u>Selected controlling PZR level channel 1LT-459 fails low. The result is isolation of CVCS letdown, rising charging flow, PZR heaters denenergize, and rising PZR level.</u>		
Time	Position	Applicant's Actions or Behavior
	RO (CONT)	Adjust PCV-CV131 to obtain 360-380 psig on PI-131 and place in AUTO Adjust TCV-CC130A to obtain 90-115F on TK-130 and place in AUTO
	RO	Trip bistables by placing in TEST: LB459A C1-751 BS-1 PZR HI WTR LVL RX TRIP
	RO	Place PZR level control in AUTO Master PZR Level Controller 1CV121 controller
	SRO	Check Technical Specifications: 3.3.1 - Rx Trip Inst Table 3.3.1-1 FU Req Channels 3 - Ensure only ONE channel inop; place inop channel in TRIP within 6 hours 3.3.3 - Post Accident Monitoring, Table 3.3.3-1 Function 6; Req Channels 2 - No action 3.3.4 - Remote Shutdown System, Condition A
	SRO	Inform SM/Maint of PZR level channel LT-459 status
	SRO	Inform SM of unit status/potential GSEP event

Event No.: <u> 5 </u>		
Event Description: <u> Rod Control Auct Tave Ckt fails. Rods move in AUTO. </u>		
Time	Position	Applicant's Actions or Behavior
	NOTE	Verify rods in auto prior to starting fault
	CUE	Inward Rod Movement
	RO	Identify/report problem with Rod Control Check turbine power stable Place Rod Control in Manual
	SRO	Implement 1BOA ROD-1 "UNCONTROLLED ROD MOTION" and direct operator action
	BOP	Check turbine power stable
	RO	Place Rod Control in Manual (previously performed) Verify rods not moving Check rod control inputs Power range instruments operable RCS Loop Tave instruments operable Turbine first stage pressure operable Tref instrumentation operable (Curve Book)
	RO	Check for unexplained reactivity addition: Rx makeup control system set proper boron conc BTRS in off Secondary system status normal (Flows and Levels) Contact Chem Dept to sample RCS Boron (SRO could do) RCS temperature stable

Event No.: <u>_5_</u>		
Event Description: <u>Rod Control Auct Tave Ckt fails. Rods move in AUTO.</u>		
Time	Position	Applicant's Actions or Behavior
	SRO	Consult with SM for status of Manual Rod Control
	RO	Place Rod Control in Manual Insert rods 7 steps Withdraw rods 7 steps
	NOTE	Insert Power Cabinet Failure here with rod movement Check Tave-Tref stable and within 1F Restore to within 1F
	SRO	Consult with SM for status of AUTO Rod Control
	RO	Check if Rod Control can be placed in AUTO TURBINE LOW POWER C5 NOT LIT Check Tave-Tref stable and within 1F Place Rod Control in AUTO (if desired)
	SRO	Check Technical Specifications: Section 3.1.4, 3.1.5, 3.1.6 Rod alignments and insertion limits

Event No.: <u> 6 </u> Event Description: <u>Rod Control Cabinet Urgent Failure due to Power 1AC Cabinet</u> (Control Bank B & D rods will be able to move in bank select)		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator: 1-10-C6 ROD CONT URGENT FAILURE
	RO	Identify/report ROD CONT URGENT FAILURE 1BAR 1-10-C6
	SRO	Implement 1BOA ROD-2 "FAILURE OF RODS TO MOVE" and direct operator actions Inform Nuclear Engineering/Maint to investigate problem. Confirm trip ability of rods Dispatch local operator to investigate
	RO	Stabilize plant Place rod control in manual stop boration or dilution
	BOP	Stop turbine load changes
	RO	Evaluate cause of rods failing to move: Check PWR RNG FLUX HIGH ROD STOP ALARM Not Lit IR HIGH FLUX ROD STOP C-1 ALARM Not Lit TURBINE LOW POWER INTLK C-5 bypass permissive Not LIT BANK D ROD STOP C-11 ALARM Not Lit Check for ROD URGENT failure: ROD CONT URGENT FAILURE ALARM LIT Maintain Tave and Tref within 1F Adjust turbine load and adjust boron concentration
	SRO	Contact SED and/or IMD for guidance and troubleshooting Consult with SED and/or IMD to determine if alarm can be reset Control Bank B & D rods will be able to move in bank select

[illegible]

Event No.: 7

Event Description: Stator Cooling Pump 1A trips and 1B fails to auto start Operator must start pump manually within 45 seconds or a Reactor trip will occur

Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator 1-18-A14 STATOR CLG WATER PUMP TRIP
	BOP	Identify/report 1A Stator cooling water pump trip
	BOP	Response per BAR 1-18-A14 Verify auto start of standby pump - Fails MANUALLY start 1B pump within 45 seconds to prevent Reactor trip Dispatch local operator to investigate and reset local alarms
	SRO	Inform SM/MAINT of failure/status

Event No.: _8/9_		
Event Description: <u>1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture</u>		
Time	Position	Applicant's Actions or Behavior
	CUE	Increased steam flow on 1A S/G S/G pressure decreasing RCS temp decreasing PZR level and pressure decreasing Rx Power increasing
	RO	Identify/report Rx Power Increasing, Steam Flow increasing from 1A S/G S/G Safeties stick open
	SIM	When asked tell them S/G safety is open
	SRO	Direct Operator actions to trip the Rx and implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION."
	RO	Manually trips RX from MCR- Rx will not trip ATWAS
	SRO	Implement 1BFR-S.1 "RESPONSE TO NUCLEAR POWER GENERATION/ATWS" and direct operator actions.
	RO	Verify RX Trip: Rod bottom lights -NOT LIT Rx Trip and Bypass breakers closed - RTA,BYA,RTB,BYB Neutron flux NOT decreasing Manually trip RX 1PM05J,6J Manually insert Control Rods CONTROL RODS B & D will move in bank select (CRITICAL TASK)
	BOP	Manually trip the turbine Check AFW pumps running - Manually start pumps

Event No.: <u>_9/10_</u> Event Description: <u>1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture</u>		
Time	Position	Applicant's Actions or Behavior
	RO/BOP (Cont)	<p>Initiate Emergency Boration of RCS: Failure of Emergency Borate Valve</p> <p>Check at least 1 CCP running</p> <p>Initiate emergency boration: Open emergency boration valve 1CV8104 - Valve is broken (CRITICAL TASK) Align one of the following flowpaths: RWST: Open at least 1 RWST to CCP suction Valve - 1CV112D,E Close at least 1 VCT outlet valve - 1CV112B,C Maximize charging flow Verify letdown is established OR Normal Boration: Open both boration valves - 1CV110A,B Start the boric acid transfer pump Verify charging flow > 30 gpm</p> <p>Check PZR pressure < 2335 psig</p> <p>Verify CNMT Ventilation Isolation: Group 6 CNMT Vent Isol monitor light - LIT Stop VQ fans and close VQ isol valves as necessary</p>
	RO	Verify RX subcritical - RX is still critical PR > 5%

Event No.: <u>_9_</u>		
Event Description: <u>1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture</u>		
Time	Position	Applicant's Actions or Behavior
	BOP	Isolate Steam Dumps: Place steam dump BYPASS INTERLOCK switches (A and B train) to OFF RESET
	RO	Rx Trip: Dispatch operator to locally perform the following until the RX is tripped Open RX trip and bypass breakers by depressing manual TRIP buttons. Shutdown both MG sets by placing breaker control switches in PULL OUT - Generator and Motor Open both MG set generator side breakers by depressing manual TRIP buttons. Open both MG set motor breakers by depressing manual TRIP buttons.
	BOP	Turbine Tripped Check S/G levels: NR level > 10% Control feed flow to maintain between 10-50% Check S/G blowdown isol valves closed - 1SD002A,B,C,D,E,F,G,H
	RO	Verify all dilution paths isolated: Check Rx M/U dilution valves closed - 1CV111A,B Verify BTRS MODE SELECTOR switch in OFF Dispatch operator locally to verify dilution paths ISOLATED

Event No.: _9_		
Event Description: <u>1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture</u>		
Time	Position	Applicant's Actions or Behavior
	RO (Cont)	Stop Reactivity insertion from RCS cooldown: Check RCS temp decreasing uncontrolled S/G pressure decreasing uncontrolled
	BOP	Check Main Steamline Isolation All MSIV and MSIV bypass valves closed Identify faulted S/G: Check pressure in all S/G - 1A S/G faulted Pressure decreasing uncontrolled or completely depressurized Isolate faulted S/G: Check FW to faulted S/G isolated: FW ISOLATION MONITOR LIGHTS panel - LIT for 1A S/G If not manually isolate from MCR and locally Close AFW isol valves for 1A S/G - 1AF013A,E Check S/G PORV on 1A S/G closed - 1MS018A Verify S/G blowdown isol valves on 1A S/G closed - 1SD002A,B Verify S/G blowdown sample isol valve on 1A S/G closed- 1SD005A (THE REACTOR CAN BE TRIPPED LOCALLY 5 MINUTES FROM START OF ATWS)
	NOTE	
	RO	Check Core Exit TC: Average of 10 highest < 1200F Verify Rx subcritical - PR < 5%, IR negative SUR
	SRO	Direct Operator actions and go to 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION."

Event No.: <u>_8_</u>		
Event Description: <u>_1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture</u>		
Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" AND DIRECT OPERATOR ACTIONS
	RO	Verify Rx trip: Rod bottom lights-all lit Rx Trip and Bypass BRKR's- open Neutron flux- decreasing
	BOP	Verify turbine trip: All turbine throttle valves-closed All turbine governor valves-closed Verify power to 4kv ESF busses: ESF busses-both energized-BUS 141, 142
	RO	Check SI actuated Any SI first out annunciator-Lit SI ACTUATED permissive- Light Lit SI equipment automatically actuated-SI pump running, Cent Chg pump cold leg injection isolation valve open-1SI8801A,B Actuate SI by taking SI Switch to actuate
	BOP	Verify FWI: FW pumps tripped FW isolation monitor lights LIT FRV's 1FW510,520,530,540 and/or FW shutoff valves 1FW006A,B,C,D FW pump discharge valves closed-1FW002A,B,C

Event No.: <u>_8_</u> Event Description: <u>1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture</u>		
Time	Position	Applicant's Actions or Behavior
	RO	Verify ECCS pumps running Both CCP Both RH Both SI
	BOP	Verify group 2 RCFC accident mode status lights-Lit Verify CNMT Isolation Phase A: Group 3 CNMT Isol monitor lights-LIT Verify CNMT Ventilation Isolation: Group 6 CNMT VENT ISOL monitor lights-LIT Verify AF system: 1A S/G isolated AF isolation valves open 1AF013A,B,C,D,E,F,G,H AF flow control valves throttled 1AF005A,B,C,D,E,F,G,H Verify both CC pumps running Verify both SX pumps running Check Main Steamline Isolation: All S/G pressures > 640 psig CNMT pressure on 1PR-937 or 1PI-CS934-937 < 8.2 psig Verify MSIV and MSIV bypass valves closed Check if CNMT Spray is required: CNMT pressure on 1PR-937 or 1PI-CS934-937 < 20 psig

Event No.: <u> 8 </u>		
Event Description: <u>1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture</u>		
Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Verify Total AF Flow: AF flow > 500 gpm Control feed flow to maintain NR level between 31-50% NR levels not increasing in an uncontrolled manner
	RO	Verify ECCS valve alignment: Group 2 cold leg injection monitor lights required for ECCS valve alignment-LIT Verify ECCS Flow: High Head Si flow > 50gpm 1FI-917 RCS Pressure < 1625 psig 1PI-403A/405 SI pump discharge flow > 100 gpm 1-FI-918/922 RCS Pressure < 325 psig RH pump discharge flow > 1000 gpm 1FI-618/619 Check at least 1 Pzr PORV relief path available: PORV isol valves energized PORV in AUTO Associated isol valve open
	BOP	Verify generator trip: Unit 1 main transformer output breakers open OCB 3-4, OCB 4-5 PMG output breaker open Verify D/G running: Both D/G running D/G SX valve open-1SX169A,B Local check D/G operation

Event No.: <u> 8 </u>		
Event Description: <u>1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture</u>		
Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	<p>Verify Control Room Ventilation aligned for emergency:</p> <p>Radiation < alarm setpoint: Control Room Outside Air intake 0A- OPR31J-32J Grid 2, 0B OPR33J-34J Grid 2</p> <p>Operating VC train equipment running Train A supply, return, & M/U fan; chilled water pump, MCR chiller Train B supply, return, & M/U fan; chilled water pump, MCR chiller</p> <p>Operating VC train dampers aligned M/U fan outlet damper NOT fully closed OVC24Y TRN A, OVC08Y TRN B VC train M/U filter light - LIT</p> <p>Operating VC train charcoal absorber aligned TRN A OVC43Y bypass damper closed, OVC21Y inlet damper open, OVC22Y outlet damper open OR TRN B OVC44Y bypass damper closed, OVC05Y inlet damper open, OVC06Y outlet damper open</p> <p>Control Room pressure > +0.125" H2O OPDI-VC038</p> <p>Verify Aux Bldg Ventilation aligned for emergency: Inaccessible filter plenums-2 plenums aligned with charcoal absorbers on-line Plenum A Fan OVA03CA-running Flow cont damper OVA022Y open Bypass Isol damper OVA020Y closed or Fan OVA03CB-running Flow cont damper OVA023Y open Bypass Isol damper OVA436Y closed</p>

Event No.: _8_		
Event Description: 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture		
Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	<p>Plenum B</p> <p>Fan OVA03CC-running</p> <p>Flow cont damper OVA024Y open</p> <p>Bypass Isol damper OVA021Y closed</p> <p>or</p> <p>Fan OVA03CD-running</p> <p>Flow cont damper OVA025Y open</p> <p>Bypass Isol damper OVA437Y closed</p> <p>Plenum C</p> <p>Fan OVA03CE-running</p> <p>Flow cont damper OVA067Y open</p> <p>Bypass Isol damper OVA052Y closed</p> <p>or</p> <p>Fan OVA03CF-running</p> <p>Flow cont damper OVA072Y open</p> <p>Bypass Isol damper OVA438Y closed</p> <p>Verify FHB ventilation aligned for emergency operation: FHB charcoal absorbers-1 train aligned</p> <p>Train A</p> <p>Fan OVA04CA-running</p> <p>Inlet Isol damper OVA04CA open</p> <p>Flow cont damper OVA057Y open</p> <p>Bypass Isol damper OVA051Y closed</p> <p>or</p> <p>Train B</p> <p>Fan OVA04CB-running</p> <p>Inlet Isol damper OVA055Y open</p> <p>Flow cont damper OVA062Y open</p> <p>Bypass Isol damper OVA435Y closed</p>

Event No.: _8_		
Event Description: <u>1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture</u>		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Check PZR spray and PORV's: PZR spray valves closed 1RY455B, 1RY455C PORV's closed 1RY455A, 1RY456</p> <p>Maintain RCS temp control: RCPs running RCS AVERAGE temps -stable at or trending to 557F If lower than 557F; Stop dumping steam and isolate cooldown If higher than 557F Dump steam by steam dumps if available or PORV's</p> <p>Check status of RCP: RCP's are off</p>
	BOP	<p>Check S/G pressure boundaries: 1A S/G pressure completely depressurized or uncontrolled</p>
	SRO	<p>Go To 1BEP-2 " FAULTED S/G ISOLATION" and direct operator actions.</p>

Event No.: _8_		
Event Description: 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture		
Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BEP-2 "FAULTED S/G ISOLATION" and direct operator actions.
	NOTE	Insert 500 GPM 1B S/G tube Rupture Now
	BOP	<p>Check Main Steamline Isolation: All MIV and MSIV Bypass valves closed</p> <p>Check if any S/G pressure boundary is intact: S/G pressures stable or increasing</p> <p>Identify faulted S/G: 1A S/G faulted</p> <p>Isolate faulted S/G 1A S/G is isolated (performed in FRS-1)</p> <p>Monitor AFW pump suction pressure: AF PUMP SX SUCT VLV ARMED Alarm - NOT LIT</p> <p>Check Secondary Radiation: Secondary Radiation trends - Normal:</p> <p>Reset CNMT Isol Phase A - IAW 1BOA PRI-5</p> <p>Request Chem to sample all S/G's fro activity: Open S/G blowdown sample isol valves at CHEM request 1SD005A (1A), 5C (1B), 5D (1C), 5B (1D)</p>
	SRO	Go to 1BEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT" and direct operator actions.

Event No.: _11_		
Event Description: 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture		
Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT" and direct operator actions.
	RO	Check status of RCP's: RCP's are secured
	BOP	Check S/G's Secondary pressure boundaries: 1A S/G faulted but previously isolated Check intact S/G levels: NR levels > 10% Control feed flow to maintain S/G NR levels 10-50% NR level not increasing uncontrolled: 1B S/G increasing uncontrolled tube rupture
	SRO	Go to 1BEP-3 "STEAM GENERATOR TUBE RUPTURE" and direct operator actions.
The scenario can be ended at Chief Examiner's discretion.		

Facility: BYRON Scenario No.: 2 Op-Test No.: 00-301

Examiners: _____ Operators: _____

Objectives:

In accordance with plant procedures: Respond to a failure of the feed flow transmitter for #1 FRV, Respond to a failure of the power range channel N-41, Increase reactor power, Respond to a failure of the level transmitter for VCT, Respond to a large break LOCA, Respond to a failure of automatic FWI, Respond to a failure of automatic sump swapover.

Initial Conditions:

Reactor power is 50%, BOL, Pressurizer level control is selected to 459/460. 1A D/G is OOS, 1A AFW pump is OOS.

Turnover:

Reactor Power is 50%. BOL 611 ppm Cb, STEP 63 OF 1BGP 100-3, POWER INCREASE TO 100%. The power increase will occur at 3MW/min using dilution. The 1A D/G is OOS due to scheduled maintenance activities on the control system. It has been OOS for the last 10 hours. The offsite power source surveillance is complete The D/G is expected to be returned to service within the next 12 hours. The 1A AFW pump is OOS due to bearing replacement. It has been OOS for the last 6 hours. The pump is expected to be returned to service within the next 10 hours. A severe thunderstorm warning is in effect for Stephenson, Winnebago, and Ogle counties for the next 6 hours.

Event No.	Malf. No.	Event Type*	Event Description
1	RX04A	I (BP)	FEED FLOW TRANSMITTER FOR #1 FRV FAILS HIGH
2	NI09A	I (RO)	PR CHANNEL N-41 FAILS HIGH
3		R (RO)	POWER INCREASE (DILUTE 50 GALLONS)
4		N (BP)	POWER INCREASE (TURBINE)
5	CV17	I (RO)	LT-185 INDICATING RECORDER FOR VCT FAILS HIGH DIVERT TO HUT NO AUTO SWAPOVER
6	TH04A	M (E)	LARGE BREAK LOCA
7	FW41,42 A-D RP43,69 OUT	C (BP)	FAILURE OF FWI
8	RP15B RP28A+ B	C (RO)	1B CCP FAILED TO AUTO START
9	RH04A+ B	C (RO)	FAILURE FOR AUTO SUMP SWAPOVER

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

Event No.: _1_		
Description: <u>Feed Flow transmitter FT-510 fails High. This channel inputs to the S/G Water Level Controller for S/G 1A Fed Reg Valve, 1FW510. The feed Reg Valve will close due to the steam flow/feed flow mismatch</u>		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator (1-15-A3) S/G 1A FLOW MISMATCH STM FLOW LOW FT-510 indication reading high 1FW510 throttling closed S/G level decreasing below program
	BOP	Identify/report feed flow channel FT-510 failure Take Manual control of 1FW510 and balance Feed and Steam Flow to stabilize S/G level as necessary
	SRO	Implement 1BOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL" Attachment G "FEEDWATER FLOW CHANNEL FAILURE" and direct operator action
	BOP	Check Affected S/G Level Normal IF Not Place Feed Reg Valve in manual and restore S/G level to stable condition Select operable feed flow channel FT-511 Establish AUTO level control Check HD system, HD pump discharge flow control valve position normal 1HD046A AND 1HD046B
	SRO	Inform Sm/Maint of failure of S/G 1A feed flow channel FT-510

Event No.: <u> 2 </u>		
Event Description: <u>Power Range Channel N-41 fails high</u>		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator (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 N-41 INDICATION AT TOP OF SCALE ROD STOP
	RO	Identify/report failure of Power Range NI Channel N-41
	SRO	Implement 1BOA INST-1 "NUCLEAR INSTRUMENTATION MALFUNCTION", Attachment A "PR CHANNEL FAILURE" and direct operator action.
	RO	Place ROD BANK SELECT switch in MANUAL Check for ROD STOP (1-10-B5) NOT LIT Place Rod Stop Bypass Switch to bypass for N-41 Check Tave-Tref within 1F and restore Tave by: Control Rods, Turbine Load, Boron Concentration
	BOP	Check S/G levels normal and stable
	BOP	Bypass/Defeat channel N-41 Place Detector Current Comparator Upper Section Defeat to N-41 Place Detector Current Comparator Lower Section Defeat to N-41 Place power Mismatch Bypass to N-41 Place Rod Stop Bypass to N-41 (performed earlier) Place Comparator Channel Defeat to N-41 Trip Bistables Remove Control Power Fuses at N-41 "A" Drawer Bistable NC41P tripped LO RX TRIP Bistable NC41R tripped HI RX TRIP Bistable NC41U/K tripped POS/NEG RATE TRIP

Event No.: <u>_2_</u>		
Event Description: <u>Power Range Channel N-41 fails high</u>		
Time	Position	Applicant's Actions or Behavior
	BOP (CONT)	Locally trip OTΔT bistables on Channel I OTΔT Trip-TB411C OTΔT Runback TB411D
	RO	Select Operable channel Loop ΔT Place Rod Control in automatic C5 permissive NOT LIT Tave-Tref within 1F Place Rod Control in AUTO
	SRO	Check Technical Specifications 3.3.1 Function 2, 3, &6, Required channels operable 4- ACTION Place inop channel in trip within 6 hours 3.2.4 QPTR IN 12 HRS
	SRO	Inform SM/Maint of N-41 channel failure/problem
	SRO	Inform SM of unit status/potential GSEP event

Event No.: _3/4_		
Event Description: <u>Power Increase by diluting and using the turbine</u>		
Time	Position	Applicant's Actions or Behavior
	SRO	Implement actions of 1BGP 100-3, step F.61:
	SRO	Direct increase from 50% power
	CREW	Review applicable precautions, limitations, and actions
	RO	Initiate dilution: (BOP CV-5) Place MU MODE CONT SWITCH to STOP position Set MU MODE SELECT to DIL or ALT DIL position Set 1FK-111 PW/TOTAL Flow Cont to desired dilution rate Verify 1CV111A in AUTO Set 1FY-0111 Primary Water Control Preset Counter to desired volume Verify 1CV11B & 1CV110B in AUTO Place MAKE-UP CONTROL Switch to START Verify proper operation of valves & PW (CV111A & 111B open, PW pump is running, CV110B throttles open [if ALT DIL]) Verify PW flow on recorder Verify B/U Heaters ON and spray valves 1RY455B/C modulates open
	BOP	Initiate turbine load increase: DEPRESS the LOAD RATE MW/MIN Pushbutton Verify/Enter the desired load rate Depress the REF Pushbutton Using the number Pushbuttons, SET in MW on the REFERENCE DEMAND window When ready to begin the load decrease, depress GO Verify load increases

[illegible]

[illegible]

Event No.: _6/8_		
Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover		
Time	Position	Applicant's Actions or Behavior
	CUE	PZR Level rapidly decreasing/ LOCA
	RO	Identify/report PZR level and pressure rapidly decreasing
	SRO	Direct operator actions
	SRO	Implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" AND DIRECT OPERATOR ACTIONS
	RO	Verify Rx trip: Rod bottom lights-all lit Rx Trip and Bypass BRKRs- open Neutron flux- decreasing
	BOP	Verify turbine trip: All turbine throttle valves-closed All turbine governor valves-closed Verify power to 4kv ESF busses: ESF busses-both energized-BUS 141, 142
	RO	Check SI actuated Any SI first out annunciator-Lit SI ACTUATED permissive- Light Lit SI equipment automatically actuated-SI pump running, Cent Chg pump cold leg injection isolation valve open-1SI8801A,B Actuate SI by taking SI Switch to actuate (TRIP RCPS-FOLD OUT PAGE RCS PRESSURE<1425 PSIG AND HIGH HEAD SI FLOW >50GPM)
	BOP	Verify FWI: (FAILURE OF FWI) FW pumps tripped-Manually trip FW pumps FW isolation monitor lights LIT-Manually close FRV's 1FW510,520,530,540 and/or FW shutoff valves 1FW006A,B,C,D FW pump discharge valves closed-1FW002A,B,C (CRITICAL TASK)

Event No.: _6/7_		
Event Description: <u>Large break LOCA, Failure of FWI, Failure of 1B CCP to start, Failure for Auto Sump Swapover</u>		
Time	Position	Applicant's Actions or Behavior
	RO	Verify ECCS pumps running Both CCP - Manually start 1B CCP failed to start in AUTO Both RH Both SI
	BOP	Verify group 2 RCFC accident mode status lights-Lit Verify CNMT Isolation Phase A: Group 3 CNMT Isol monitor lights-LIT Verify CNMT Ventilation Isolation: Group 6 CNMT VENT ISOI monitor lights-LIT Verify AF system: AF isolation valves open 1AF013A,B,C,D,E,F,G,H AF flow control valves throttled 1AF005A,B,C,D,E,F,G,H Verify both CC pumps running Verify both SX pumps running Check Main Steamline Isolation: All S/G pressures > 640 psig CNMT pressure on 1PR-937 or 1PI-CS934-937 < 8.2 psig Verify MSIV and MSIV bypass valves closed Check if CNMT Spray is required: CNMT pressure on 1PR-937 or 1PI-CS934-937 > 20 psig Group 6 CS monitor lights - LIT Group 6 Phase B Isolation monitor lights - LIT Stop all RCP's-(previously performed by RO) Check eductor suction flow on running pumps > 15 gpm 1FI-CS013,14

Event No.: _6_		
Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover		
Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	<p>Check CS eductor additive flow on running pump > 5gpm 1FI-CS015,16</p> <p>Align SX Cooling Towers: All 8 riser valves Open- 0SX163A thru H All 4 Hot Water Basin Bypass valves Closed-0SX162A,B,C,D All 8 Sx Cooling Tower fans running in Hi speed</p> <p>Verify Total AF Flow: AF flow > 500 gpm Control feed flow to maintain NR level between 31-50% NR levels not increasing in an uncontrolled manner</p>
	RO	<p>Verify ECCS valve alignment: Group 2 cold leg injection monitor lights required for ECCS valve alignment-LIT</p> <p>Verify ECCS Flow: High Head Si flow > 50gpm 1FI-917 RCS Pressure < 1625 psig 1PI-403A/405 SI pump discharge flow > 100 gpm 1-FI-918/922 RCS Pressure < 325 psig RH pump discharge flow > 1000 gpm 1FI-618/619</p> <p>Check at least 1 Pzr PORV relief path available: PORV isol valves energized PORV in AUTO Associated isol valve open</p>
	BOP	<p>Verify generator trip: Unit 1 main transformer output breakers open OCB 3-4, OCB 4-5 PMG output breaker open</p> <p>Verify D/G running: Both D/G running D/G SX valve open-1SX169A,B Local check D/G operation</p>

Event No.: _6_

Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	<p>Verify Control Room Ventilation aligned for emergency:</p> <p>Radiation < alarm setpoint: Control Room Outside Air intake 0A- OPR31J-32J Grid 2, 0B OPR33J-34J Grid 2</p> <p>Operating VC train equipment running Train A supply, return, & M/U fan; chilled water pump, MCR chiller Train B supply, return, & M/U fan; chilled water pump, MCR chiller</p> <p>Operating VC train dampers aligned M/U fan outlet damper NOT fully closed OVC24Y TRN A, OVC08Y TRN B VC train M/U filter light - LIT</p> <p>Operating VC train charcoal absorber aligned TRN A OVC43Y bypass damper closed, OVC21Y inlet damper open, OVC22Y outlet damper open OR TRN B OVC44Y bypass damper closed, OVC05Y inlet damper open, OVC06Y outlet damper open</p> <p>Control Room pressure > +0.125" H2O OPDI-VC038</p> <p>Verify Aux Bldg Ventilation aligned for emergency: Inaccessible filter plenums-2 plenums aligned with charcoal absorbers on-line Plenum A Fan OVA03CA-running Flow cont damper OVA022Y open Bypass Isol damper OVA020Y closed or Fan OVA03CB-running Flow cont damper OVA023Y open Bypass Isol damper OVA436Y closed</p>

Event No.: _6_		
Event Description: <u>Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover</u>		
Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	<p>Plenum B Fan OVA03CC-running Flow cont damper OVA024Y open Bypass Isol damper OVA021Y closed or Fan OVA03CD-running Flow cont damper OVA025Y open Bypass Isol damper OVA437Y closed</p> <p>Plenum C Fan OVA03CE-running Flow cont damper OVA067Y open Bypass Isol damper OVA052Y closed or Fan OVA03CF-running Flow cont damper OVA072Y open Bypass Isol damper OVA438Y closed</p> <p>Verify FHB ventilation aligned for emergency operation: FHB charcoal absorbers-1 train aligned</p> <p>Train A Fan OVA04CA-running Inlet Isol damper OVA04CA open Flow cont damper OVA057Y open Bypass Isol damper OVA051Y closed or Train B Fan OVA04CB-running Inlet Isol damper OVA055Y open Flow cont damper OVA062Y open Bypass Isol damper OVA435Y closed</p>

Event No.: _6_		
Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Check PZR spray and PORV's: PZR spray valves closed 1RY455B, 1RY455C PORV's closed 1RY455A, 1RY456</p> <p>Maintain RCS temp control: No RCPs running RCS cold leg temps -stable at or trending to 557F If lower than 557F; Stop dumping steam and isolate cooldown If higher than 557F Dump steam by steam dumps if available or PORV's</p> <p>Check status of RCP: RCP's are off</p>
	BOP	<p>Check S/G pressure boundaries: All S/G pressure stable</p> <p>Check if S/G tubes intact: All secondary rad monitors < Alert setpoint SJAЕ exhaust gas S/G blowdown liquid Main Steamline</p>
	RO	<p>Check if RCS is intact: Diagnose LOCA CNMT are rad monitors (grid 4) < Alert alarm CNMT pressure >3.4 psig CNMT sump level lights LIT</p> <p>RCS is not intact</p>
	SRO	<p>Go To 1BEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT" AND DIRECT OPERATOR ACTIONS. Direct initiation of Critical Safety Function Status Trees.</p>

[illegible]

Event No.: _6_		
Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover		
Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT" and direct operator actions.
	RO	Check status of RCP's: No RCP's running
	BOP	Check S/G pressure boundaries: All S/G pressure stable Check intact S/G levels: NR level > 31% Control feed flow to maintain NR level- 31-50% NR level not increasing in an uncontrolled manner Check secondary radiation: All secondary rad monitors < Alert setpoint S/JAE exhaust gas S/G blowdown liquid Main Steamline
	RO	Check PZR PORV's PORV isol valves Energized-1RY8000A,B PORV's closed 1RY455A, 456 PORV isol valves open (at least 1)-1RY8000A,B Check if ECCS flow should be reduced: RCS subcooling acceptable-ICONIC Display or ATT A Secondary heat sink-S/G NR level > 31%, AFW flow > 500gpm RCS pressure decreasing PZR level < 38%
	BOP	Check if CS should be stopped: CS pumps running RESET CS Signal When spray additive tank LO-2 is reached then close CS eductor valves-1CS019A,B

Event No.: <u>6</u>		
Event Description: <u>Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover</u>		
Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Containment spray termination requirements: CNMT press < 15 psig RX Coolant loss only- 2 hrs operating time and Spray Additive Tank LO-2 level lights lit then secure CS
	RO	Check if RH pumps should be stopped: Reset SI: Depress both SI reset pushbuttons Verify SI ACTUATED permissive light NOT LIT Verify AUTO SI BLOCKED permissive light LIT Check RCS pressure: RCS pressure < 325 PSIG
	BOP	Check RCS and S/G pressures for faulted S/G: S/G pressure stable or increasing RCS pressure stable or increasing Check if D/G should be stopped: 4KV ESF busses energized by offsite power- BUS 141, 142 4KV NON-ESF busses energized by offsite power- BUS 143, 144 Stop any unloaded D/G and place in standby per BOP DG-12
	RO	Verify cold leg recirculation capability: Power to at least 1 RH pump Associated CNMT sump isol valve position light LIT 1SI8811A (A), 8811B (B)
	BOP	AUX Bldg radiation trends normal Reset CNMT Isol Phase A Place Hydrogen Monitors in service per BOP PS-9, POST LOCA CONTAINMENT HYDROGEN MONITORING SYSTEM OPERATION

Event No.: <u> 6 </u>		
Event Description: <u>Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover</u>		
Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	<p>BOP PS-9, POST LOCA CONTAINMENT HYDROGEN MONITORING SYSTEM OPERATION</p> <p>Verify open or open valves-1PS228A,230A,228B,229A,229B,230B Direct local operator to open valves-1PS232A,233A,232B,233B Direct local operator to verify LOCAL SET/NORMAL switch for alarms on H2 units are set to NORMAL Place ON/OFF switch on H2 panels to ON position After 4 minutes verify H2 and System Status alarms light OFF Verify LO RANGE lights are ON for 1EL-PS343 and 344</p> <p>Obtain samples by contacting CHEM: RCS activity and Boron Concentration CNMT atmosphere and recirc sump</p> <p>Per SM prepare both Hydrogen Recombiners IAW BOP OG-10. Dispatch the operators</p> <p>Align SX MDCT for long term cooling per BOP SX-T2 Maintain UHS Basin level > 80%-Place SX tower makeup in AUTO Close SXCT B/D to Flume Isol Valve SX161A/B</p> <p>Shutdown unnecessary equipment: ALL HD pumps FW pumps per BOP FW-2A, FW-8 All unnecessary CD/CB pumps per BOP CD/CB-2</p> <p>Align NDCT for temp and level control: Verify CW intake bay level within band Locally verify NDCT's basin water levels acceptable Align NDCT per BOP CW-25A</p> <p>Shutdown all unnecessary CW pumps per 1BOP CW-2</p> <p>Shut down chiller on non-operating VC train: Momentarily place control switch in TRIP</p>

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Event No.: _9_		
Event Description: <u>Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover</u>		
Time	Position	Applicant's Actions or Behavior
	RO (Cont)	<p>Manually align RH pump 1A suction to CNMT sump: Place RH pump 1A in PULL OUT Close RH pump 1A suction from RWST isol valve-1SI8812A Place CS pump 1A in PULL OUT Close CS pump 1A RWST suction valve-1CS001A Open RH pump 1A CNMT sump isol valve -1SI8811A Restart RH pump 1A Reopen CS pump 1A RWST suction valve-1CS001A Restart CS pump 1A</p> <p>Check If RH pump 1B needs to be aligned to CNMT sump TRN A CNMT sump isol valve closed-1SI8811B</p> <p>Check TRN B Recirc flowpath from CNMT sump avail : RH pump 1B running TRN B CNMT sump isol valve energized-1SI8811B</p> <p>Manually align RH pump 1B suction to CNMT sump: Place RH pump 1B in PULL OUT Close RH pump 1B suction from RWST isol valve-1SI8812B Place CS pump 1B in PULL OUT Close CS pump 1B RWST suction valve-1CS001B Open RH pump 1B CNMT sump isol valve -1SI8811B Restart RH pump 1B Reopen CS pump 1B RWST suction valve-1CS001B Restart CS pump 1B</p> <p>Check at least one CNMT sump recirc flowpath established: TRN A-RH pump 1A running, 1SI8811A open TRN B-RH pump 1A running, 1SI8811B open</p>
	SRO	Return to main Body step 3C
The scenario can be ended at Chief Examiner's discretion.		

Facility: BYRON Scenario No.: 3 Op-Test No.: 00-301

Examiners: _____ Operators: _____

Objectives:

In accordance with plant procedures: Respond to a failure of the charging valve controller, Decrease reactor power for instrument cross cals, Respond to a failure of the steam dumps, Respond to a failure of the reactor protection system, Respond to a steam line rupture in containment, Respond to a failure of the MSIV's, Respond to a failure of containment spray pumps.

Initial Conditions:

Reactor power is 100%, MOL, Pressurizer level control is selected to 459/460, 1A D/G is OOS, 1A AFW pump is OOS, Steam Dumps in pressure mode due to testing.

Turnover:

Reactor Power is 100%, MOL 529 ppm Cb. Lower Reactor Power to 90% for TV-GV testing. The power decrease will occur at 3MW/min using boration. The 1A D/G is OOS due to scheduled maintenance activities on the control system. It has been OOS for the last 10 hours. The offsite power source surveillance is complete. The D/G is expected to be returned to service within the next 12 hours. The 1A AFW pump is OOS due to bearing replacement. It has been OOS for the last 6 hours. The pump is expected to be returned to service within the next 10 hours. A severe thunderstorm warning is in effect for Stephenson, Winnebago, and Ogle counties for the next 6 hours.

Event No.	Malf. No.	Event Type*	Event Description
1	CV10	I (RO)	CHARGING VALVE CONTROLLER FAILS FULL OPEN
2		R (RO)	POWER DECREASE (BORATE)
3		N (BP)	POWER DECREASE (TURBINE)
4	ZA1PK 507595	I (BP)	STEAM DUMPS FAIL OPEN
5	ZDISIA1	C (RO)	INADVERTENT SI
6	MSO7D	M (E)	MAJOR STEAM LINE BREAK IN CONTAINMENT
7	MSO1A-D	C (BP)	FAILURE OF ALL MSIV'S TO CLOSE (UNCONTROLLED DEPRESSURIZATION ALL S/G'S)
8	RFCS04 ,05	C (BP)	FAILURE OF CONTAINMENT SPRAY PUMPS IN AUTO

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

[illegible]

Event No.: <u>_2/3_</u>		
Event Description: <u>Power Decrease by borating and using the turbine</u>		
Time	Position	Applicant's Actions or Behavior
	SRO	Implement actions of 1BGP 100-4, step F.1: Implement flowpath 1BGP 100-4T1, Power Descension Flowchart Direct initiation of Reference Reactivity Data as per 1BGP 100-7
	SRO	Direct decrease from 100% power
	CREW	Review applicable precautions, limitations, and actions
	RO	Initiate boration: (BOP CV-6) 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 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
	BOP	Initiate turbine load decrease: DEPRESS the LOAD RATE MW/MIN Pushbutton Verify/Enter the desired load rate Depress the REF Pushbutton Using the number Pushbuttons, SET in MW on the REFERENCE DEMAND window When ready to begin the load decrease, depress GO Verify load decreases

Event No.: <u>_2/3_</u>		
Event Description: <u>Power Decrease by borating and using the turbine</u>		
Time	Position	Applicant's Actions or Behavior
	CREW	Monitor power decrease: Monitor reactor power, Tave Verify rods move in AUTO to maintain Tave within $\pm 2F$ of Tref Borating 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

Event No.: _4_		
Event Description: <u>Steam Dumps valves Fails Open due to Steam Pressure Controller</u>		
Time	Position	Applicant's Actions or Behavior
	CUE	Steam Dump valve indicate throttled open
	BOP	Identify/report Steam Dump valves open (Steam flow increasing, Steam pressure decreasing)
	RO	Identify/report Rx power increasing, Tave decreasing
	SRO	Direct operator actions
	BOP	Manual control of Steam Dumps and shut valves
	SRO	Inform SM/Maint of Steam Dump Failure
	SIM	Informs US that the Steam Pressure Controller is failing recommend transferring to Tave Mode
	SRO	Implement 1BGP 100-3 and direct operator actions
	BOP	Transfer Steam Dumps to Tave Mode Place the MS Hdr Press Cont in manual and adjust to 0% demand Place the Steam Dump Mode Select Switch in the reset position and then to Tave position. Ensure C-7 permissive is OFF. Ensure Steam Dump Vales remain closed Place the Pressure Mode Controller in AUTO.
	SIM	Eliminate fault to allow the placement of Steam Dumps in Tave Mode
	SRO	Inform SM of Steam Dump status

Event No.: <u> 5 </u>		
Event Description: <u>Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto</u>		
Time	Position	Applicant's Actions or Behavior
	CUE	Inadvertent SI
	RO	Identify/report SI
	SRO	Direct operator actions
	SRO	Implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" AND DIRECT OPERATOR ACTIONS
	RO	Verify Rx trip: Rod bottom lights-all lit Rx Trip and Bypass BRKR's- open Neutron flux- decreasing
	BOP	Verify turbine trip: All turbine throttle valves-closed All turbine governor valves-closed Verify power to 4kv ESF busses: ESF busses-both energized-BUS 141, 142
	RO	Check SI actuated Any SI first out annunciator-Lit SI ACTUATED permissive- Light Lit SI equipment automatically actuated-SI pump running, Cent Chg pump cold leg injection isolation valve open-1SI8801A,B Actuate SI by taking SI Switch to actuate
	BOP	Verify FWI: FW pumps tripped FW isolation monitor lights LIT FW pump discharge valves closed-1FW002A,B,C

Event No.: <u> 5 </u> Event Description: <u>Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto</u>		
Time	Position	Applicant's Actions or Behavior
	RO	Verify ECCS pumps running Both CCP Both RH Both SI
	BOP	Verify group 2 RCFC accident mode status lights-Lit Verify CNMT Isolation Phase A: Group 3 CNMT Isol monitor lights-LIT Verify CNMT Ventilation Isolation: Group 6 CNMT VENT ISOL monitor lights-LIT Verify AF system: AF isolation valves open 1AF013A,B,C,D,E,F,G,H AF flow control valves throttled 1AF005A,B,C,D,E,F,G,H Verify both CC pumps running Verify both SX pumps running Check Main Steamline Isolation NOT required: All S/G pressures > 640 psig CNMT pressure on 1PR-937 or 1PI-CS934-937 < 8.2 psig Check if CNMT Spray is required: CNMT pressure on 1PR-937 or 1PI-CS934-937 < 20 psig

Event No.: <u>5</u>		
Event Description: <u>Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto</u>		
Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Verify Total AF Flow: AF flow > 500 gpm Control feed flow to maintain NR level between 31-50% NR levels not increasing in an uncontrolled manner
	RO	Verify ECCS valve alignment: Group 2 cold leg injection monitor lights required for ECCS valve alignment-LIT Verify ECCS Flow: High Head Si flow > 50gpm 1FI-917 RCS Pressure < 1625 psig 1PI-403A/405 SI pump discharge flow > 100 gpm 1-FI-918/922 RCS Pressure < 325 psig RH pump discharge flow > 1000 gpm 1FI-618/619 Check at least 1 Pzr PORV relief path available: PORV isol valves energized PORV in AUTO Associated isol valve open
	BOP	Verify generator trip: Unit 1 main transformer output breakers open OCB 3-4, OCB 4-5 PMG output breaker open Verify D/G running: Both D/G running D/G SX valve open-1SX169A,B Local check D/G operation

Event No.: _5_

Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	<p>Verify Control Room Ventilation aligned for emergency:</p> <p>Radiation < alarm setpoint: Control Room Outside Air intake 0A- OPR31J-32J Grid 2, 0B OPR33J-34J Grid 2</p> <p>Operating VC train equipment running Train A supply, return, & M/U fan; chilled water pump, MCR chiller Train B supply, return, & M/U fan; chilled water pump, MCR chiller</p> <p>Operating VC train dampers aligned M/U fan outlet damper NOT fully closed OVC24Y TRN A, OVC08Y TRN B VC train M/U filter light - LIT</p> <p>Operating VC train charcoal absorber aligned TRN A OVC43Y bypass damper closed, OVC21Y inlet damper open, OVC22Y outlet damper open OR TRN B OVC44Y bypass damper closed, OVC05Y inlet damper open, OVC06Y outlet damper open</p> <p>Control Room pressure > +0.125" H2O OPDI-VC038</p> <p>Verify Aux Bldg Ventilation aligned for emergency: Inaccessible filter plenums-2 plenums aligned with charcoal absorbers on-line Plenum A Fan OVA03CA-running Flow cont damper OVA022Y open Bypass Isol damper OVA020Y closed or Fan OVA03CB-running Flow cont damper OVA023Y open Bypass Isol damper OVA436Y closed</p>

Event No.: _5_

Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	<p>Plenum B Fan OVA03CC-running Flow cont damper OVA024Y open Bypass Isol damper OVA021Y closed or Fan OVA03CD-running Flow cont damper OVA025Y open Bypass Isol damper OVA437Y closed</p> <p>Plenum C Fan OVA03CE-running Flow cont damper OVA067Y open Bypass Isol damper OVA052Y closed or Fan OVA03CF-running Flow cont damper OVA072Y open Bypass Isol damper OVA438Y closed</p> <p>Verify FHB ventilation aligned for emergency operation: FHB charcoal absorbers-1 train aligned</p> <p>Train A Fan OVA04CA-running Inlet Isol damper OVA04CA open Flow cont damper OVA057Y open Bypass Isol damper OVA051Y closed or Train B Fan OVA04CB-running Inlet Isol damper OVA055Y open Flow cont damper OVA062Y open Bypass Isol damper OVA435Y closed</p>

Event No.: <u>5</u>		
Event Description: <u>Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto</u>		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Check PZR spray and PORV's: PZR spray valves closed 1RY455B, 1RY455C PORV's closed 1RY455A, 1RY456</p> <p>Maintain RCS temp control: RCPs running RCS Tave temps -stable at or trending to 557F If lower than 557F; Stop dumping steam and isolate cooldown If higher than 557F Dump steam by steam dumps if available or PORV's</p> <p>Check status of RCP: RCP's are running Parameters are normal to keep them running RCS pressure > 1425 psig</p>
	BOP	<p>Check S/G pressure boundaries: All S/G pressure stable</p> <p>Check if S/G tubes intact: All secondary rad monitors < Alert setpoint SJAЕ exhaust gas S/G blowdown liquid Main Steamline</p>
	RO	<p>Check if RCS is intact: CNMT is Normal, RCS is intact Rad < setpoint, Pressure < 3.4 psig, Sump lights NOT LIT</p> <p>Check if ECCS should be terminated: RCS subcooling fine - ICONIC Display or ATT A Secondary Heat Sink - FW flow > 500 gpm and NR level > 10% RCS pressure is stable PZR level > 4%</p>
	SRO	Go to 1BEP ES-1.1 "SI TERMINATION" and direct operator actions.

Event No.: _5_		
Event Description: <u>Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto</u>		
Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BEP ES-1.1 "SI TERMINATION" and direct operator actions. T. S. 3.3.1-16, 3.3.2-1.b FOR INADVERTENT SI
	RO	Reset SI if necessary: Depress both SI reset pushbuttons Verify SI ACTUATED permissive light - NOT LIT Verify AUTO SI BLOCKED permissive light - LIT
	BOP	Reset CNMT Isolation: Reset CNMT Isol Phase A - IAW 1BOA PRI-5 ATT E Reset CNMT Isol Phase B - IAW 1BOA PRI-5 ATT E Reset CNMT Vent Isol Check SACs running Open INST AIR CNMT Isol Valves - 1IA065,66
	SRO	Per fold out page go To 1BEP-2 "FAULTED S/G ISOLATION" and direct operator actions. The crew could go to 1BEP-1 then go to 1BEP-2 through the fold out page (Start Main Steam Line Rupture) 1D S/G major steam line break in CNMT (MSIV's fail to shut) Pressure in all S/G's decreasing in an uncontrolled manner.

Event No.: _6/7_		
Event Description: <u>Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto</u>		
Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BEP-2 "FAULTED S/G ISOLATION" and direct operator actions.
	BOP	<p>Check Main Steamline Isolation: MSIV and MSIV Bypass valves open Manually actuate Main Steamline Isolation and verify valves closed</p> <p>MSIV valves can not be closed due to failure</p> <p>Check if any S/G pressure boundary is intact: ALL S/G pressures decreasing uncontrolled:</p>
	SRO	Go to 1BCA-2.1 "UNCONTROLLED DEPRESSURIZATION OF ALL S/G'S" and direct operator actions.

Event No.: _6_

Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BCA-2.1 "UNCONTROLLED DEPRESSURIZATION OF ALL S/G'S" and direct operator actions.
	BOP	<p>Check secondary pressure boundary:</p> <p>Check MSIV's closed - 1MS001A,B,C,D Manually actuate Main Steamline Isolation If still not closed then manually close valves</p> <p>Check MSIV bypass valves closed - 1MS101A,B,C,D</p> <p>Check S/G PORVs closed - 1MS018A,B,C,D</p> <p>Check Main FW valves closed:</p> <p>FW isol valves - 1FW009A,B,C,D FW tempering flow control valves - 1FW034A,B,C,D FW tempering isol valves - 1FW035A,B,C,D Low flow FW isol valves - 1FW039A,B,C,D FW reg valves - 1FW510,520,530,540 FW reg bypass valves - 1FW510A,520A,530A,540A Check S/G blowdown isol valves closed: 1A 1SD002A,B 1B 1SD002E,F 1C 1SD002G,H 1D 1SD002C,D Check S/G blowdown sample isol valves closed: 1A 1SD005A 1B 1SD005C 1C 1SD005D 1D 1SD005B</p> <p>(A Minimum feed flow of 25 gpm must be maintained to each S/G with a NR level < 10%)</p>

Event No.: <u>_6_</u>		
Event Description: <u>Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto</u>		
Time	Position	Applicant's Actions or Behavior
	BOP	Control feed flow to minimize RCS cooldown: Check cooldown rate in RCS cold legs < 100F in any 1 hr period Check NR level in all S/G < 50% Check RCS hot leg temps stable or decreasing
	RO	Check status of RCP's: RCP's running - TRIP RCP's due to CNMT pressure fold out page
	BOP	Monitor AFW pump suction pressure: AF PUMP SX SUCT VLVS ARMED alarm - NOT LIT
	RO	Check PZR PORV's and Isolation Valves: PORV isol valves energized - 1RY8000A,B PORV's closed - 1RY455A,456 PORV isol vlaves at least 1 open - 1RY8000A,B
	BOP	Check Secondary Radiation: Reset CNMT Isol Phase A - IAW 1BOA PRI-5 Request Chem to sample S/G's for activity Check secondary radiation trends - normal SJAE/Gland exhaust, S/G blowdown, Main Steamline
	NOTE	(1B MSIV closed locally 1B S/G pressure increasing) Transition to 1BEP-2 per fold out page prior to step 12 through 21starting SI Termination
	SRO	Go To 1BEP-2 "FAULTED S/G ISOLATION" and direct operator actions.
<p align="center">The scenario can be ended at Chief Examiner's discretion. Technical Specifications on SI needs to be addressed NOTE: ENSURE THAT THE CS PUMP FAILURE HAS BEEN HANDLED BY CREW</p>		

Event No.: _6/8_		
Event Description: <u>Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto</u>		
Time	Position	Applicant's Actions or Behavior
NOTE : AT SOME TIME CNMT PRESSURE COULD RISE TO AN ORANGE PATH FOR CONTAINMENT CSFST. IF SO THE PERFORMANCE OF 1BFR-Z.1 IS REQUIRED.		
	SRO	Implement 1BFR-Z.1 "RESPONSE TO HIGH CONTAINMENT PRESSURE " and direct operator action
	BOP	<p>Verify CNMT Isol phase: CNMT Isol phase A valves closed Group 3 CNMT Isol Mon lights- LIT</p> <p>Verify CNMT Vent Isol: CNMT Vent Isol valves closed Group 6 CNMT Vent Isol mon lights- LIT</p> <p>Check if CNMT spray is required: CNMT pressure > 20 psig 1PR-937 or 1PI-CS934-937</p> <p>Verify CS system valves- proper emergency alignment: CS pump suction valves: Train A: RWST suction valve 1CS001A Open Sump suction valve 1CS009A open</p> <p>OR Train B: RWST suction valve 1CS001B Open Sump suction valve 1CS009B open CS pump header isol valves closed- 1CS007A,B</p> <p>CS eductor spray additive valves open- valves closed 1CS019A,B closed - NO PUMPS RUNNING Failure When valves open pumps will start when in normal (CRITICAL TASK) Place CS pump test switch in test Manually open valves Place CS pump test switch in normal - Pumps start</p>

Event No.: _6_		
Event Description: <u>Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto</u>		
Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	<p>CS eductor inlet flow control valves open-1CS010A,B</p> <p>Verify both CS pumps running</p> <p>Verify CNMT Isol Phase B valves closed: Group 6 Phase B Isol monitor lights-LIT</p> <p>Stop all RCP's</p> <p>Check CS flow indications- On Scale: CS pump discharge flow > 200 gpm 1FI-CS011/012 CS eductor suction flow > 15 gpm 1FI-CS013/014 CS eductor additive flow > 5 gpm 1FI-CS015/016</p> <p>Reset CS signal</p> <p>When Spray additive tank LO-2 level lights LIT then close CS eductor spray additive valves: 1CS019A,B</p> <p>Align SX Cooling Towers: All 8 riser valves Open- 0SX163A thru H All 4 Hot Water Basin Bypass valves Closed-0SX162A,B,C,D All 8 Sx Cooling Tower fans running in Hi speed</p> <p>Verify RCFC's running in accident Mode: Group 2 RCFC Accident Mode status lights - LIT</p> <p>Verify Main Steamline Isolation: All MSIV and MSIV Bypass valves closed</p> <p>Check if feed flow should be isolated to any S/G: Any S/G pressure decreasing in an uncontrolled manner</p>
	SRO	Return to procedure in effect 1BEP-2 or 1BCA-2.1 and direct operator actions.

Facility: BYRONScenario No.: 4Op-Test No.: 00-301

Examiners: _____ Operators: _____

Objectives:

In accordance with plant procedures: Increase reactor power, Respond to a failure of the #1 FRV controller, Respond to a failure of #1 THot channel, Respond to a LOCA outside containment, Respond to a failure of the RWST valves, Respond to a failure of the Turbine.

Initial Conditions:

Reactor power is 50%, BOL, Pressurizer level control is selected to 459/460.

1A D/G is OOS, 1A AFW pump is OOS. PR Channel N42 OOS

Turnover:

Reactor Power is 50%. BOL 611 ppm Cb, STEP 63 OF 1BGP 100-3, POWER INCREASE TO 100%. The power increase will occur at 3MW/min using dilution. Power range channel N42 is OOS. The 1A D/G is OOS due to scheduled maintenance activities on the control system. It has been OOS for the last 10 hours. The offsite power source surveillance is complete The D/G is expected to be returned to service within the next 12 hours. The 1A AFW pump is OOS due to bearing replacement. It has been OOS for the last 6 hours. The pump is expected to be returned to service within the next 10 hours. A severe thunderstorm warning is in effect for Stephenson, Winnebago, and Ogle counties for the next 6 hours.

Event No.	Malf. No.	Event Type*	Event Description
1		R (RO)	POWER INCREASE (DILUTE 50 GALLONS)
2		N (BP)	POWER INCREASE (TURBINE)
3	FW09A-D	I (BP)	#1 FRV DRIFTS SHUT SLOWLY
4	RX18E	I (RO)	#1 THOT (TAVE) CKT FAILS HIGH (LCO 3.0.3)
5	RH10A, SI03A, SI05A	M (E)	LOCA OUTSIDE CONTAINMENT
6	ZDISI88 01A	C (RO)	FAILURE OF RWST VALVES TO OPEN
7	MFTCO3	C (BP)	FAILURE OF TURBINE TO TRIP

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

Event No.: _1/2_		
Event Description: <u>Power Increase by diluting and using the turbine</u>		
Time	Position	Applicant's Actions or Behavior
	SRO	Implement actions of 1BGP 100-3, step F.61:
	SRO	Direct increase from 50% power
	CREW	Review applicable precautions, limitations, and actions
	RO	Initiate dilution: (BOP CV-5) Place MU MODE CONT SWITCH to STOP position Set MU MODE SELECT to DIL or ALT DIL position Set 1FK-111 PW/TOTAL Flow Cont to desired dilution rate Verify 1CV111A in AUTO Set 1FY-0111 Primary Water Control Preset Counter to desired volume Verify 1CV11B & 1CV110B in AUTO Place MAKE-UP CONTROL Switch to START Verify proper operation of valves & PW (CV111A & 111B open, PW pump is running, CV110B throttles open [if ALT DIL]) Verify PW flow on recorder Verify B/U Heaters ON and spray valves 1RY455B/C modulates open
	BOP	Initiate turbine load increase: DEPRESS the LOAD RATE MW/MIN Pushbutton Verify/Enter the desired load rate Depress the REF Pushbutton Using the number Pushbuttons, SET in MW on the REFERENCE DEMAND window When ready to begin the load decrease, depress GO Verify load increases

[illegible]

Event No.: _4		
Event Description: <u>Loop A Thot fails high resulting in Loop A Tave failing high. Rods move in AUTO. Loop A #1 RTD fails high.</u>		
Time	Position	Applicant's Actions or Behavior
	CUE	Tave Loop A increase ΔT Loop A increase Numerous annunciators on Block 14 Inward Rod Movement
	RO	Identify/report problem with Rod Control Check turbine power stable Place Rod Control in Manual
	SRO	Implement 1BOA ROD-1 "UNCONTROLLED ROD MOTION" and direct operator action
	BOP	Check turbine power stable
	RO	Place Rod Control in Manual (previously performed) Verify rods not moving Check rod control inputs Power range instruments operable RCS Loop Tave instruments inoperable Failed 1TI-412 Loop 1A due to failed high Thot on Loop A Turbine first stage pressure operable Tref instrumentation operable
	SRO	Implement 1BOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL" Attachment A "RCS NARROW RANGE RTD CHANNEL" while continuing with this procedure and direct operator action
	RO	1BOA INST-2 Place Rod Control in Manual (previously performed) Manually defeat failed channel Select 1A position on Tave DEFEAT Switch Select 1A position ΔT DEFEAT Switch

Event No.: <u>_4_</u> Event Description: <u>Loop A Thot fails high resulting in Loop A Tave failing high. Rods move in AUTO. Loop A #1 RTD fails high.</u>		
Time	Position	Applicant's Actions or Behavior
	RO (CONT)	<p>Select operable channel for ΔT recorder</p> <p>Check if Rod Control can be placed in AUTO</p> <p>TURBINE LOW POWER C5 NOT LIT</p> <p>Check Tave-Tref stable and within 1F</p> <p>Restore to within 1F</p> <p>adjust rods, adjust turbine load, or adjust RCS boron concentration</p> <p>Place Rod Control in AUTO (if desired)</p> <p>Check PZR level normal & stable</p> <p>Manually restore PZR to program level</p> <p>Locally trip bistables for Loop A by placing in TEST</p> <p>OPAT Trip TB411G</p> <p>OPAT Runback TB411H</p> <p>OT ΔT Trip TB411C - will trip plant if tripped</p> <p>OT ΔT Runback TB411D - will trip plant if tripped</p> <p>Low Tave TB412G</p> <p>Lo-Lo- Tave TB412D</p> <p>Check P12 interlock</p> <p>LO-2 TAVE STM DUMP INTLK P12 not lit</p>
	SRO	<p>Check Technical Specifications:</p> <p>3.3.1-Rx Trip Inst. Table 3.3.1 Function 6 & 7 Required channels 4 place inop channel in TRIP within 6 hours</p> <p>3.3.2-ESFAS Inst Table 3.3-3 Function 8.c (p12) Required channels 3- with <Required Op, within 1 hour check permissive status correct</p> <p>3.0.3 (Due to loss of Loop 2 OT ΔT Trip earlier with N-42 failure) be in Mode 3 within 7 hours, Mode 4 within 13 hours, and Mode 5 within 37 hours</p> <p>(CRITICAL TASK)</p> <p>CUE: Can't be fixed must shut down</p>

Event No.: <u> 4 </u>		
Event Description: <u> Loop A Thot fails high resulting in Loop A Tave failing high. Rods move in AUTO. Loop A #1 RTD fails high. </u>		
Time	Position	Applicant's Actions or Behavior
	SRO	Inform SM/Maint of Loop 1A Thot RTD failure Inform SM of unit status/potential GSEP event.
	RO	1BOA ROD-1 Check for unexplained reactivity addition: Rx makeup control system set proper boron conc BTRS in off Secondary system status normal Contact Chem Dept to sample RCS Boron RCS temperature stable
	SRO	Consult with SM for status of Manual Rod Control
	RO	Place Rod Control in Manual Insert rods 7 steps Withdraw rods 7 steps Check Tave-Tref stable and within 1F Restore to within 1F adjust rods, adjust turbine load, or adjust RCS boron concentration
	SRO	Consult with SM for status of AUTO Rod Control
	RO	Check if Rod Control can be placed in AUTO TURBINE LOW POWER C5 NOT LIT Check Tave-Tref stable and within 1F Place Rod Control in AUTO (if desired)
	SRO	Check Technical Specifications: Section 3.1.4, 3.1.5, 3.1.6 Rod alignments and insertion limits

Event No.: <u>_5/7_</u> Event Description: <u>LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open</u>		
Time	Position	Applicant's Actions or Behavior
	CUE	PZR Level rapidly decreasing/ LOCA
	RO	Identify/report PZR level and pressure rapidly decreasing
	SRO	Direct operator actions
	SRO	Implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" AND DIRECT OPERATOR ACTIONS
	RO	Verify Rx trip: Rod bottom lights-all lit Rx Trip and Bypass BRKRs- open Neutron flux- decreasing
	BOP	Verify turbine trip: Turbine failed to trip Manually trip turbine-Throttle and Governor valves still open Isolate steam supply: Manually runback turbine at maximum rate press TURBINE MANUAL Press FAST ACTION and GV LOWER simultaneously Manually actuate Main Steamline Isolation and Verify MSIV bypass valves are closed Place EH pumps in PULL OUT (CRITICAL TASK) Verify power to 4kv ESF busses: ESF busses-both energized-BUS 141, 142
	RO	Check SI actuated Any SI first out annunciator-Lit SI ACTUATED permissive- Light Lit SI equipment automatically actuated-SI pump running, Cent Chg pump cold leg injection isolation valve open-1SI8801A,B Actuate SI by taking SI Switch to actuate

Event No.: <u> 5 </u> Event Description: <u>LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open</u>		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify FWI: FW pump tripped FW isolation monitor lights-LIT FW pump discharge valves closed-1FW002A,B,C
	RO	Verify ECCS pumps running Both CCP Both RH Both SI
	BOP	Verify group 2 RCFC accident mode status lights-Lit Verify CNMT Isolation Phase A: Group 3 CNMT Isol monitor lights-LIT Verify CNMT Ventilation Isolation: Group 6 CNMT VENT ISOL monitor lights-LIT Verify AF system: AF isolation valves open 1AF013A,B,C,D,E,F,G,H AF flow control valves throttled 1AF005A,B,C,D,E,F,G,H Verify both CC pumps running Verify both SX pumps running Check Main Steamline Isolation: All S/G pressures > 640 psig CNMT pressure on 1PR-937 or 1PI-CS934-937 < 8.2 psig Verify MSIV and MSIV bypass valves closed Check if CNMT Spray is required: CNMT pressure on 1PR-937 or 1PI-CS934-937 < 20 psig

Event No.: _5/6_		
Event Description: <u>LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open</u>		
Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Verify Total AF Flow: AF flow > 500 gpm Control feed flow to maintain NR level between 10-50% NR levels not increasing in an uncontrolled manner
	RO	Verify ECCS valve alignment: RWST valves did not open Group 2 cold leg injection monitor lights required for ECCS valve alignment-LIT- Manually align RWST valves SI8801A,B (CRITICAL TASK) Verify ECCS Flow: High Head Si flow > 50gpm 1FI-917 RCS Pressure < 1625 psig 1PI-403A/405 SI pump discharge flow > 100 gpm 1-FI-918/922 RCS Pressure > 325 psig RH pump discharge flow > 1000 gpm 1FI-618/619 Check at least 1 Pzr PORV relief path available: PORV isol valves energized PORV in AUTO Associated isol valve open
	BOP	Verify generator trip: (Manually open breakers as necessary) Unit 1 main transformer output breakers open OCB 3-4, OCB 4-5 PMG output breaker open

Event No.: _5_		
Event Description: <u>LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open</u>		
Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	<p>Verify D/G running: 1B D/G running D/G SX valve open-1SX169A,B Local check D/G operation</p> <p>Verify Control Room Ventilation aligned for emergency: Radiation < alarm setpoint: Control Room Outside Air intake 0A- OPR31J-32J Grid 2, 0B OPR33J-34J Grid 2</p> <p>Operating VC train equipment running Train A supply, return, & M/U fan; chilled water pump, MCR chiller Train B supply, return, & M/U fan; chilled water pump, MCR chiller</p> <p>Operating VC train dampers aligned M/U fan outlet damper NOT fully closed OVC24Y TRN A, OVC08Y TRN B VC train M/U filter light - LIT</p> <p>Operating VC train charcoal absorber aligned TRN A OVC43Y bypass damper closed, OVC21Y inlet damper open, OVC22Y outlet damper open OR TRN B OVC44Y bypass damper closed, OVC05Y inlet damper open, OVC06Y outlet damper open Control Room pressure > +0.125" H2O OPDI-VC038</p> <p>Verify Aux Bldg Ventilation aligned for emergency: Inaccessible filter plenums-2 plenums aligned with charcoal absorbers on-line Plenum A Fan OVA03CA-running Flow cont damper OVA022Y open Bypass Isol damper OVA020Y closed or Fan OVA03CB-running Flow cont damper OVA023Y open Bypass Isol damper OVA436Y closed</p>

Event No.: _5_		
Event Description: <u>LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open</u>		
Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	<p>Plenum B Fan OVA03CC-running Flow cont damper OVA024Y open Bypass Isol damper OVA021Y closed or Fan OVA03CD-running Flow cont damper OVA025Y open Bypass Isol damper OVA437Y closed</p> <p>Plenum C Fan OVA03CE-running Flow cont damper OVA067Y open Bypass Isol damper OVA052Y closed or Fan OVA03CF-running Flow cont damper OVA072Y open Bypass Isol damper OVA438Y closed</p> <p>Verify FHB ventilation aligned for emergency operation: FHB charcoal absorbers-1 train aligned</p> <p>Train A Fan OVA04CA-running Inlet Isol damper OVA04CA open Flow cont damper OVA057Y open Bypass Isol damper OVA051Y closed or Train B Fan OVA04CB-running Inlet Isol damper OVA055Y open Flow cont damper OVA062Y open Bypass Isol damper OVA435Y closed</p>

Event No.: _5_		
Event Description: <u>LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open</u>		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Check PZR spray and PORV's: PZR spray valves closed 1RY455B, 1RY455C PORV's closed 1RY455A, 1RY456</p> <p>Maintain RCS temp control: RCPs running RCS average temps -stable at or trending to 557F If lower than 557F; Stop dumping steam and isolate cooldown If higher than 557F Dump steam by steam dumps if available or PORV's</p> <p>Check status of RCP: RCP's are on</p>
	BOP	<p>Check S/G pressure boundaries: All S/G pressure stable</p> <p>Check if S/G tubes intact: All secondary rad monitors < Alert setpoint SJAЕ exhaust gas S/G blowdown liquid Main Steamline</p>
	RO	<p>Check if RCS is intact: Diagnose LOCA CNMT are rad monitors (grid 4) < Alert alarm CNMT pressure < 3.4 psig CNMT sump level lights - NOT LIT</p> <p>Check if ECCS flow should be terminated: RCS subcooling acceptable-ICONIC Display or Att A Secondary heat sink-AFW flow > 500 gpm or S/G NR level > 10% RCS pressure decreasing PZR level < 4%</p>
	SRO	Direct initiation of Critical Safety Function Status Trees.

Event No.: _5_		
Event Description: <u>LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open</u>		
Time	Position	Applicant's Actions or Behavior
	BOP	Check S/G levels: S/G NR level > 10% Control feed flow to maintain level 10-50% S/G NR level not increasing uncontrolled
	RO	Reset SI: Depress both SI reset pushbuttons Verify SI ACTUATED permissive light-LIT Verify AUTO SI BLOCKED permissive light-LIT
	BOP	Reset CNMT Isolation: Reset CNMT Isol Phase A Reset CNMT Isol Phase B Reset CNMT Vent Isol Check SACs running Open CNMT air valves-11A065,066
	RO	Check if RH pumps should be stopped: RCS pressure > 325 psig RCS pressure and stable Stop RH pumps and place in standby
	BOP	Check Secondary Radiation normal: Chem sample S/G's Secondary Radiation trends normal for plant conditions: S/JAE/Gland Exhaust, S/G blowdown, Main steamline Check AUX Bldg radiation normal: Rad levels are abnormally high
	SRO	Go To 1BCA-1.2 "LOCA OUTSIDE CONTAINMENT" and direct operator actions

Event No.: _5_		
Event Description: <u>LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open</u>		
Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BCA-1.2 "LOCA OUTSIDE CONTAINMENT" and direct operator actions
	RO	<p>Verify proper valve alignment:</p> <p>RCS loop to RH pump suction isol valves closed: 1RH8701A,B ; 1RH8702A,B</p> <p>RH to hot legs isol valve closed: - 1SI8840</p> <p>SI to hot legs isol valves closed: - 1SI8802A,B</p> <p>CNMT Isol Phase A valves closed: Group 3 CNMT Isol monitor lights-LIT</p> <p>Try to identify and isolate break:</p> <p>Reset SI recirc sump isol valves: "IAW 1BOA PRI-5 ATT E" 1SI8811A/1CV8110 1SI8811B/1CV8111</p> <p>Reset SI CENT CHG pump miniflow isol valves: "IAW ATT E" 1CV8114, 1CV8116</p> <p>Verify CENT CHG pump miniflow isol valves open: 1CV8110,8111,8114,8116</p> <p>Energize following valves: 1SI8835, 1SI8809A, 1SI8809B</p> <p>Sequentially close and open valves while monitoring for an RCS pressure increase:</p>

Event No.: _5_		
Event Description: <u>LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open</u>		
Time	Position	Applicant's Actions or Behavior
	RO (Cont)	<p>Cycle RH to cold legs 1A and ID isol valve: 1SI8809A, pressure change maintain closed</p> <p>Break between 1S8948A and 1S8818A valve 1SI8809A isolates</p> <p>Realign or shutdown affected systems as necessary:</p> <p>Check if break is isolated: RCS pressure increasing</p>
	SRO	Go to 1BEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT" and direct operator actions.

Event No.: _5_

Event Description: LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open

Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT" and direct operator actions.
	RO	Check status of RCP's: RCP's running
	BOP	Check S/G pressure boundaries: All S/G pressure stable Check intact S/G levels: NR level > 10% Control feed flow to maintain NR level- 10-50% NR level not increasing in an uncontrolled manner Check secondary radiation: All secondary rad monitors < Alert setpoint S/JAE exhaust gas S/G blowdown liquid Main Steamline
	RO	Check PZR PORV's PORV isol valves Energized-1RY8000A,B PORV's closed 1RY455A, 456 PORV isol valves open (at least 1)-1RY8000A,B Check if ECCS flow should be reduced: RCS subcooling acceptable-ICONIC Display or ATT A Secondary heat sink-S/G NR level > 10%, AFW flow > 500gpm RCS pressure increasing PZR level < 4%
	SRO	Go To 1BEP ES-1.1 "SI TERMINATION"

The scenario can be ended at Chief Examiner's discretion.

Byron June 2000 Examination

Facility-Developed Scenarios

Final, As-Administered

Simulation Facility	BYRON	Scenario No.:	1	Op Test No.:	1
Examiners:	_____	Operators:	_____		<u>SRO</u>
	_____		_____		<u>RO</u>
	_____		_____		<u>BOP</u>

Initial Conditions: IC-18; 75% power MOL, Equil. Xenon, 1B AF pump OOS, 1C HDP OOS, U-2 SAC OOS.
 1AR022J Radiation monitor is in an out of poll status due to a failed circuit card.

Turnover: 50% Power Steady State, Equilibrium Xenon, MOL. The Diesel Driven Aux Feedwater Pump is OOS for replacement of a fuel injector. The pump has been OOS for 6 hours and is expected to be returned to service by the end of the shift. 1C Heater Drain Pump is out of service 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. 1AR022J Radiation monitor is in an out of poll status due to a failed circuit card. Electrical Operations will be requesting a power increase to Full Power later in the shift.

Event No.	Malf. No.	Event Type*	Event Description
Preload			Place Unit 2 SAC, 1C HD pump, 1B AF Pump out of service, and Set the Poll Status on the 1AR022J's to off on the RM11, verify/ select 1LT-558 as controlling channel for 1C SG.
Preload	BAT 1baf-oos	C BOP SRO	1B AF Pump OOS
Preload	RF RP84 RP15D	C RO SRO	1B SI Pump fails to start automatically (mrf RP84 open; imf RP15D)
1	TH03C	C RO BOP SRO	1C SGTL (20 gpm, 50 sec ramp)(SDG TH5)
2		N BOP SRO	Reduce Turbine Load for Plant Shutdown due to SG leakage > T.S.
		R RO	Lower reactor power using rods and/or boration
3	RX06L	I BOP SRO	1LT558 Failed High (MF RX06L 100% 3 sec ramp) (SDG RX19) SEE NEXT MALFUNCTION ALSO. Note 1. S/G 1C
4	RX29C	C BOP SRO	FRV 1FW530 Failed Closed in Automatic (MF RX29C 0, 3 sec ramp) (SDG RX21)
5	ED11A	C RO BOP SRO	Loss of Instrument Bus 111 (MF ED11A) (SDG ED6) SEE NEXT MALFUNCTION ALSO.
6	RX18A	I RO SRO	1A Tcold failed High (MF RX18A 630) (SDG RX2) Note 2
7	TH03C	M RO BOP SRO	1C SGTR (460 gpm) (SDG TH5)
8	Preload	C RO SRO	Manually start an SI pump
9		C RO BOP SRO	Manually Align ECCS for Injection

*(N)ormal, (R)eactivity	(I)nstrument,	(C)omponent,	(M)ajor Transient
NOTE 1:	RP20 RX126 RX013 RX147	Cab. Door #1 P-14 Lo-2 Rx Trip AMS Test Bypass Switch	(MRF RP20 OPEN) (CLOSE) (SDG RX4) LB558B C1-753 BS-1 (MRF RX126 Trip) (SDG RX19) LB558C C1-753 BS-2 (MRF RX073 Trip) (SDG RX19) (MRF RX147 Trip) (SDG RX19)
NOTE 2:	FW45A-D RP20 RX014 RX136 RX013 RX135 RX016 RX015	1AF005 A-D Cab. Door #1 OPΔT Trip OPΔT Runback OTΔT Trip OTΔT Runback Low Tave FW Isol Lo-Lo Tave	IMF FW45A,B,C,D (0) (SDG FW13) (MRF RP20 OPEN) (CLOSE) (SDG RX4) TB411G C1-124 BS-1 (MRF RX014 Trip) (SDG RX4) TB411H C1-124 BS-2 (MRF RX136 Trip) (SDG RX4) TB411C C1-124 BS-3 (MRF RX013 Trip) (SDG RX4) TB411D C1-124 BS-4 (MRF RX135 Trip) (SDG RX4) TB412G C1-121 BS-2 (MRF RX016 Trip) (SDG RX2) TB412D C1-121 BS-1 (MRF RX015 Trip) (SDG RX2)

SCENARIO 1 OVERVIEW

The unit is at 50% power, Equilibrium Xenon, MOL with all applicable control systems in automatic. The Diesel Driven Aux Feedwater Pump is OOS for replacement of a fuel injector. The pump has been OOS for 6 hours and is expected to be returned to service by the end of the shift. 1C Heater Drain Pump is out of service 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. 1AR022J Radiation monitor is in an out of poll status due to a failed circuit card. Electrical Operations will be requesting a power increase to Full Power later in the shift.

One minute into the scenario, a 20 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 and increased charging flow requirements, and primary to secondary leakage based on abnormal off gas and only one train of main steam line radiation. The crew should implement OA SEC-8 "Steam Generator Tube Leak". A unit shutdown will be commenced in accordance with OA SEC-8 step 10 and TS. 3.4.13, Operational Leakage.

After an adequate power change is viewed, 1C Steam Generator Level Channel 1LT-558 will fail high causing 1FW530 to close. This failure will also cause a failure of the Automatic Feed Control of the 1FW530 requiring manual feedwater control. The BOP should take manual control of the 1C FRV and restore feed flow to normal. The US will enter OA INST-2 and take actions for the failed channel. When the US directs the BOP to establish automatic FRV control, the BOP should identify the failure of the FRV in automatic and establish normal steam generator level in manual control.

After actions are complete for the level channel failure, a simultaneous failure of Instrument Bus 111 and 1A Tcold instrument will occur. The US will enter OA ELEC-2 and stabilize plant conditions. The crew should identify the failed instrument and defeat loop 1A Tave and ΔT channels. An instrument bus fault will prevent energizing the bus requiring a plant shutdown to hot standby within the next 8 hours. Technical Specifications 3.3.1 and 3.8.9 apply. The crew should take actions to identify failed equipment. OA INST-1 and INST-2 should be entered and bistables tripped for the failed instrument channels.

When actions are complete for the instrument bus and Tave failures, the 1C Steam Generator tube leak will increase to 460 gpm requiring a reactor trip and safety injection. The crew will enter EP-0 and manually align A train of ECCS. The crew will take actions to manually start 1A and 1B SI pumps.

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

Completion criteria is performance of EP-3 through ECCS termination, step 21.

Critical Tasks

1. E-0 — J: Establish flow from at least one intermediate-head ECCS pump before transition out of E-0.
2. E-3 — A: Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.
3. E-3 — B: Establish/maintain RCS temperature so that transition from E-3 does not occur because the 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 or severe challenge to the subcriticality and/or the integrity CSF.
4. E-3 — C: Depressurize RCS to meet SI termination criteria before water enters the steamlines.

Scenario No: 1		Event No. 1
Event Description: SG Tube Leak in 1C SG		
Time	Position	Applicant's Actions or Behavior
	CUE:	Secondary radiation monitors alarming Annunciator (1-9-D3) "CHG LINE FLOW HIGH/LOW" PZR level decreasing
	US	Implement OA SEC-8 "STEAM GENERATOR TUBE LEAK" and direct operator action.
	RO	<ul style="list-style-type: none"> Attempt to maintain PZR level <ul style="list-style-type: none"> Throttle Charging header valves to maintain PZR level <ul style="list-style-type: none"> CV121 CV182 Check PZR level stable or increasing <ul style="list-style-type: none"> If not, establish 75 gpm letdown flow
	RO	<ul style="list-style-type: none"> Monitor VCT level
	BOP	<ul style="list-style-type: none"> Minimize secondary contamination Perform BOP MS-11 (DIRECT WEC) Notify Rad Protection Monitor secondary systems Monitor condensate polisher area Monitor area radiation in aux and turbine bldgs Initiate OBR SR 11.i.1-1, Gaseous Radwaste Treatment Effluents Dose Calculations Monthly

Comments: _____

Scenario No: 1		Event No. 1
Event Description: SG Tube Leak in 1C SG		
Time	Position CREW	Applicant's Actions or Behavior <ul style="list-style-type: none"> Identify leaking SG <ul style="list-style-type: none"> Increasing trend on any Main Steamline Rad Monitor (1AR022J is not available.) 1C SG RT-AR023 Grid 1 4AC323 High activity sample Decreasing feed flow with stable level Unexpected rise in SG NR level Identify/report 1C SG as leaking (RATE IS INCREASING 30 GPD/HR)
	CREW	<ul style="list-style-type: none"> Determine leak rate > 10 gpm (22)
	US	<ul style="list-style-type: none"> Initiate Power reduction/Unit shutdown <ul style="list-style-type: none"> Review Technical Specifications <ul style="list-style-type: none"> 3.4.13 RCS leakage - > 150 gpd - ACTION reduce leakage with 4 hours or be in MODE 3 in 6 hours Shutdown Unit within 6 hours
	US	Inform SM of SG Tube Leak, and planned shutdown
	US	Inform SM of unit status/potential GSEP event.

Comments: _____

Scenario No: 1		Event No. 2
Event Description: Plant Shutdown due to excessive SG leakage		
Time	Position	Applicant's Actions or Behavior
	CUE:	As a result of the excessive Steam Generator tube leak, procedure dictates a power reduction to Hot Shutdown within 6 hours.
	US	Implement actions of GP 100-4:
	US	<ul style="list-style-type: none"> • Direct load reduction to MODE 3
	CREW	Review applicable Precautions, and Limitations and Actions.
	RO	<p>Verify rod position and boron concentration.</p> <p>Initiate boration, if required to maintain ΔI within target band. (OP CV-6)</p> <ul style="list-style-type: none"> • Determine required boric acid volume and 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 & BA transfer pump (CV110B open, BA pump is running, CV110A throttles open) • Verify BA flow on recorder • When desired amount of boric acid added, Verify/ Stop MU System <ul style="list-style-type: none"> o Flush BA line. o Restore Reactor Makeup Control System to Automatic (May occur after numerous batch additions)

Comments: _____

Scenario No: 1		Event No. 2
Event Description: Plant Shutdown due to excessive SG 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 580 MW When ready to begin load reduction, depress GO Verify load decreases.
	RO/BO P	Monitor power/load decrease: <ul style="list-style-type: none"> Monitor reactor power, Tave, ΔI Verify rods move in AUTO to maintain Tave and Tref.
	RO	If borating: <ul style="list-style-type: none"> Monitor VCT level Verify RCS boron concentration increasing Monitor BA Blender counter Verify boration auto stops at preset value. Return Reactor Makeup System to blended flow at current Boron concentration.

Comments: _____

Scenario No: 1		Event No. 3 and 4
Event Description: 1C SG Controlling SG Level Transmitter 1LT558 fails closed with failure of FWRV-530 closed in automatic.		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciator (1-15-B8) "S/G 1B LVL HI-2 TURB TRIP P-14 ALERT" Annunciator (1-15-B9) "S/G 1B LVL DEVIATION HIGH LOW" FRV FW530 closed 1LT-558 meter pegged high Feedwater flow < Steam flow
	US	Implement OA INST-2 "OPERATION WITH A FAILED INSTRUMENT" Att. E and direct recovery actions.
	BOP	Stabilize S/G 1C level. <ul style="list-style-type: none"> • If S/G level abnormal, control FRV-530 in manual • Select an operable level channel • Identifies failure of FRV in automatic
	BOP	Dispatch operator and trip Bistables for 1LT-558 (B,C) <ul style="list-style-type: none"> • P-14 • Lo Lo Lvl Rx Trip and Aux Feedpump Start • Place AMS System in TEST
	US	Review Tech Specs <ul style="list-style-type: none"> • 3.3.1 Reactor Trip System Instrumentation, • 3.3.2 ESF Actuation Sys Inst • 3.3.3 Post Accident Monitoring Inst. • Determine required action: Bistables tripped w/i 6 hrs
	US	Inform SM of unit status/potential GSEP event.

Comments: _____

Scenario No: 1		Event No. 5 and 6
Event Description: Loss of Instrument Bus 111 (Loss of Train A ESF Actuation) with 1A Tcold failure		
Time	Position	Applicant's Actions or Behavior
	CUE	Loss of Control and Instrument Power to N31, Source Range Instrument, N35, Intermediate Range Instrument, and N41, Power Range Instrument Annunciator (1-4-A5) "BUS 111 INVERTER TROUBLE" Annunciator (1-4-C2) "SEQUENCING CAB PWR FAILURE"
	US	Implement OA ELEC-2 "LOSS OF INSTRUMENT BUS"
	RO	<ul style="list-style-type: none"> • Verify Turbine Power Stable • Place Rods in Manual
	RO/BO P	Instrument Control Channels checked for operability: <ul style="list-style-type: none"> o PZR Pressure & Level • T_{ave} & ΔT - 1A T_{ave}/ΔT failed <ul style="list-style-type: none"> • Defeat Loop 1 T_{ave} & ΔT • ΔT RECORDER o P_{imp} o S/G Level (1LT558 previously failed) <ul style="list-style-type: none"> o Steam Flow & Feedwater Flow
	CREW	Attempt to locally energize Instrument Bus 111 from CVT
	CREW	<ul style="list-style-type: none"> o Dispatch operator to locally fail open AF005A-D o Station operator at AF005A-D or Remote Shutdown Panel to control AF flow if needed
	US	Brief crew on effects of Loss of Bus 111 per Table A <ul style="list-style-type: none"> • Train A ESF Equipment MANUAL Start Requirements • Manual Makeup required to the VCT

Comments: _____

Scenario No: 1		Event No. 5 and 6
Event Description: Loss of Instrument Bus 111 (Loss of Train A ESF Actuation) with 1A Tcold failure		
Time	Position	Applicant's Actions or Behavior
	US	Inform SM of unit status/loss of bus 111/GSEP potential/Shutdown required by Tech Specs
	US	Review Tech Spec 3.8.9 "Distribution Systems - Operating". (Restore power to bus 111 within 2 hours or be in hot standby in next 6 hours.)
	CREW	Dispatch operators to investigate status of bus
	US	Implement OA INST-1 Att A, "NUCLEAR INSTRUMENT MALFUNCTION".
	RO	Control rods placed in manual
	RO/BO P	Plant conditions stabilized <ul style="list-style-type: none"> • Rod stop bypassed • T_{ave} restored to T_{ref} (± 1 degree) <ul style="list-style-type: none"> o SG levels stable
	BOP	Bypass associated functions for N-41 <ul style="list-style-type: none"> • Upper current comparator • Lower current comparator • Power Mismatch <ul style="list-style-type: none"> o Rod Stop • Channel current comparator
	RO/BO P	Bistables for N-41 tripped <ul style="list-style-type: none"> • Pull control power fuses to trip: <ul style="list-style-type: none"> • Low Rx trip • High Rx trip • Positive Rate and Negative Rate trip • Dispatch operator to locally trip: <ul style="list-style-type: none"> • OTAT trip and runback
	RO	Select operable channels to recorder (if necessary)
	RO	Automatic rod control not restored (Does Not Restore Automatic Rod Control until after steps are taken for the failed Tave Channel) NOTE: CAN ELIMINATE STEPS

Comments: _____

Scenario No: 1		Event No. 5 and 6
Event Description: Loss of Instrument Bus 111 (Loss of Train A ESF Actuation) with 1A Tcold failure		
Time	Position	Applicant's Actions or Behavior
	US	Review Tech Specs 3.3.1 and 3.2.4 RTS Instrumentation and QPTR. Trip bistables within next 6 hours.
	US	Informs SM of unit status/potential GSEP event
	US	Implement OA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL" Attachment A
	RO	Verify Control Rods in Manual
	RO	Verify Loop A RTD Channel Manually defeated <ul style="list-style-type: none"> • T_{ave} Defeat Switch to Loop 1A • Delta T Defeat Switch to Loop 1A Verify an Operable T _{ave} Channel is selected to the ΔT
	RO/BO P	Place Rod control in Automatic by: (No outward rod motion in auto due to INST 111 failure) <ul style="list-style-type: none"> ▪ Check C-5 NOT LIT ▪ Check T_{ave} - T_{ref} Deviation stable and within 1°F ▪ Place rod control in Auto if desired
	RO	Check PZR Level stable
	RO	Operator dispatched to trip Bistables for Loop 1A RTD Channel <ul style="list-style-type: none"> • OPΔT Trip • OPΔT Runback o OTΔT Trip o OTΔT Runback • Low T_{ave} • Low-2 T_{ave}
	RO	P-12 Interlock checked – P-12 Not Lit
	US	Review Tech Specs 3.3.1 and 3.2.2 RTS Instrumentation and ESFAS Instrumentation. Trip bistables within next 6 hours.
	US	Contact SM/maintenance to investigate/correct failure of Bus 111 and Loop 1A T _{ave}

Comments: _____

Scenario No: 1		Event No. 7, 8 and 9
Event Description: 1C SGTR with 1B SI pump failure to auto-start and ECCS components required to be manually aligned.		
Time	Position	Applicant's Actions or Behavior
	CUE	Pzr Level/Pressure decreasing Annunciator (1-11-A1) "MANUAL RX TRIP" Annunciator (1-11-B1) "MANUAL SI/RX TRIP"
	US	Implement EP-0 "REACTOR TRIP OR SI"
	RO	Perform immediate operator actions of BwEP-0: Verify reactor trip <ul style="list-style-type: none"> Rod bottom lights LIT Reactor trip & Bypass breakers open Neutron flux lowering
	BOP	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 energized Bus 142 energized
	CREW	Determine SI needed/actuated <ul style="list-style-type: none"> If 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 actuated (SI pumps running, CV Cold leg injection SI8801A/B open) If SI NOT actuated <ul style="list-style-type: none"> Check <ul style="list-style-type: none"> PZR pressure <1829 psig Steamline pressure <460 psig CNMT pressure > 3.4 psig PZR level CANNOT be maintained > 4% Manually actuate SI
	CREW	Manually align Train A ECCS components as necessary (Train A fails to actuate due to Instrument Bus 111 loss.)

Comments: _____

Scenario No: 1		Event No. 7, 8 and 9
Event Description: 1C SGTR with 1B SI pump failure to auto-start and ECCS components required to be manually aligned.		
Time	Position	Applicant's Actions or Behavior
	BOP/US	<ul style="list-style-type: none"> • Verify FW isolated • Check FW pumps tripped • Check isolation monitor lights lit
	BOP/US	Identify/report FWI indications for all Steam Generators <ul style="list-style-type: none"> • Verify all FWIVs closed for ALL SGs • Check FW pumps disch valves closed (FW002A-C)
	RO/US [CT] EP-0-I	<ul style="list-style-type: none"> • Verify ECCS pumps running • CENT Chg pumps running • RH pumps – manually start 1A RH pump Identify/report failure of SI Pumps: 1A and 1B failed to start (on SI) <ul style="list-style-type: none"> • Manually start SI pump 1A (C/S to START) • Manually start SI pump 1B (C/S to START)
	RO/US	Verify RCFCs running in ACCIDENT MODE <ul style="list-style-type: none"> ▪ Stop 1A and 1C RCFCs running in High speed ▪ Close 1SX112A and 1SX114A ▪ Open 1SX147A ▪ Start 1A and 1C RCFCs in low speed

Comments: _____

Scenario No: 1		Event No. 7, 8 and 9
Event Description: 1C SGTR with 1B SI pump failure to auto-start and ECCS components required to be manually aligned.		
Time	Position	Applicant's Actions or Behavior
	BOP/US	<ul style="list-style-type: none"> • Verify Phase A isolation - Group 3 Monitor lights lit • Manually Align Valves as necessary • Verify CNMT Ventilation isolation - Group 6 Monitor lights lit
	BOP/US	<ul style="list-style-type: none"> • Verify AF system: (1A AF pump may have auto-started on an AMS actuation signal) <ul style="list-style-type: none"> • NO AF pumps running - Manually Start 1A AF Pump • AF isolation valves open (AF13A-H) • AF flow control valves throttled (AF005A-H) (A train valves may have been opened previously) <ul style="list-style-type: none"> ▪ Dispatch operator to open 1AF005A, B, & D locally or at Remote Shutdown Panel ▪ CAN THROTTLE WITH 13'S • Verify CC Pumps running • Verify SX Pumps running
	BOP/US	<ul style="list-style-type: none"> • Check Main Steamline Isolation <ul style="list-style-type: none"> • Check SG pressure > 640 psig • Check CNMT pressure < 8.2

Comments: _____

Scenario No: 1		Event No. 7, 8 and 9
Event Description: 1C SGTR with 1B SI pump failure to auto-start and ECCS components required to be manually aligned.		
Time	Position	Applicant's Actions or Behavior
	BOP/US	<ul style="list-style-type: none"> • Check if CNMT Spray is required <ul style="list-style-type: none"> • CNMT pressure > 20 psig • Determine/report CNMT Spray NOT required
	BOP/US	<ul style="list-style-type: none"> • Verify AF flows <ul style="list-style-type: none"> • AF flow > 500 gpm • Check SG levels > 10% • If level is NOT > 10% in any SG (i.e. $\leq 10\%$ in ALL SGs), maintain feed flow > 500 gpm total until NR level > 10% in at least ONE SG. • Control feed flow to maintain NR level between 10% and 50% • Check NR levels NOT increasing in an uncontrolled manner <ul style="list-style-type: none"> • Close AF013C&G to isolate 1C SG
	RO/US	<ul style="list-style-type: none"> • Verify ECCS valve alignment & flows <ul style="list-style-type: none"> • Group 2 CL Inj monitor lights lit – manually align valves as necessary • HHSI flow > 50 gpm • SI flow > 100 gpm (if RCS pressure < 1625 psig)
	RO/US	<ul style="list-style-type: none"> • Check at least ONE PZR PORV relief path available: <ul style="list-style-type: none"> • At least ONE PORV Isol valve energized. • PORV in AUTO • Associated Isol valve open

Comments: _____

Scenario No: 1		Event No. 7, 8 and 9
Event Description: 1C SGTR with 1B SI pump failure to auto-start and ECCS components required to be manually aligned.		
Time	Position	Applicant's Actions or Behavior
	BOP/US	<ul style="list-style-type: none"> • Verify generator trip <ul style="list-style-type: none"> • OCB 3-4 and 4-5 open • PMG output breaker open • Verify DGs running <ul style="list-style-type: none"> • Manually start 1A DG • DG SX valves 1SX169A and 1SX169B open • Dispatch operator to locally check DGs • Ventilation systems aligned for emergency <ul style="list-style-type: none"> • Control Room <ul style="list-style-type: none"> • Manually start OA Makeup Fan • Align OA Charcoal Absorber • Control Room dP on 0PDI-VC038 > +0.125" H2O • Aux Bldg • Fuel Handling Bldg
	RO/US	<ul style="list-style-type: none"> • Check PZR sprays & PORVs closed • RCS temperature control <ul style="list-style-type: none"> • Check RCP status – any running OR none running • Check RCS CL temps trending to or stable at 557°F
	RO/US	<ul style="list-style-type: none"> • Check RCP status: • If any RCP running and RCS pressure < 1425 psig AND HHSI flow > 50 gpm OR SI flow > 100 gpm <ul style="list-style-type: none"> • RCPs remain running

Comments: _____

Scenario No: 1		Event No. 7, 8 and 9
Event Description: 1C SGTR with 1B SI pump failure to auto-start and ECCS components required to be manually aligned.		
Time	Position	Applicant's Actions or Behavior
	BOP/US	<ul style="list-style-type: none"> Check SG secondary boundary Identify/report NO SGs pressures decreasing in an uncontrolled manner or completely depressurized.
	BOP	<ul style="list-style-type: none"> Check Steam Generator Tubes Intact Identify 1C SG as ruptured
	US	Transition to EP-3 "STEAM GENERATOR TUBE RUPTURE"
	US	Direct actions of EP-3
	RO	<ul style="list-style-type: none"> Check status of RCPs <ul style="list-style-type: none"> HHSI flow >50 gpm IHSI flow > 100 gpm RCS pressure < 1425 psig
	CREW	<ul style="list-style-type: none"> Identify ruptured SG <ul style="list-style-type: none"> Unexpected rise in level Main Steamline Radiation Monitor (1AR022J is out of poll) 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 1C SG as ruptured

Comments: _____

Scenario No: 1		Event No. 7, 8 and 9
Event Description: 1C SGTR with 1B SI pump failure to auto-start and ECCS components required to be manually aligned.		
Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> Isolate flow from ruptured SG <ul style="list-style-type: none"> SG PORV MS018C in AUTO Check SG PORV MS018C closed
	BOP [CT] E-3--A	<ul style="list-style-type: none"> Verify SG blowdown valves closed unless open for sampling <ul style="list-style-type: none"> SD002G SD002H Close MSIV and MSIV bypass valves for 1C SG
	BOP	<ul style="list-style-type: none"> Check PORVs on 1A, 1B & 1D SGs available for cooldown
	BOP	<ul style="list-style-type: none"> Check ruptured SG level <ul style="list-style-type: none"> If < 10%, <ul style="list-style-type: none"> Initiate Aux feed flow until NR level is >10%, then Verify AF valves closed on SG 1C
	BOP	<ul style="list-style-type: none"> Check 1C SG pressure >320 psig

Comments: _____

Scenario No: 1		Event No. 7, 8 and 9
Event Description: 1C SGTR with 1B SI pump failure to auto-start and ECCS components required to be manually aligned.		
Time	Position	Applicant's Actions or Behavior
	CREW [CT] E-3--B	<ul style="list-style-type: none"> Initiate RCS cooldown <ul style="list-style-type: none"> Determine target temperature based on 1C SG pressure (Normal CNMT) <ul style="list-style-type: none"> Check PZR pressure < 1930 psig <ul style="list-style-type: none"> If so, block Steamline SI Dump steam from intact SGs at maximum rate <ul style="list-style-type: none"> Steam dumps in STEAM PRESSURE Mode If steam dumps NOT available, SG PORVs Check average CETC temperatures < value determined above Stop RCS Cooldown Maintain CETC -<than value determined above.
	BOP	<ul style="list-style-type: none"> Check SG secondary boundaries intact Check intact SG levels <ul style="list-style-type: none"> NR level >10% Maintain level between 18% and 50%
	RO	<ul style="list-style-type: none"> Check PZR PORVs <ul style="list-style-type: none"> PORVs available PORVs closed <ul style="list-style-type: none"> RY455A RY456 At least ONE PORV Block valve OPEN <ul style="list-style-type: none"> RY8000A RY8000B

Comments: _____

Scenario No: 1		Event No. 7, 8 and 9
Event Description: 1C SGTR with 1B SI pump failure to auto-start and ECCS components required to be manually aligned.		
Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> Reset SI Reset CNMT isolation <ul style="list-style-type: none"> ϕA ϕB Restore IA to containment
	BOP	<ul style="list-style-type: none"> Verify all AC buses powered from offsite
	RO	<ul style="list-style-type: none"> Check if RH stopped <ul style="list-style-type: none"> RCS pressure >350 psig Stop RH pumps and place in standby
	CREW	<ul style="list-style-type: none"> Check ruptured SG pressure – STABLE OR INCREASING
	CREW	<ul style="list-style-type: none"> Check RCS subcooling acceptable

Comments: _____

Scenario No: 1		Event No. 7, 8 and 9
Event Description: 1C SGTR with 1B SI pump failure to auto-start and ECCS components required to be manually aligned.		
Time	Position	Applicant's Actions or Behavior
	RO [CT] E-3--C	<ul style="list-style-type: none"> Depressurize RCS <ul style="list-style-type: none"> Use PZR sprays <ul style="list-style-type: none"> Spray at maximum rate until ONE of the following met <ul style="list-style-type: none"> BOTH <ul style="list-style-type: none"> RCS pressure < 1C SG pressure PZR level > 4% PZR level > 76% RCS subcooling NOT acceptable Close spray valves If sprays are not available, use one PZR PORV <ul style="list-style-type: none"> Open one PZR PORV until ONE of the following met <ul style="list-style-type: none"> BOTH <ul style="list-style-type: none"> RCS pressure < 1C SG pressure PZR level > 4% PZR level > 76% RCS subcooling NOT acceptable Close PORVs Close spray valves Check RCS pressure rising
	CREW	<ul style="list-style-type: none"> Check if ECCS flow should be terminated <ul style="list-style-type: none"> Subcooling acceptable Secondary heat sink acceptable RCS pressure stable or increasing PZR level > 4%
	CREW	<ul style="list-style-type: none"> Stop ECCS Pumps and place in standby <ul style="list-style-type: none"> 1A and 1B SI Pumps 1A or 1B CV pump

Comments: _____

Scenario No: 1		Event No. 7, 8 and 9
Event Description: 1C SGTR with 1B SI pump failure to auto-start and ECCS components required to be manually aligned.		
Time	Position	Applicant's Actions or Behavior
	CREW	<ul style="list-style-type: none"> ▪ Terminate High Head ECCS <ul style="list-style-type: none"> ▪ Check CV Pump suction aligned to RWST ▪ Reset/ realign CV miniflow ▪ Close 1SI8801A and 1SI8801B
		NOTE: Scenario may be terminated at this point

Comments: _____

Simulation Facility <u>BYRON</u>	Scenario No.: <u>2</u>	Op Test No.: <u>1</u>
Examiners: _____	Operators: _____	<u>SRO</u>
_____	_____	<u>RO</u>
_____	_____	<u>BOP</u>

Initial Conditions: IC-21, Reactor Power 100%, BOL, Equil. Xenon, 1B AF pump OOS, 1C HDP OOS, U-2 SAC OOS.
1AR022J Radiation monitor is in an out of poll status due to a failed circuit card.

Turnover: Reactor power is 100%. The Diesel Driven Aux Feedwater Pump is OOS for replacement of a fuel injector. The pump has been OOS for 6 hours and is expected to be returned to service by the end of the shift. 1C Heater Drain Pump is out of service 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. 1AR022J Radiation monitor is in an out of poll status due to a failed circuit card. Electrical Operations has ordered Byron Unit 1 to lower power at 5 Mw/min after shift turnover to 900Mw.

Event No.	Malf. No.	Event Type*	Event Description
Preload			Place Unit 2 SAC, 1C HD pump, 1B AF Pump out of service, and Set the Poll Status on the 1AR022J's to off on the RM11.
Preload	BAT 1baf-oos	C BOP SRO	1B AF Pump OOS
Preload	FW43		1A AFW Pump fails to start
Preload	MRF RP34 OUT RP35 OUT RP60 OUT RP61 OUT		Failure of MSIV automatic closure signal
Preload	MS01A, 100		1A MSIV Fails to Close
1		R RO	Lower reactor power using rods and/or boration
		N BOP SRO	Set and lower turbine load at 5 Mw/min to 900Mw
2	CC02B, 134 CC01B	C BOP SRO	1A CC Pump trips coincident with 1B CC Pump discharge pressure switch failing as-is.
3	RX10A,0,20	I RO SRO	Impulse Pressure Channel PT-505 fails downscale on a 20 second ramp. NOTE 1
4	RX05, 0	I BOP SRO	Steam Header Pressure Detector PT-507 fails low
5	MS09,4.0 MLB/H	M RO SRO BOP	Main Steam Header Break with failure of MSIV auto closure
6	(MS01A)	C RO SRO BOP	1A Steam Generator MSIV failure to close both automatic and manual
7	(FW43)	M RO SRO BOP	1A MD AFW pump trip results in loss of feed.
8	TH11B, 100	C RO SRO	Pzr PORV 456 fails open (insert when pressure rises to setpoint)

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

NOTE 1: RP20 RX143 RX149 SE:PN0470	Cab. Door #1 PB505A Operating Bypass to Test-Trip AMS in Test	(MRF RP20 OPEN) (CLOSE) (SDG RX11) (MRF RX143 Trip) (SDG RX11) (MRF RX149 Trip) (SDG RX11) (IOR SE:PN0470 ON)
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SCENARIO 2 OVERVIEW

Reactor power is 100%, Equilibrium Xenon, BOL, with all applicable control systems in automatic. The Diesel Driven Aux Feedwater Pump is OOS for replacement of a fuel injector. The pump has been OOS for 6 hours and is expected to be returned to service by the end of the shift. 1C Heater Drain Pump is out of service 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. 1AR022J Radiation monitor is in an out of poll status due to a failed circuit card. Electrical Operations has ordered Byron Unit 1 to lower power at 5 Mw/min after shift turnover to 900Mw.

After an adequate power change is viewed, the 1A CC Pump will trip and the standby 1B CC Pump will NOT auto start due to failure of the associated discharge pressure instrument. BOA PRI-6 will be entered and the operator will be required to recognize failure of auto start of the standby pump, diagnose failed pressure instrument and start the 1B CC Pump. The SRO will address Technical Specification 3.7.7, Condition B.

Shortly after the manual start of the standby CC pump, impulse pressure channel PT-505 will fail downscale on a 20 second ramp. BOA INST-2, ATTACHMENT D will be entered. Bistables will be tripped and Technical Specifications addressed.

Following Technical Specification actions, steam header pressure transmitter PT-507 will fail downscale causing feedwater pumps to go to minimum flow. Manual control will have to be taken of the feedpump speed controller to restore normal feed flow (FW header pressure).

After actions are complete for the PT-507 failure, a Main Steam header break occurs at the steam header crosstie with a failure of the Steamline Isolation automatic closure signal and a failure of the 1A MSIV to close. The 1A AFW pump will trip on overcurrent. Feed flow is lost to the SGs. BFR-H.1 will be entered and an alternate method of feedwater will be required. With 1A steam generator being faulted, the actions of BEP-2 will be required following transition from BFR-H.1. One Pzr PORV will fail open requiring the operator to close its associated Block valve to isolate the leak path to the PRT. The scenario ends following transition to BEP-1 after isolating the faulted SG in BEP-2.

ERG-Based Critical Tasks

1. EP-0 – P: Manually actuate main steamline isolation before a severe challenge develops to either the Subcriticality or the Integrity CSF OR before transition to BCA-2.1, whichever occurs first.
2. EP-2 – A: Isolate the faulted SG before transition out of EP-2.
3. FR-H.1 – A: Establish feedwater flow into at least one SG before RCS bleed and feed is required.

Scenario No: 2		Event No. 1
Event Description: Normal power decrease to 900 Mw at 5 MW/min		
Time	Position	Applicant's Actions or Behavior
	US	Implement actions of 1BGP 100-4, Step F.1: <ul style="list-style-type: none"> Implement flowpath 1BGP 100-4T1, Power Descension Flowchart. or Load Swing Instruction Sheet
	US	Direct decrease from 100% power to 900 Mw at 5 Mw/minute.
	CREW	Review applicable Precautions, and Limitations and Actions.
	BOP	Initiate turbine load decrease to 900 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 900 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

Comments: _____

Scenario No: 2		Event No. 1
Event Description: Normal power decrease to 900 Mw at 5 MW/min		
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> 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.
	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.

Comments: _____

Scenario No: 2		Event No. 2
Event Description: The 1A CC Pump trips. Normally the standby pump (1B CC Pp) would start on low CC header discharge pressure; however, the 1B CC Pump discharge header pressure instrument fails as-is.		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators (1-2-A4) CC PUMP TRIP (1-2-B5) CC PUMP DSCH PRESS LOW May also receive associated CC low flow alarms for cooled equipment <ul style="list-style-type: none"> 1PI-CC107 indicates LOW
	US/BOP	Identify/report trip of CC Pump 1A. Identify/report failure of 1B CC Pump to start on low header pressure.
	US	Implement BOA PRI-6 "Component Cooling Malfunction" and direct operator action.
	BOP/US	Perform actions of BOA PRI-6 as directed: <ul style="list-style-type: none"> Check CC Surge Tank level > 13% and stable Check CC Pumps and manually start standby CC Pump (1B) Check CC system pressure > 85 psig. Check CC HX outlet temperatures < 105°F Check CC flow to RCP cooling. The following alarms NOT lit: <ul style="list-style-type: none"> RCP __ THERM BARR CC WTR FLOW LOW (1-7-_4) RCP __ BRNG CC WTR FLOW LOW (1-7-_5) RCP THERM BARR CC WTR TEMP HIGH (1-7-E3) RCP THERM BARR CC WTR FLOW HIGH LOW (1-7-E4) RCP BRNG CC WTR TEMP HIGH (1-7-E5) Check letdown temperatures. LTDWN HX OUTLET TEMP HIGH (1-8-C5) & LTDWN TEMP HIGH (1-9-E2) alarms NOT lit. Check CC Surge Tank level between 50% and 65% <p>(NOTE: The crew may place the "0" CC pump in AFTER TRIP with the "1A" CC pump in PTL.)</p>

Comments: _____

Scenario No: 2		Event No. 2
Event Description: The 1A CC Pump trips. Normally the standby pump (1B CC Pp) would start on low CC header discharge pressure; however, the 1B CC Pump discharge header pressure instrument fails as-is.		
Time	Position	Applicant's Actions or Behavior
	US	Check Technical Specifications: <ul style="list-style-type: none"> 3.7.7 <ul style="list-style-type: none"> CONDITION B - Restore required CC Pump to OPERABLE status within 7 days.
	US	Inform SM/Maint of trip of 1A CC Pump Inform SM/Maint of failure of 1B CC Pump to auto start.
	US	Inform SM of unit status.

Comments: _____

Scenario No: 2		Event No. 3
Event Description: Turbine Impulse Pressure Channel, 1PT-505, Failed Low		
Time	Position	Applicant's Actions or Behavior
	CUES:	Annunciator 1-14-D1 Tave Cont DevHigh Bypass Permissive Alarms 1-BP-5.7 Turb Low Power Intlk C-5 1-BP-5.8 AMS Permissive C-20 Abnormally fast rod insertion on load decrease PT-505 meter indication decreasing < PT-506
	RO	<ul style="list-style-type: none"> Notes rods stepping in with stable turbine load, places rods in manual. Identifies 1PT-505 failed low.
	US	Implement BOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL" Attachment D and direct operator actions
	RO	Verify Rod control in manual
	CREW	Restore Steam Dumps <ul style="list-style-type: none"> Check Loss of Turbine Load INTLK C7 Not Lit Place MS header pressure controller in MANUAL and reduce demand to "0" Place steam dump MODE SELECT switch in STM PRESS mode Place MS header pressure controller in AUTO
	RO/BOP	Select failed channel 1PT-505 on TURBINE IMPULSE PRESSURE DEFEAT switch.
	RO	Restore T_{ave} - Tref deviation within 1°F by: <ul style="list-style-type: none"> o Adjusting Rods o Adjusting Turbine Load o Adjusting RCS Boron Concentration
	RO	Verify turbine power > 10% Coordinate with field operator and trip bistable PB505A

Comments: _____

Scenario No: 2		Event No. 3
Event Description: Turbine Impulse Pressure Channel, 1PT-505, Failed Low		
Time	Position	Applicant's Actions or Behavior
	RO	Check if rod control can be placed in AUTO <ul style="list-style-type: none"> • C5 Turbine Low Power Intlk NOT LIT • T_{ave} - T_{ref} deviation stable and within 1°F • Place ROD BANK SELECT switch in AUTO
	CREW	Locally place AMS System in bypass condition <ul style="list-style-type: none"> • Locally check OPERATING BYPASS switch (S12) in OFF • For 1PT-505 place OPERATING BYPASS switch (S12) in TIP 1 position • For 1PT-505 place OPERATING BYPASS TEST INPUT (SW11) to TEST-TRIP
	RO	Check P-13 LOW TURB IMP PRESS PERMISSIVE window NOT LIT
	US	Review Technical Specification 3.3.1 (trip bistable within 6 hours)
	US	Inform SM/Maint of PT-505 failure.
	US	Inform SM of unit status/potential GSEP event.

Comments: _____

Scenario No: 2		Event No. 4
Event Description: Steamline pressure sensor PT-MS507 fails LOW causing FW Pump speeds to decrease. Manual control of FW Pump master controller is expected. Steam Dumps are affected in STM PRESS Mode; the dumps will NOT open in AUTO since measured pressure is ZERO.		
Time	Position	Applicant's Actions or Behavior
	CUE	<p>Annunciator (1-15-A9/B9/C9/D9) S/G 1_ LEVEL DEVIATION HIGH LOW (1-15-A3/B3/C3/D3) S/G 1_ FLOW MISMATCH STM FLOW LOW</p> <p>PI-507 indication at bottom of scale PI-507 computer input low Decreasing SG levels Decreasing feedwater flow FW pump(s) decrease speed</p>
	BOP	Identify/report PT-507 failed low
	BOP/US	<p>Response per AR 1-15-A9/B9/C9/D9 and 1-15-A3/B3/C3/D3:</p> <ul style="list-style-type: none"> • Take MAN control of FW Pump speed controller (Feedwater Pumps Master Controller) and raise speed to increase FW flow • If required, take MAN control of FW Reg valves (FW 510/520/530/540) and open to restore level • Recover SG levels to 60% ($\pm 5\%$) • Monitor SG levels and FW flows, adjusting feed pump speed as necessary • Return FW Reg valves to AUTO if required <p>NOTE: LOSS OF STEAM DUMPS DUE TO 507 FAILURE MUST TAKE TO MANUAL FOR THEM TO WORK</p>
	US	Inform SM/Maint of PT-507 failure/status.

Comments: _____

Scenario No: 2		Event No. 5
Event Description: A steam break outside CNMT develops on steam header crosstie. MSIVs fail to close automatically on SGs low pressure. Manual operation of MSIVs (Control Room control switches) is available.		
Time	Position	Applicant's Actions or Behavior
	CUE	Increased steam flow indication on all SGs (until MSIVs close) SG pressures decreasing RCS temperature falling PZR level lowering PZR pressure lowering
	US	Implement BEP-0 "REACTOR TRIP OR SI"
	RO	Perform immediate operator actions of BEP-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 lowering
	CREW	<i>The crew may elect to isolate steamlines at this point due to personnel safety reasons.</i>
	BOP	<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	Determine SI needed/actuated <ul style="list-style-type: none"> • If 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 actuated (SI pumps running, CV Cold leg injection SI8801A/B open)

Comments: _____

Scenario No: 2		Event No. 5
Event Description: A steam break outside CNMT develops on steam header crosstie. MSIVs fail to close automatically on SGs low pressure. Manual operation of MSIVs (Control Room control switches) is available.		
Time	Position	Applicant's Actions or Behavior
	CREW (cont.)	<ul style="list-style-type: none"> If SI NOT actuated <ul style="list-style-type: none"> Check <ul style="list-style-type: none"> PZR pressure <1829 psig Steamline pressure <460 psig CNMT pressure > 3.4 psig PZR level CANNOT be maintained > 4% Manually actuate SI
	CREW	Identify/report failure of MSIVs to close on SG low(ering) pressure at 640 psig.
	BOP/US	<ul style="list-style-type: none"> Verify FW isolated <ul style="list-style-type: none"> FW pumps tripped Isolation monitor lights lit FW pumps disch valves closed (FW002A-C)
	RO/US	<ul style="list-style-type: none"> Verify ECCS pumps running <ul style="list-style-type: none"> CENT Chg pumps RH pumps SI pumps
	RO/US	<ul style="list-style-type: none"> Monitor RCP trip criteria and trip RCPs <ul style="list-style-type: none"> RCS pressure < 1425 psig AND HHSI flow > 50 gpm OR SI flow > 100 gpm CNMT Phase B actuated Loss of CC water to RCP
	RO/BOP	<ul style="list-style-type: none"> Verify Group 2 RCFC Accident Mode Status lights lit

Comments: _____

Scenario No: 2		Event No. 5
Event Description: A steam break outside CNMT develops on steam header crosstie. MSIVs fail to close automatically on SGs low pressure. Manual operation of MSIVs (Control Room control switches) is available.		
Time	Position	Applicant's Actions or Behavior
	BOP/US	<ul style="list-style-type: none"> • Verify Phase A isolation - Group 3 Monitor lights lit • Verify CNMT Ventilation isolation - Group 6 Monitor lights lit
		SEE Event 6

Comments: _____

Scenario No: 2		Event No. 6, 7 & 8
Event Description: The 1A AFW Pump fails to start resulting in a loss of feed flow to all SGs. The next event (addressed immediately following AF), with the AUTO MSIV failure the operator is required to manually close MSIVs. The MSIV for SG A fails to close due to binding. With recognition for actions required for loss of feedwater flow, Pzr PORV 456 fails open and path to must be isolated.		
Time	Position	Applicant's Actions or Behavior
	BOP	Identifies/reports failure of AFW Pump 1A to start.
	BOP/US	<ul style="list-style-type: none"> Verify AF system: <ul style="list-style-type: none"> AF 1B pump OOS and NOT available AF 1A pump fails to start manually AF isolation valves open (AF13A-H) AF flow control valves throttled (AF005A-H) Verify CC Pumps running Verify SX Pumps running
	BOP/US	<ul style="list-style-type: none"> Check Main Steamline Isolation <ul style="list-style-type: none"> Check SG pressure < 640 psig Check CNMT pressure >8.2 Verify MSIV and MSIV Bypass valves closed
	BOP	If NOT performed previously, identify/report MSIV failure to auto close
	BOP/US [CT] E-0--P	<ul style="list-style-type: none"> Manually actuate Main Steamline Isolation Verify MSIV and MSIV Bypass valves closed <ul style="list-style-type: none"> Identify/report 1A MSIV failed to close. SG 1A still steaming
	BOP/US	<ul style="list-style-type: none"> Check if CNMT Spray is required

Comments: _____

Scenario No: 2		Event No. 6, 7 & 8
Event Description: The 1A AFW Pump fails to start resulting in a loss of feed flow to all SGs. The next event (addressed immediately following AF), with the AUTO MSIV failure the operator is required to manually close MSIVs. The MSIV for SG A fails to close due to binding. With recognition for actions required for loss of feedwater flow, Pzr PORV 456 fails open and path to must be isolated.		
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> • CNMT pressure > 20 psig • Determine/report CNMT Spray NOT required
	BOP/US	<ul style="list-style-type: none"> • Verify AF flows • AF flow > 500 gpm • Determine/report AF flows ZERO • Check SG levels > 10% • If level is NOT > 10% in any SG (i.e. $\leq 10\%$ in ALL SGs), then transition is made to 1BFR-H.1 "RESPONSE TO LOSS OF SECONDARY HEAT SINK" (Actions of 1BFR-H.1 covered below)
		1BFR-H.1 ACTIONS
	US	Transition to 1BFR-H.1 "RESPONSE TO LOSS OF SECONDARY HEAT SINK" <ul style="list-style-type: none"> • Direct initiation of Critical Safety Function Status Tree monitoring.
	US	Direct action of BFR-H.1
	CREW	<ul style="list-style-type: none"> • Check secondary heat sink required • RCS pressure > non-faulted SG pressure • RCS temperature > 350°F
	RO/US	<ul style="list-style-type: none"> • Check at least ONE Cent Chg pump running
	CREW	<ul style="list-style-type: none"> • Check if Feed and Bleed is required by either ONE of the following: • Wide Range level in any THREE SGs < 27%

Comments: _____

Scenario No: 2		Event No. 6, 7 & 8
Event Description:		The 1A AFW Pump fails to start resulting in a loss of feed flow to all SGs. The next event (addressed immediately following AF), with the AUTO MSIV failure the operator is required to manually close MSIVs. The MSIV for SG A fails to close due to binding. With recognition for actions required for loss of feedwater flow, Pzr PORV 456 fails open and path to must be isolated.
Time	Position	Applicant's Actions or Behavior
		<p>OR</p> <ul style="list-style-type: none"> PZR pressure > 2335 psig due to loss of heat sink <p>Determine/report Feed & Bleed is NOT required at this time.</p>
	BOP/US	<ul style="list-style-type: none"> Try to establish AF flow to ONE SG Verify SG blowdown valves closed (SD002A-H) Verify SG sample isol valves closed (SD005A-D) Review feed flow guidelines (ATTACHMENT B): <ul style="list-style-type: none"> Do NOT feed any DRY SGs (WR level < 10%) If SG feedlines are NOT voided (VOIDED - feed flow lost for > 75 min), feed at least TWO non-dry SGs at rate to increase WR level If SG lines voided: <ul style="list-style-type: none"> Feed TWO non-dry SGS at sufficient rate to increase WR level Feed remaining non-dry SGs between 40 and 80 gpm for 15 min. prior to restoring desired feed rate. Check AF PUMP SX VLVS ARMED (1-3-E7) NOT lit Check AF Pumps both running – NONE running
	BOP/US	<ul style="list-style-type: none"> Since neither pump starts, dispatch an operator to start one pump per 1BOA ELEC-5 Verify AF test valves open (AF004A) Verify AF isol valves open (AF013B/C/D/F/G/H) Verify AF flow control valves throttled/open (AF005B/C/D/F/G/H)
	RO/US	<ul style="list-style-type: none"> Check RCP status All stopped

Comments: _____

Scenario No: 2		Event No. 6, 7 & 8
Event Description: The 1A AFW Pump fails to start resulting in a loss of feed flow to all SGs. The next event (addressed immediately following AF), with the AUTO MSIV failure the operator is required to manually close MSIVs. The MSIV for SG A fails to close due to binding. With recognition for actions required for loss of feedwater flow, Pzr PORV 456 fails open and path to must be isolated.		
Time	Position	Applicant's Actions or Behavior
	BOP/US	<ul style="list-style-type: none"> • Prepare to restore FW: <ul style="list-style-type: none"> • Check at least ONE CD/CB pump running • Place FW Reg valves in MANUAL at ZERO demand (1FW510/520/530/540) • Place FW Bypass Reg valves in MANUAL at ZERO demand (1FW510A/520A/530A/540A) • Place tempering flow control valves in MANUAL at ZERO demand (1FW034A-D)
	RO	Identify/ report Pzr PORV RY456 open and will NOT close Note: insert when pressure rises to setpoint and is actually lifting
	RO	<ul style="list-style-type: none"> • Determine PORV NOT required to be open • Attempt to close PORV RY456 by taking switch to CLOSE • When PORV identified as NOT closing , take control switch for 1RY8000B, PORB RY456 Block valve, to CLOSE
	BOP/US	<ul style="list-style-type: none"> • Reset FW Isol • Check for FW isolation aux relay lights lit • Check SI actuated
	BOP/US	<ul style="list-style-type: none"> • Dispatch operator to pull FW Isol Aux Relay fuses: <ul style="list-style-type: none"> • 1PA27J - FU-24 & FU-27 • 1PA28J - FU-24 & FU-27 • Establish main FW flow <ul style="list-style-type: none"> • Check either Startup FW Pump OR FW Pump 1A available • Open FW Tempering Isol valve for selected SGs, 1FW035B, C and/or D • Check at least TWO CD/CB pumps running
	BOP/US [CT]	<ul style="list-style-type: none"> • Start the Startup FW Pump • Check Bus 159 energized

Comments: _____

Scenario No: 2		Event No. 6, 7 & 8
Event Description: The 1A AFW Pump fails to start resulting in a loss of feed flow to all SGs. The next event (addressed immediately following AF), with the AUTO MSIV failure the operator is required to manually close MSIVs. The MSIV for SG A fails to close due to binding. With recognition for actions required for loss of feedwater flow, Pzr PORV 456 fails open and path to must be isolated.		
Time	Position	Applicant's Actions or Behavior
	FRH.1-A	<ul style="list-style-type: none"> Locally start SU Feed Pump Aux LO pump Check discharge valve 1FW059 open Place recirc valve 1FW076 in MODULATE and check open Close Main FW Pump recirc valves 1FW012A/B/C Take control switch for SU Feed Pump to START Review feed flow guidelines <ul style="list-style-type: none"> Throttle tempering flow control valves for selected SGs 1FW034B, C and/or D (at least 2 SGs) Maintain hotwell level > 20 inches Check Narrow range level in at least one SG > 10% <ul style="list-style-type: none"> If NOT, verify adequate feed flow to at least one SG <ul style="list-style-type: none"> SG WIDE RANGE level increasing Core Exit TCs decreasing <p>(NOTE: If adequate feed flow NOT verified, crew will use ATTACHMENT C to establish flow through the low flow line.)</p>
	BOP/US	<ul style="list-style-type: none"> If adequate feed flow verified, return to procedure and step in effect while restoring level in at least ONE SG to >10% narrow range.
		BEP-0 ACTIONS
	RO/US	<ul style="list-style-type: none"> Verify ECCS valve alignment & flows Group 2 CL Inj monitor lights lit

Comments: _____

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Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> HHSI flow >50 gpm SI flow > 100gpm (if RCS pressure <1625 psig)
	RO/US	<ul style="list-style-type: none"> Check at least ONE PZR PORV relief path available: <ul style="list-style-type: none"> At least ONE PORV Isol valve energized. PORV in AUTO Associated Isol valve open
	BOP/US	<ul style="list-style-type: none"> Verify generator trip <ul style="list-style-type: none"> OCB 3-4 and 4-5 open PMG output breaker open Verify both DGs running <ul style="list-style-type: none"> DG SX valves 1SX169A & B open Dispatch operator to locally check DGs Ventilation systems aligned for emergency <ul style="list-style-type: none"> Control Room <ul style="list-style-type: none"> Control Room d/P on OPDI-VC038 > +0.125" H2O Aux Bldg Fuel Handling Bldg
	RO/US	<ul style="list-style-type: none"> Check PZR sprays & PORVs closed RCS temperature control <ul style="list-style-type: none"> Check RCP status - any running OR none running Check RCS CL temps trending to or stable at 557°F
	RO/US	<ul style="list-style-type: none"> Check RCP status: - NONE running (NOTE: Operator must control in MAN due to earlier PT-MS507 failure)

Comments: _____

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Time	Position	Applicant's Actions or Behavior
	BOP/US	<ul style="list-style-type: none"> • Check SG secondary boundary • Identify/report 1A SG pressure lower and decreasing
	CREW	Diagnose faulted SG
	US	Transition to 1BEP-2 "Faulted Steam Generator Isolation"
		BEP-2 ACTIONS
	US	Direct operator actions of 1BEP-2.
	BOP/US	<ul style="list-style-type: none"> • Check Main Steamline Isolated • Identify report SG 1A MSIV NOT closed • Check if any SG boundary intact • Identify/report 1B, 1C & 1D SGs pressures higher (than 1A) and stable • Identify faulted SG <ul style="list-style-type: none"> • 1A SG identified faulted <ul style="list-style-type: none"> o Lowering pressure o Indicated steam flow o Completely depressurized
	BOP/US [CT] E-2—A	<ul style="list-style-type: none"> • Isolate 1A SG • Manually close AF valves (AF013A, AF013E) <ul style="list-style-type: none"> o FW Isol valves 1FW009A closed o FW tempering flow control valves 1FW034A closed o FW tempering Isol valves 1FW035A closed

Comments: _____

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Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> o Low flow FW Isol valve 1FW039A closed o FW Reg valve 1FW510 close o 1FW Reg Bypass valve 1FW510A close o Verify SG PORV closed (MS018A) o Verify SG blowdown isol valves closed (SD002A, SD002B) o Verify SG blowdown sample isol valve closed (SD005A) • Check AF PUMP SX VLVS ARMED (1-3-E7) NOT lit
	BOP/US	<ul style="list-style-type: none"> • Check secondary radiation <ul style="list-style-type: none"> • Trends NORMAL for plant conditions. (HMI or RM-11) • Reset CNMT Isol Phase A • Request Chem to sample SGs and open sample isol valves 1SD005A-D at Chem Dept request
	US	<ul style="list-style-type: none"> • Transition to BEP-1 "Loss Of Reactor or Secondary Coolant"
		Scenario may be terminated at this point.

Comments: _____
