Facility: Byron Scenario No: #1 Op-Test No: 2008-01

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: Rx Power ~ 100%.

Turnover: Drain PRT per BOP RY-4 and then ramp down to 95% Rx Power.

Event No.	Malf. No.	Event Type*		Event Description
1	NONE	N	RO SRO	Drain PRT per RY-4, Draining the PRT
2	NONE	R	RO SRO	Ramp from 100% down to 95%
3	ED11A	C	BOP SRO	Loss of Instrument Bus 111
4	Cv01a	C	RO SRO	Trip of 1A CV Pump
5	RX01E0	I	BOP SRO	Failure of 1PT-525 low 1B S/G pressure transmitter
6	Rx15 2500	I	RO SRO	Failure of Pzr Master Pressure Controller 1PK-455A high
7	MS07A 3 120	M	TEAM	1A Main Steam Line Break inside Cnmt.
8	TC03	M	TEAM	Failure of Turbine to Auto Trip
9	MS01A&D 100	M	TEAM	MSIV's A & D fail to close
10	SI01B	C	BOP	Failure of 1B SI Pump to start

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

SCENARIO NUMBER: #1

TITLE: Respond to a Loss of Instrument Bus followed by a Main Steam Line Fault

TURNOVER INFORMATION:

The unit is at full power, steady state, equilibrium xenon, MOL.

THIS SCENARIO CONTAINS: The following objectives/K/A's:

			Drain PRT per BOP RY-4 Ramp Down from 100% to 95%
004000A4.08	(3.8/3.4)	IV.D.OA-06/VIII.D.OA-056-C	Response to Instrument Bus 111 Failure Respond to 1A CV Pump Trip Respond to a Failed S/G Press Channel Fails Low Respond to Master Pzr Press Controller Failing high
000040AA2.04	(4.5/4.7)	IV.D.EP-06/VIII.D.EP-001-E /012-B/ VIII.D.EP-007-B	Respond to 'A' Main Steam Line Break inside Cnmt Respond to Failure of Turbine to Trip Respond to Failure of 'A' & 'D' MSIV to close

COMPLETION CRITERIA: Terminate SI injection flow

CRITICAL TASKS:

1. Manually Trip Turbine during immediate action steps of 1BEP-0.
2. Manually aligning the A Train of ESF equipment prior to transitioning out of 1BEP-0.
3. Terminate SI to prevent Pzr overfill and eliminate PTS concern.

Examinees: US _____
RO _____
BOP _____

Evaluator: _____ Date: _____

- X 1. Perform pre-startup procedures for the facility, including operation those controls associated with plant equipment that could affect reactivity.
- X 2. Manipulate the console controls as required to operate the facility between shutdown and designated power levels.
- X 3. Identify annunciators and condition-indicating signals and perform appropriate remedial action where appropriate.
- X 4. Identify the instrumentation systems and the significance of facility instrument readings.
- X 5. Observe and safely control the operating behavior characteristics of the facility.
- X 6. Perform control manipulations required to obtain desired operating results during normal, abnormal, and emergency situations.
- X 7. Safely operate the facility's heat removal systems, including primary coolant, emergency coolant, and decay heat removal systems and identify the relation of the proper operation of these systems to the operation of the facility.
- X 8. Safely operate the facility's auxiliary and emergency systems, including operation of those controls associated with plant equipment that could affect reactivity or the release of radioactive materials to the environment.
- X 9. Demonstrate or describe the use and function of the facility's radiation monitoring systems, including fixed radiation monitors and alarms, portable survey instruments, and personnel monitoring equipment.
- ___ 10. Demonstrate knowledge of significant radiation hazards, including permissible levels in excess of those authorized, and ability to perform other procedures to reduce excessive levels of radiation and to guard against personnel exposure.
- X 11. Demonstrate knowledge of the emergency plan for the facility, including, as appropriate, the operator's or senior operator's responsibility to decide whether the plan should be executed and the duties under the plan assigned.
- X 12. Demonstrate the knowledge and ability as appropriate to the assigned position to assume the responsibility associated with the safe operation of the facility.
- X 13. Demonstrate the applicant's ability to function within the control room team as appropriate to the assigned position, in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated.

Simulator Scenario Review Checklist

1. The scenario has clearly stated objectives in the scenario summary. — Yes
2. The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue crew into expected events. — Yes
3. The scenario consists mostly of related events. — Yes
4. Each event description consists of: — Yes
   - the point in the scenario when it is to be initiated
   - the malfunction(s) that are entered to initiate the event
   - the symptoms/cues that will be visible to the crew
   - the expected operator actions (by shift position)
   - the event termination point
5. No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event. — Yes
6. The events are valid with regard to physics and thermodynamics. — Yes
7. Sequencing/timing of events is reasonable, and allows for the examination team to obtain complete evaluation results commensurate with the scenario objectives. — Yes
8. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given. If time compression techniques are used, scenario summary clearly indicates. — Yes
9. The simulator modeling is not altered. — Yes
10. All crew competencies can be evaluated. — Yes
11. The scenario has been validated. — Yes
12. The sampling plan indicates that the scenario was not used for training during the requal cycle. Evaluate the need to modify/replace scenario if used. — Yes
13. Total malfunctions inserted: 4-8 ___8___
14. Malfunctions that occur after EOP entry: 1-4 ___3___
15. Abnormal Events: 1-2 ___2___
16. Major Transients: 1-2 ___1___
17. EOPs used beyond primary scram response EOP: 1-3 ___4___
18. EOP Contingency Procedures used: 0-3 ___1___
19. Approximate scenario run time: 45-60 minutes — No
20. EOP run time: 40-70% of scenario run time — Yes
21. Crew Critical Tasks: 2-5 ___3___
22. Technical Specifications are exercised during the test. — Yes

SCENARIO OVERVIEW

The unit is at full power, steady state, equilibrium xenon, MOL.

The scenario begins with the operating crew draining the PRT per BOP RY-4 this action will account for the normal evolution. The reactivity requirement will be fulfilled with a unit ramp from 100% Rx power down to 95% Rx power in preparation for a Main Feedwater Pump swap.

Once the power change has been completed Instrument Bus 111 will de-energize and BOA ELEC-2, Loss of an Instrument Bus will be entered. The instr. bus is damaged will remain de-energized. Depending on the cause of the failure enter the applicable Tech Spec 3.8.7 & 3.8.9.

After the actions of BOA ELEC-2 are complete, the 1A CV pump trips. The crew should start the 1B CV pump per BAR 1-9-A3 and take actions to stabilize the plant. Technical Specification 3.5.2 and TRM 3.1.d apply.

S/G Pressure Channel 1PT-525 fails low. The crew enters BOA INST-2, the BOP needs to take manual control of the 1B Feed Reg Valve and manual control of the Feedwater ΔP controller to restore adequate feedwater flow to all S/G's. The applicable Tech Spec for this failure is 3.3.2. Crew will not be required to trip bi-stables since bi-stable switches are not modeled.

Master Pressurizer Pressure Controller 1PK-455A output fails high. PORV 1RY455A does not open due to the previous Instrument Bus failure. However, Pressurizer Spray valves fully open and Pzr pressure begins to drop. The RO takes manual control of the Master Pressurizer Pressure controller and restores Pzr Pressure. The applicable Tech Specs are 3.3.1, 3.3.2, & 3.3.4.

The 1A Main Steam Line experiences a large break. Containment temperature and pressure increase and Main Steam Line Pressure decreases to the SI setpoint. 1BEP-0, Response to Reactor Trip of Safety Injection is entered. The Reactor automatically trips on the SI signal but the Turbine fails to trip automatically following the Reactor trip. A Manual Turbine trip is required to be actuated. Due to the Instrument Bus failure all A train ESF loads fail to start on the SI signal. A Train ESF loads must be manually started.

The A & D MSIV's fail to automatically or manually close causing both S/G's to blow down. Upon completion of 1BEP-0 the crew transitions to 1BEP-2, Faulted S/G to isolate the faulted S/G's then transitions to 1BEP-1 Loss of Reactor or Secondary Coolant, and then to 1BEP ES-1.1, SI Termination, completion criteria is stopping the RH pumps in 1BEP ES-1.1.

- Initialize IC-22: "full power, steady state, equilibrium xenon, MOL."
- Lineup control boards.
- Place simulator in run (allow simulator to run during board walkdowns and turnover).
- Type **bat a:/BY-46** and ensure the following insert:
- Perform TQ-BY-201-0113, Appendix A, “Simulator Exam/ Scenario Reset Checklist”

EVENT	TIME	MALF NO.	DESCRIPTION
1	0	N/A	Drain PRT per BOP RY-4
2	4	N/A	Ramp Unit from 100% to 95%
3	25	????	Trip Instrument Bus 111
4	??	????	Trip of 1A CV Pump (SDG CV5)
5	??	????	Failure of 1PT-525 low 1B S/G pressure transmitter
6	??	????	Failure of PZR Master Press controller 1PK-455A High
7	??	????	1A Main Steam Line Break inside Cnmt.
8	??	????	Failure of Turbine to Auto Trip
9	??	????	MSIV’s A & D fail to close

Note 1: Events 7, 8 & 9 should be tied to Main Steam Line Break.

EVENT	ADDITIONAL INFORMATION
3	Report Bus 111 Inverter AC Output Bkr 4CB Open. Report Bus 111 Main Feed Bkr Open. Report Bus 111 is damaged, small fire has been put out. Enters INST-1, NI malfunction, need to trip bistables associated with N41. Operator needs to be dispatched to open 1AF005A-D. Allow ten minutes to accomplish this task.

Remote functions per event:

RP20	Open/Close	Protection Cabinet Door #1			(SDG RX10)
RX013	TRIP	OTΔT Rx Trip	TB411C	C1-124 BS-3	(SDG RX4)
RX135	TRIP	OTΔT Runback	TB411D	C1-124 BS-4	(SDG RX4)

4	Acknowledge 1A CV pump trip/EP review request when contacted as SM (as required). When requested to investigate, report a Phase A overcurrent flag at the 1A CV pump breaker. Report results 4 minutes after request.

BRIEF DESCRIPTION Drain PRT per BOP RY-4

EXPECTED OPERATOR/PLANT RESPONSE	SAT	UNSAT	N/A

Perform the action to lower PRT level per BOP RY-4

(Cue)

- o Per the initial scenario cue.
- o Annunciator A7 PRT LVL Hi-Low

(Response)

• Refer to BOP RY-4 Draining the Pressurizer Relief Tank	**U-1**	____	____	____
• CLOSE 1RY469 PRT to GW isol vlv	**U-1**	____	____	____
• VERIFY approximately 3 psig on 1PI469	**U-1**	____	____	____
• VERIFY/OPEN 1AOV-RY8033 N_2 Supply to PRT isol vlv	**U-1**	____	____	____
• VERIFY/OPEN 1AOV-RE9170, RCDT Discharge header vlv	**U-1**	____	____	____
• VERIFY/OPEN 1AOV-RE1003, RCDT Discharge header vlv	**U-1**	____	____	____
• OPEN 1AOV-RY8031, PRT Drain vlv	**U-1**	____	____	____
• VERIFY/START 1RE01PA/B, RCDT Pump 1A/B	**U-1**	____	____	____
• CYCLE 1RY8031, PRT Drain vlv to control PRT pressure	**U-1**	____	____	____
• CLOSE 1AOV-RY8031, PRT Drain vlv at desired PRT level	**U-1**	____	____	____
• VERIFY/STOP 1RE01PA/B, RCDT Pump 1A/B	**U-1**	____	____	____
• VERIFY/CLOSE 1AOV-RE1003, RCDT Discharge header vlv	**U-1**	____	____	____

EXAMINER'S NOTE:

COMMENTS

EVENT 2

BRIEF DESCRIPTION Ramp Unit from 100% to 95%

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Re-activity manipulation for this scenario.				
(Cue)				
o Per the initial scenario cue.				
(Response)				
• Refer to BGP 100-4, Power Descension	**CREW**			
• Direct actions to lower Rx Pwr	**US**			
• PROGRAM Turbine Controls to ramp down	**U-1 AST**			
• BORATE per BOP CV-6 to control Tave-Tref within desired limits	**U-1**			
• ENERGIZE Second Pressurizer B/U Htr group.	**U-1**			
• INSERT Control Rods to maintain ΔI and Tave-Tref	**U-1**			
• STOP ramp at 95% Rx Pwr	**US**			

EXAMINER'S NOTE:

COMMENTS

EVENT 3

BRIEF DESCRIPTION Loss of Instrument Bus 111

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Recognize symptoms and respond to a de-energized Instrument Bus 111				
(Cue)				
• Loss of Control and Instrument Power to:				
• N31 Source Range Instrument				
• N35 Intermediate Range Instrument				
• N41 Power Range Instrument				
• Annunciator (1-4-A5) "BUS 111 INVERTER TROUBLE"				
• Annunciator (1-4-A3) "PROCESS I & C CAB PWR SUP FAILURE"				
• Annunciator (1-4-B3) "SOLID STATE PROT CAB GENERAL WARNING"				
• Annunciator (1-4-C2) "SEQUENCING CAB PWR FAILURE"				
• Annunciator (1-13-A2) "RCP BUS UNDERVOLTAGE RX TRIP ALERT" and associated trip status light				
(Response)				
• Instrument control channels checked for operability:	**CREW**			
• PZR pressure/level				
• T_{AVE}/Delta T				
• P_{IMP}				
• SG level, steam flow & feed flow				
Do NOT attempt to energize Instrument Bus 111 from CVT (bus is damaged)	**CREW**			
• Dispatch operator to locally fail open 1AF005A-D	**U-1 AST**			
• Brief crew on effects of loss of inst. bus 111/Train A ESF equipment manual start requirements per Table A	**US**			
• Inform SM of unit status/loss of inst. bus 111/EP potential/shutdown required by Tech Specs	**STA/US**			
• Dispatch operator to investigate status of bus	**US**			
• Evaluate potential EP/ OLR	**SM**			
EXAMINER'S NOTE:				
Implement 1BOA INST-1 "NUCLEAR INSTRUMENT MALFUNCTION" to establish the following conditions:	**US**			
• Control rods placed in manual	**U-1**			
• Plant conditions stabilized	**CREW**			
• Rod stop bypassed				
• T_{ave} restored to T_{ref} ($\pm$ 1 degree)				
• SG levels stable				

- Bypass associated functions for PR N-41 **U-1 AST**____ ____ ____
  - Upper current comparator
  - Lower current comparator
  - Power mismatch
  - Rod stop
  - Channel current comparator

- Trip bistables for PR N-41
  - Pull control power fuses to trip: **U-1 AST**____ ____ ____
    - Lo Rx trip
    - Hi Rx trip
    - Positive Rate trip
  - Dispatch operator to locally trip: **CREW**____ ____ ____
    - OTΔT Trip
    - OTΔT Runback
- Select/verify operable channel to loop ΔT recorder **U-1**____ ____ ____
- Remove Point from Scan Input to PDMS **U-1**____ ____ ____
- Restore automatic rod control **U-1**____ ____ ____
- Inform SM of unit status/potential EP event **US/STA**____ ____ ____
- Review Tech Spec 3.8.7, Inverters - Operating & 3.8.9, Dist. Systems - Operating (Restore power to inst. bus 111 within 2 hours or be in hot standby in next 6 hours.) **US/STA**____ ____ ____

COMMENTS _____

_____

_____

_____

EVENT 4

BRIEF DESCRIPTION 1A CV Pump Trip

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Recognize symptoms and respond to a tripped CV pump				
(Cue)				
o Annunciator (1-7-B2) "RCP SEAL WTR INJ FLOW LOW"				
o Annunciator (1-9-A3) "CHG PUMP TRIP"				
o Annunciator (1-9-D3) "CHG LINE FLOW HIGH LOW"				
o 1A CV pump trip light lit				
(Response)				
• Direct actions to restore charging flow	**US**	____	____	____
• Refer to BAR 1-9-A3	**U-1 AST/U-1**	____	____	____
• Isolate Letdown	**U-1 AST/U-1**	____	____	____
• Ensure suction source to standby charging pump	**U-1**	____	____	____
• Place 1CV121 in Manual at 10% Open	**U-1**	____	____	____
• Start the 1B CV pump	**U-1**	____	____	____
EXAMINER'S NOTE:				
The crew may elect to perform actions for loss of seal injection per 1BOA RCP-2 "LOSS OF SEAL COOLING".				
Implement 1BOA RCP-2 "LOSS OF SEAL COOLING" to direct operator actions to:	***US***	____	____	____
• *Check RCP seal cooling*	***U-1***	____	____	____
• *Start 1B CV pump*	***U-1***	____	____	____
• *Throttle 1CV182 and 1CV121 to control seal injection flow*	***U-1***	____	____	____
EXAMINER'S NOTE:				
Instr. Bus 111 failure prevents auto make-up to VCT. Low VCT level will require manual action to Open make-up isolation valves per applicable BAR.				
o Restore Letdown per BOP CV-17	**U-1 AST/U-1**	____	____	____
• Notify SM of unit status/EP potential	**US**	____	____	____
• Refer to TRM 3.1.d, Charging Pumps - Operating, and Tech Spec 3.5.2, ECCS - Operating (return to operable status within 7 days).	**US**	____	____	____
• Direct performance of 1BOSR 5.5.1-1 (Reference BOP CV-19)	**US**	____	____	____
• Dispatch operators to locally check 1A CV pump/breaker	**CREW**	____	____	____
• Notify EM Dept. to investigate 1A CV pump trip	**US**	____	____	____
• Evaluate OLR (Yellow)	**US**	____	____	____
(Feedback)				
o 1B CV pump running				
o Charging flow restored				
o Seal injection flows normal				

COMMENTS _____

EVENT 5

BRIEF DESCRIPTION Master PZR Pressure Controller

EXPECTED OPERATOR/PLANT RESPONSE	SAT	UNSAT	N/A

Recognize symptoms and respond to a Master Pzr Press Controller failure

(Cue)

- o Annunciator (1-12-D2) "PZR PRESS CONT DEV HIGH"
- o Annunciator (1-12-B2) "PZR PORV OR SAF VLV OPEN" Won't Open due to Bus 111 failure
- o PZR spray valves (1RY455B & C) open
- o Master PZR pressure controller output indication (1PK-455A) at 100%
- o Actual PZR pressure dropping

(Response)

• Check PZR pressure	**U-1**_____	_____	_____
• Take manual control to restore PZR pressure			
• Place Master PZR pressure controller in manual	**U-1**_____	_____	_____
• Control PZR pressure			
• Check PZR PORVs, spray valves and heaters **(Pzr Htr's won't work due to Bus 111 failure)**	**U-1**_____	_____	_____
• PZR PORVs – closed	**U-1**_____	_____	_____
• PZR spray valves – normal	**U-1**_____	_____	_____
• PZR heaters – normal **(Pzr Htr's won't work due to Bus 111 failure)**	**U-1**_____	_____	_____
• Review Tech Spec 3.4.1, DNB Limits.	**US**_____	_____	_____
• Contact SM/maintenance to investigate 1PK-455A failure	**US**_____	_____	_____

(Feedback)

- o Appropriate annunciators clear
- o Associated trip status lights and annunciators lit
- o PZR pressure restored to normal

COMMENTS _____

EVENT 6

Brief Description: 1A Main Steam line break inside of Cnmt.

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Recognize symptoms and respond to main steam line break inside of cnmt.				
(Cue)				
o Cnmt temp and pressure increasing				
o Low S/G & Main Steam Line Pressure				
o Rx Trip and Safety Injection				
o Multiple Annunciator Alarms				
(Response)				
Automatic Rx Trip	**CREW**	____	____	____
Implement 1BEP-0, Reactor Trip or Safety Injection				
• Inform SM of unit status/potential EP event	**US/STA**	____	____	____
• Reactor trip verified • Rod bottom lights • Reactor trip/Bypass breakers • Neutron flux dropping	**U-1**	____	____	____
•* ***Turbine MANUALLY TRIPPED by fast action GV CLOSED from OWS panel G-5512*** • ***GVs closed*** • ***TVs closed***	***U-1 AST***	____*	____*	____*
• 4 KV ESF busses are energized • Bus 141 energized • Bus 142 energized	**U-1 AST**	____	____	____
• SI Status • SI is actuated/required o SI ACTUATED permissive light lit o SI first out annunciator lit o SI equipment automatically actuated	**CREW**	____	____	____
• Actuate SI	**U-1/U-1 AST**	____	____	____
• Feedwater Status	**CREW**	____	____	____

COMMENTS _____

(NOTE)
Loss of Instrument Bus 111 causes failure of A train ESF load to automatically start on SI signal. A Train ESF loads must be manually aligned to complete critical task. RCP Trip criteria may also be met early during scenario.

•*	Verify ECCS Status	**CREW**	____	____	____
	• Verify 1B CV Pp Running	**U-1 AST/U-1**	____	____	____
	•* START 1A SI Pp	**U-1 AST/U-1**	____*	____*	____*
	•*START 1A RH Pp	**U-1 AST/U-1**	____*	____*	____*
•	Verify RCFC's Running in Accident Mode				
	• *Manually align A Train components	**U-1 AST/U-1**	____	____	____
•	Verify Cnmt Isolation Phase A				
	• *Manually align A Train components	**U-1 AST/U-1**	____	____	____
•	Verify Cnmt Ventilation Isolation	**U-1 AST/U-1**	____	____	____
•	Verify Aux. Feed System				
	• *Manually align A Train components	**U-1 AST/U-1**	____	____	____
	• US should dispatch NLO to close open throttle vlvs to isolate faulted S/G	**US**	____	____	____
•	Verify CC Pp's Running				
	• *Manually align A Train component Start 1A CC Pp	**U-1 AST/U-1**	____	____	____
•	Verify SX Pp's Running				
	• *Manually align A Train component Start 1A SX Pp	**U-1 AST/U-1**	____	____	____
•	Main Steam Line Isolation				
	• Manually attempt to close 1A & 1D MSIV's	**U-1 AST/U-1**	____	____	____
•	Check if Cnmt Spray is Required				
	• *Manually align A Train if required	**U-1 AST/U-1**	____	____	____
•	Verify Total Aux. Feed System Flow				
	• *Manually align A Train components	**U-1 AST/U-1**	____	____	____
	• US should dispatch NLO to close open throttle vlvs to isolate faulted S/G	**US**	____	____	____
•	Verify ECCS Valve alignment				
	• *Manually align A Train components	**U-1 AST/U-1**	____	____	____
•	Verify ECCS Flow	**U-1 AST/U-1**	____	____	____
•	Verify one Pzr PORV relief path available	**U-1**	____	____	____
•	Verify Main Generator Tripped	**U-1 AST/U-1**	____	____	____

- Verify D/G's Running
  - *Manually Start 1A D/G **U-1 AST/U-1**____ ____ ____

- Verify Ventilation Equipment aligned for Emergency
  - *Manually align A Train components **U-1 AST/U-1**____ ____ ____

- Verify Pzr Spray Valves Closed **U-1 AST/U-1**____ ____ ____

EXAMINER'S NOTE:
Due to steam line break RCS temperature control will not be possible. The crew should stop dumping steam and close all MSIV's. They should also stop Aux Feed flow to the faulted S/G's.

- Maintain RCS Temperature Control **U-1 AST/U-1**____ ____ ____

- Check RCP Status **U-1 AST/U-1**____ ____ ____

- Check S/G Secondary Pressure boundaries intact **U-1 AST/U-1**____ ____ ____
  - Crew determines Secondary Pressure Boundaries not intact and transitions to 1BEP-2, Faulted S/G Isolation

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EXAMINER'S NOTE:
US directs transition from 1BEP-0 to 1BEP-2, Faulted S/G Isolation. The Critical Task in this procedure is to isolate the Non-Faulted S/G's from the Faulted S/G's. This is accomplished by closing the MSIV's on the Non-Faulted 1B & 1C S/G's.

Announcement of faulted Steam Generator symptoms **US**____ ____ ____
Transition to 1BEP-2 "FAULTED SG ISOLATION"
- Implement STA function at transition from 1BEP-0 "RX TRIP OR SI" **STA**____ ____ ____
- Monitor plant conditions using status trees **STA**____ ____ ____

Perform operator actions to establish the following conditions:
- Isolate/close MSIVs and bypass valves **U-1 AST**____ ____ ____
- Identify at least 1 non-faulted S/G (1B & 1C) **U-1 AST**____ ____ ____
- Faulted SG isolated (1A & 1D S/G's) **US/U-1 AST**____ ____ ____
  - AF isolated (1AF013A&E closed & 1AF013D&H locally closed)
  - Main feedwater isolated
  - 1A & 1D SG PORV closed (1MS018A&D)
  - Blowdown isolation valves closed (1SD002A-H)
  - Blowdown sample valve closed (1SD005A-D)
- Monitor AF pump suction pressure **U-1 AST**____ ____ ____
- Check Secondary Radiation
  - Identify NO ruptured SGs **U-1 AST**____ ____ ____

EXPECTED OPERATOR/PLANT RESPONSE	SAT	UNSAT	N/A
• Transition to 1BEP-1, Loss of Rx or Secondary Coolant	**US**____	____	____
Transition from 1BEP-2 to 1BEP-1, "LOSS OF REACTOR OR SECONDARY COOLANT" upon verification that a SGTR does not exist per 1BEP-2	**US**____	____	____
Perform operator actions of 1BEP-1 to establish the following conditions:			
• Check status of RCPs	**U-1**____	____	____
• Check SG pressure boundaries intact (1A & D SG faulted)	**U-1 AST**____	____	____
• Check intact SG levels	**U-1 AST**____	____	____
• SG levels > 10%			
• Maintain SG NR levels between 10% - 50%			
• SG levels not rising in an uncontrolled manner			
• Check secondary radiation trends normal	**U-1 AST**____	____	____
• Check SJAE/gland steam exhaust and MS line radiation normal for plant conditions			
• Check PZR PORVs and isolation valves	**U-1**____	____	____
Transition from 1BEP-1 to ES-1.1 "SI TERMINATION" when the following conditions are met:	**US**____	____	____
• Acceptable RCS subcooling			
• Secondary heat sink			
• SG NR levels > 10%			
• > 500 gpm total flow			
• RCS pressure is stable/rising			
• PZR level > 12%			
Direct operator actions to establish the following conditions of ES-1.1:	**US**____	____	____
• Reset SI	**U-1/U-1 AST**____	____	____
• Reset Containment Isolation	**U-1 AST**____	____	____
• Phase A			
• Phase B			
• Check SAC run light lit			
• IA restored to Cnmt			
• CV system realigned	**U-1**____	____	____
• 1B CV pump already running			
• Check RCS pressure stable or rising	**U-1**____	____	____
•* Terminate high-head ECCS	**U-1**____*	____*	____*
• CV pump suction aligned to RWST			
• SI recirc sump/CV miniflows reset			
• CV miniflow valves open			
•* 1SI8801A & B closed			

- Establish charging flow **U-1**_____ _____ _____
  - 1CV182 controller at 0%
  - 1CV8105 and 1CV8106 opened
  - 1CV182 throttled (8-13 gpm seal injection)
- Control charging to maintain PZR level **U-1**_____ _____ _____
- SI pumps stopped **U-1/U-1 AST**_____ _____ _____
- RH pumps stopped **U-1/U-1 AST**_____ _____ _____

TERMINATE SCENARIO

- Classify conditions per minimum applicable EP description **SM**_____ _____ _____

  - **SITE EMERGENCY**
    • MU8,

- Identify reportability requirements **SM**_____ _____ _____
  - SAF 1.1 - Declaration of an Emergency Class
  - SAF 1.5 - ECCS Injection/Actuation
  - SAF 1.6 - RPS actuation
  - SAF 1.7 - System actuation not including RPS

COMMENTS _____

Facility: Byron Scenario No: #2 Op-Test No: 2008-01

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: Rx Power ~ 100%.

Turnover: Ramp down to 95% Rx Power.

Event No.	Malf. No.	Event Type*		Event Description
1	msv1ms004a =100	C	BOP SRO	1MS004A Fails Open. Rx Power increases > 100%
1a		R	RO SRO	Ramp from 102% down to 98%
2	Cv16 100	I	RO SRO	1LT-112 Failure High
3	Rx18f 650	I	BOP SRO	1TE-445 Failure High
4	rm061	C	BOP SRO	Failure of 0PR031J to actuate VC Emergency Make-Up
5	Eg03 96	C	BOP SRO	Failure of Main Generator Voltage Regulator High
6	Th04a 50000	M	TEAM	Sesmic event results in Large Break LOCA
7	Cs05	C	TEAM	1B CS Train fails to align, Manual action required
8	Rh01b	C	TEAM	1B RH Pp Trips on OC at 49% RWST level
9	Ed053p open	C	TEAM	1SI8811A Fails to open on low RWST level

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

SCENARIO NUMBER: #2

TITLE: _____

TURNOVER INFORMATION:

The unit is at 100% power, steady state, equilibrium xenon, MOL.

THIS SCENARIO CONTAINS: The following objectives/K/A's

1MS004A Steam Dump Valve Leak
Load Ramp from 100% to 95% Rx Pwr
1TE-445 Failed High
High Rad Alarm on 0PR31J with no Emergency Mode Actuation Signal – Manual alignment required
Main Generator Voltage Regulator fails high
Large Break LOCA
Failure of 1B CS Train to properly align
Failure of 1SI8811A Cnmt Recirc Sump Isolation Vlv to Open
Failure of 1B RH Pp

COMPLETION CRITERIA: Initiate RCS Cooldown to 200^{o}F

CRITICAL TASKS:

1. Manually align the 0A VC Train to Emergency Mode.
2. Manually align the 1B CS Train during 1BEP-0.
3. Initiate Make-Up flow to the RWST during 1BCA-1.1.

Examinees: US _____
RO _____
BOP _____

Evaluator: _____ Date: _____

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10 CFR 55.45

X	1.	Perform pre-startup procedures for the facility, including operation those controls associated with plant equipment that could affect reactivity.
X	2.	Manipulate the console controls as required to operate the facility between shutdown and designated power levels.
X	3.	Identify annunciators and condition-indicating signals and perform appropriate remedial action where appropriate.
X	4.	Identify the instrumentation systems and the significance of facility instrument readings.
X	5.	Observe and safely control the operating behavior characteristics of the facility.
X	6.	Perform control manipulations required to obtain desired operating results during normal, abnormal, and emergency situations.
X	7.	Safely operate the facility's heat removal systems, including primary coolant, emergency coolant, and decay heat removal systems and identify the relation of the proper operation of these systems to the operation of the facility.
X	8.	Safely operate the facility's auxiliary and emergency systems, including operation of those controls associated with plant equipment that could affect reactivity or the release of radioactive materials to the environment.
X	9.	Demonstrate or describe the use and function of the facility's radiation monitoring systems, including fixed radiation monitors and alarms, portable survey instruments, and personnel monitoring equipment.
___	10.	Demonstrate knowledge of significant radiation hazards, including permissible levels in excess of those authorized, and ability to perform other procedures to reduce excessive levels of radiation and to guard against personnel exposure.
X	11.	Demonstrate knowledge of the emergency plan for the facility, including, as appropriate, the operator's or senior operator's responsibility to decide whether the plan should be executed and the duties under the plan assigned.
X	12.	Demonstrate the knowledge and ability as appropriate to the assigned position to assume the responsibility associated with the safe operation of the facility.
X	13.	Demonstrate the applicant's ability to function within the control room team as appropriate to the assigned position, in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated.

Simulator Scenario Review Checklist

1.	The scenario has clearly stated objectives in the scenario summary.	Yes
2.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue crew into expected events.	Yes
3.	The scenario consists mostly of related events.	Yes
4.	Each event description consists of: • the point in the scenario when it is to be initiated • the malfunction(s) that are entered to initiate the event • the symptoms/cues that will be visible to the crew • the expected operator actions (by shift position) • the event termination point	Yes
5.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.	Yes
6.	The events are valid with regard to physics and thermodynamics.	Yes
7.	Sequencing/timing of events is reasonable, and allows for the examination team to obtain complete evaluation results commensurate with the scenario objectives.	Yes
8.	Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given. If time compression techniques are used, scenario summary clearly indicates.	Yes
9.	The simulator modeling is not altered.	Yes
10.	All crew competencies can be evaluated.	Yes
11.	The scenario has been validated.	Yes
12.	The sampling plan indicates that the scenario was not used for training during the requal cycle. Evaluate the need to modify/replace scenario if used.	Yes
13.	Total malfunctions inserted: 4-8 ___8___	
14.	Malfunctions that occur after EOP entry: 1-4 ___3___	
15.	Abnormal Events: 1-2 ___3___	
16.	Major Transients: 1-2 ___1___	
17.	EOPs used beyond primary scram response EOP: 1-3 ___3-4___	
18.	EOP Contingency Procedures used: 0-3 ___1___	
19.	Approximate scenario run time: 45-60 minutes	No
20.	EOP run time: 40-70% of scenario run time	Yes
21.	Crew Critical Tasks: 2-5 ___3___	
22.	Technical Specifications are exercised during the test.	Yes

SCENARIO OVERVIEW

The unit is at 100% Rx power, steady state, equilibrium xenon, MOL.

The scenario begins with the operating crew preparing to ramp from 100% Rx Pwr to 95% Rx Pwr when Steam Dump valve 1MS004A fully opens. This pushes Rx Pwr above 100% and required the unit to be ramped down and the valve isolated.

Once 1MS004A has been isolated, the ramp to 95% can commence.

After enough of the actions to ramp to 95% have been completed or the ramp to 95% has been completed the Loop 2 T_{hot} Channel will fail High. This failure will require the crew to place the Control Rods into Manual to stop outward rod motion. The crew enters 1BOA INST-2, stablizes the plant and trips the associated bistable. The applicable Tech Spec for this failure is 3.3.1. Crew will not be required to trip bi-stables since bi-stable switches are not modeled.

Following initiation of bistable tripping for the T_{hot} Channel failure 0PR31J will go into High Rad Alarm without actuating the Emergency Make-Up Mode of Operation for the 0A VC Train. The crew will need to recognize the appropriate system response did not occur and will have to manually align the 0A VC Train into the Emergency Make-Up Mode.

The next failure to occur will be for the Main Generator Voltage Regulator output to fail high. This will result in increased excitation of the Main Generator which results in increased MVAR output and thus increased current flowing through the generator. The crew should recognize the failure respond to the applicable BAR procedures switch the voltage regulator to OFF and lower generator output to within limits.

The major failure for this scenario will be a seismic event that causes a Large Break LOCA. During 1BEP-0 it will be discovered that the 1B CS Train doesn't align properly. The crew must take manual actions to correctly align the 1B CS Train into operation.

When RWST water level reaches 49% the 1B RH Pp will trip due to a φC overcurrent condition. When RWST water level reaches 46% the 1SI8811A Cnmt Sump Isolation Valve will not open. This results in a Loss of Emergency Recirculation capability and thus 1BCA-1.1 needs to be enetered from 1BEP ES-1.3.

- Initialize IC-22: "full power, steady state, equilibrium xenon, MOL."
- Lineup control boards.
- Place simulator in run (allow simulator to run during board walkdowns and turnover).
- Type **bat a:/BY-46** and ensure the following insert:
- Perform TQ-BY-201-0113, Appendix A, “Simulator Exam/ Scenario Reset Checklist”

EVENT	TIME	MALF NO.	DESCRIPTION
1	0	N/A	1MS004A Fails Open, Ramp Unit to < 100% Rx Pwr
2	4	N/A	Ramp Unit from 100% to 95%
3	25	????	Failure of 1TE-445 High
4	??	????	Failure of 0PR31J to actuate Emergency Make-Up Mode
5	??	????	Failure of Main Generator Voltage Regulator High
6	??	????	Seismic event results in Large Break LOCA
7	??	????	1B CS Train fails to align, Manual action required
8	??	????	1B RH Pp trips on φC overcurrent at 49% RWST level
9	??	????	1SI8811A fails to open on low RWST level 46.7%

Note 1: Events 6 &7 can be tied to the seismic event and events 8 & 9 should be tied to RWST Level.

EVENT ADDITIONAL INFORMATION

1

Remote functions per event:

2

Remote functions per event:

BRIEF DESCRIPTION 1MS004A Fails Open

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A

Perform the action to determine cause of over power condition and take actions to reduce Rx Pwr to < 100%. The crew should also determine cause of the overpower condition and take actions to isolate the failed open Steam Dump valve.

(Cue)

- o Annunicator Bank D Rod Stop C-11
- o Annunicator Pwr Rng Flux High Rod Stop
- o Rx Power > 100%
- o Crew notices 1MS004A Open sugar cube light lit

(Response)

• Refer to 1BGP 100-4, Power Descension	**Crew**	____	____	____
• Direct actions to lower Rx Pwr	**US**	____	____	____
• PROGRAM Turbine Controls to ramp down	**U-1 AST**	____	____	____
• BORATE per BOP CV-6 to control Tave-Tref within desired limits	**U-1**	____	____	____
• INSERT Control Rods to maintain ΔI and Tave-Tref	**U-1**	____	____	____
• STOP ramp when < 100% Rx Pwr	**US**	____	____	____
• Direct NLO to Locally isolate 1MS004A	**U-1 AST**	____	____	____

EXAMINER'S NOTE:

COMMENTS _____

EVENT 2

BRIEF DESCRIPTION Ramp Unit from 100% to 95%

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Re-activity manipulation for this scenario.				
(Cue)				
o Per the initial scenario cue.				
(Response)				
• Refer to BGP 100-4, Power Descension	**CREW**			
• Direct actions to lower Rx Pwr	**US**			
• PROGRAM Turbine Controls to ramp down	**U-1 AST**			
• BORATE to control Tave-Tref within desired limits	**U-1**			
• INSERT Control Rods to maintain ΔI and Tave-Tref	**U-1**			
• STOP ramp at 95% Rx Pwr	**US**			

EXAMINER'S NOTE:

COMMENTS

EVENT 3

BRIEF DESCRIPTION 1TE-445 Fails High

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Recognize symptoms and respond to a Failed High Tave Channel				
(Cue)				
o Annunciator				
o Annunciator				
o Annunciator				
o Annunciator				
o Annunciator				
o Annunciator				
(Response)				
• Refer to BAR's	**U-1 AST/U-1**			
• Direct actions to enter 1BOA INST-2	**US**			
• PLACE Rod Bank Select Switch in Manual	**U-1**			
• Manually Defeat Failed RTD Channel				
• SELECT failed Tave channel with Tave Defeat Switch	**U-1**			
• SELECT failed ΔT channel with ΔT defeat switch	**U-1**			
• SELECT an operable RTD channel to the ΔT Recorder	**U-1**			
• Check if Rod Control can be placed in Auto				
• Turbine Low Power Interlock C5 Not Lit	**U-1**			
• Tave-Tref deviation Stable and within 1°F	**U-1**			
• Place Rod Bank Select Switch in Auto if desired	**U-1**			
• Check Pzr Level normal and Stable	**U-1**			
• Locally trip Bistables for failed channel	**U-1 AST/U-1**			
• Check P12 Interlock in correct state for current RCS temp	**U-1**			
• Defeat affected channel input to PDMS (T0422 to Test)	**U-1**			
• Enter Tech Spec 3.3.1 for the failed channel	**US**			

EXAMINER'S NOTE:

COMMENTS

EVENT 4

BRIEF DESCRIPTION 0PR31J High Alarm fails to align the 0A VC Train

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Recognize symptoms and respond to a 0PR31J High Rad Alarm				
(Cue)				
o RM-11-2-0PR31J Annunciator (0PB131) "Main Control Room Out Air In OA"				
(Response)				
• Direct actions to respond to the RM-11 alarm	**US**			
• Enter BAR RM-11-2-0PR31J	**U-1 AST/U-1**			
• Determines Auto actions have not occurred	**U-1 AST**			
• STARTS Make-Up Fan 0VC03CA	**U-1 AST**			
• Aligns recirculation charcoal adsorber	**U-1 AST**			
• Direct NLO to STOP 0VV01CA & B at 0VV01J	**U-1 AST**			
• Notify RP to perform BRP 5820-13	**US**			
• Enter Tech Spec 3.3.7, spec 3.7.10 not required	**US**			
EXAMINER'S NOTE: *The crew may elect to perform actions to swap trains of Main Control Room HVAC but this is not required or anticipated.*				
Implement 1BOP-VC-17 "Swapping Control Room Chillers and HVAC Trains"	***US***			
• *Secure electric heaters*	***U-1 AST***			
• *Secure chiller*	***U-1 AST***			
• *Secure Ventilation system*	***U-1 AST***			
• *Start standby Ventilation system*	***U-1 AST***			
• *Start standby chiller*	***U-1 AST***			
• *Start standby electric heaters*	***U-1 AST***			
(Feedback)				

COMMENTS _____

EVENT 5

BRIEF DESCRIPTION Main Generator Voltage Regulator Output Fails High.

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Recognize symptoms and respond to the Main Generator Voltage Regulator's output failing high.				
(Cue)				
o Annunciator (1-19-B6) "Generator Field Forcing"				
(Response)				
Implement BAR 1-19-B8				
• PLACE Voltage Regulator Control Switch to OFF	**U-1 AST**			
• ADJUST Base Adjuster reduce exciter field current to LESS THAN 100 amps	**U-1 AST**			
• Notify Electric Operations	**U-1 AST**			
• Check U-2 for adverse Main Generator trends	**U-1 AST**			
• If Generator field current cannot be reduced to LESS THAN 109 amps THEN trip the Rx if above P-8	**U-1 AST**			

COMMENTS

EVENT 6

BRIEF DESCRIPTION Large Break LOCA with failure of the 1B CS Train to properly align.

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Recognize symptoms and respond to a Large Break LOCA				
(Cue)				
o Annunciator () "Rx Trip"				
o Annunciator () "Safety Injection"				
(Response)				
Automatic Rx Trip	**CREW**____	____	____	____
Implement 1BEP-0, Reactor Trip or Safety Injection				
• Inform SM of unit status/potential EP event	**US/STA**____	____	____	____
• Reactor trip verified	**U-1**____	____	____	____
• Rod bottom lights				
• Reactor trip/Bypass breakers				
• Neutron flux dropping				
• Turbine trip verified by	**U-1 AST**____	____	____	____
• GVs closed				
• TVs closed				
• 4 KV ESF busses are energized	**U-1 AST**____	____	____	____
• Bus 141 energized				
• Bus 142 energized				
• SI Status				
• SI is actuated/required	**CREW**____	____	____	____
o SI ACTUATED permissive light lit				
o SI first out annunciator lit				
o SI equipment automatically actuated				
• Actuate SI	**U-1/U-1 AST**____	____	____	____
• Feedwater Status	**CREW**____	____	____	____

COMMENTS _____

• Verify ECCS Status	**CREW**____	____	____	
• Verify CV Pp's Running	**U-1 AST/U-1**____	____	____	
• Verify SI Pp's Running	**U-1 AST/U-1**____	____	____	
• verify RH Pp's Running	**U-1 AST/U-1**____	____	____	
• Verify RCFC's Running in Accident Mode	**U-1 AST/U-1**____	____	____	
• Verify Cnmt Isolation Phase A	**U-1 AST/U-1**____	____	____	
• Verify Cnmt Ventilation Isolation	**U-1 AST/U-1**____	____	____	
• Verify Aux. Feed System	**U-1 AST/U-1**____	____	____	
• Verify CC Pp's Running	**U-1 AST/U-1**____	____	____	
• Verify SX Pp's Running	**U-1 AST/U-1**____	____	____	
• Main Steam Line Isolation	**U-1 AST/U-1**____	____	____	

Note: Not exactly sure what failure will be input or what actions will be required to manually re-align the B CS Train

•* ***Check if Cnmt Spray is Required***				
• ***Manually align B Train*** Test Switch to 'Test Position'	**U-1 AST/U-1**____*	____*	____*	
• Verify Total Aux. Feed System Flow	**U-1 AST/U-1**____	____	____	
• Verify ECCS Valve alignment	**U-1 AST/U-1**____	____	____	
• Verify ECCS Flow	**U-1 AST/U-1**____	____	____	
• Verify one Pzr PORV relief path available	**U-1**____	____	____	
• Verify Main Generator Tripped	**U-1 AST/U-1**____	____	____	

COMMENTS _____

_____

_____

- Verify D/G's Running **U-1 AST/U-1**____ ____ ____
- Verify Ventilation Equipment aligned for Emergency **U-1 AST/U-1**____ ____ ____
- Verify Pzr Spray Valves & PORV's Closed **U-1 AST/U-1**____ ____ ____
- Maintain RCS Temperature Control **U-1 AST/U-1**____ ____ ____
- Check RCP Status **U-1 AST/U-1**____ ____ ____
- Check S/G Secondary Pressure boundaries Intact **U-1 AST/U-1**____ ____ ____
- Check S/G Tubes are Intact **U-1 AST/U-1**____ ____ ____

EXAMINER'S NOTE:
US directs transition from 1BEP-0 to 1BEP-1, Loss of Reactor of Secondary Coolant. When RWST Level get to 46% the Crew will transition to 1BEP ES-1.3, Cold Leg Recirculation.

- Check if RCS is Intact (Crew will transition to 1BEP-1, Loss of Rx or Secondary Coolant) **U-1 AST/U-1**____ ____ ____

Announcement of faulted Steam Generator symptoms **US**____ ____ ____
Transition to 1BEP-1 "Loss of Rx or Secondary Coolant"
- Implement STA function at transition from 1BEP-0 "RX TRIP OR SI" **STA**____ ____ ____
- Monitor plant conditions using status trees **STA**____ ____ ____

Operator actions of 1BEP-1 establish the following conditions:
- RCPs tripped (RCP should have been tripped earlier) **U-1**____ ____ ____
- Steam Generator boundaries intact **U-1 AST**____ ____ ____
  - All Steam Generator pressures stable
- SG levels maintained between 10%(31%) - 50% **U-1 AST**____ ____ ____
- Check secondary radiation normal **U-1 AST**____ ____ ____
  - All secondary radiation trends normal for plant conditions
- Acceptable RCS subcooling **U-1**____ ____ ____
- Secondary heat sink **U-1**____ ____ ____
  - SG NR levels > 10%(31%)
  - > 500 gpm total flow
- RCS pressure is stable/rising **U-1**____ ____ ____
- PZR level > 12%(28%) **U-1**____ ____ ____

COMMENTS _____

_____

_____

- Check if CS should be Stopped **U-1**_____ _____ _____
  - CS Pumps running
  - Reset CS signal
  - Spray Add Tank Lo-2 level lights lit (answer should be no)
  - Cnmt pressure less than 15 psig (it may be)
  - Sprays operating time greater than 8 hours (it will not be)

- Check if RH Pumps should be Stopped **U-1**_____ _____ _____
  - Reset SI
  - Verify SI ACTUATED permissive light NOT LIT
  - Verify AUTO SI BLOCKED permissive light LIT
  - Check RCS pressure greater than 325 psig (it won't be so go to step 10)

- Check if DG's should be stopped **U-1**_____ _____ _____
  - Check 4 KV ESF busses energized by offsite power
  - Check 4 KV Non-ESF busses energized by offsite power
  - Stop any unloaded DG

- Initiate evaluation of plant status **U-1**_____ _____ _____
  - Verify power to a least on RH pump
  - Verify CNMT sump isol valve position lights LIT
  - Check Aux Bldg radiation trends NORMAL for PLANT CONDITIONS
  - Reset CNMT Isol Phase A
  - Place Hydrogen Monitors in service per BOP PS-9
  - Consult TSC for obtaining samples
  - Evaluate plant equipment
    - Prepare Hydrogen Recombiners to run per BOP OG-10
    - Align SX MDCT for long term cooling per BOP SX-T2
    - Shutdown all HD Pumps
    - Shutdown FW Pumps per BOP FW-2
    - Shutdown all unnecessary CD/CB Pumps per BOP CD/CB-2
    - Align NDCT for temperature and level control
    - Shutdown all unnecessary CW Pumps per BOP CW-2
    - Shutdown chiller on non-operating VC train

- Check if RCS cooldown and depressurization is required **U-1**_____ _____ _____
  - Check RCS pressure greater than 325 psig

- Check if transfer to cold leg recirculation is required **U-1**_____ _____ _____
  - Check ECCS in INJECTION MODE
  - Check RWST level less than 46% if yes go to 1BEP ES-1.3

EXAMINER'S NOTE:
US directs transition from 1BEP-0 or 1BEP-1 when RWST Level get to 46%. The Crew will transition to 1BEP ES-1.3, Cold Leg Recirculation.

• Recommend US transitions to 1BEP ES-1.3 "TRANSFER TO COLD LEG RECIRCULATION"	**STA**	_____	_____	_____
Transition to 1BEP ES-1.3 "TRANSFER TO COLD LEG RECIRCULATION"	**US**	_____	_____	_____
Direct operator actions of 1BEP ES-1.3 to establish the following conditions:	**US**	_____	_____	_____
• Establish CC flow to RH HXs	**U-1/U-1 AST**	_____	_____	_____
• Check U-0 CC HX aligned to U-1				
• Check 2 CC Pumps running				
• Open 1CC9412A/B				
• Check CC to RH HX flows > 5000 GPM				
• Check Cnmt floor water level > 8"(13")	**U-1 AST**	_____	_____	_____
• Align RH pumps suction to Cnmt sumps	**U-1 AST**	_____	_____	_____
• Place Train B SVAG valve control switch to CLOSE				
• Check RH Pumps both running (1B RH not running)				
• 1SI8811A NOT open (GO TO Att. A)				
• Check if RH Pump 1A needs to be aligned to CNMT Sump	**U-1 AST**	_____	_____	_____
• 1SI8811A closed				
• Check Train A Recirc flowpath from CNMT Sump available	**U-1 AST**	_____	_____	_____
• 1A RH pump running				
• 1SI8811A energized (1SI8811A is NOT energized)				
* Transfer to cold leg recirculation and establish ECCS recirculation flow before RWST level reaches 7%	**U-1 AST/U-1**	_____	_____	_____
• Place 1A RH pump in PULL OUT				
• Close 1SI8812A				
o Place 1A CS pump in PULL OUT				
• Close 1CS001A				
• Open 1SI8811A (It will not Open)				
o Reopen 1CS001A				
o Restart 1A CS pump (will NOT start)				
• Check if RH Pump 1B needs to be aligned to CNMT Sump	**U-1 AST**	_____	_____	_____
• 1SI8811B closed (open)				
• Close 1SI8812B				
• Check at least one CNMT Sump Recirc flowpath Established	**U-1 AST**	_____	_____	_____
• 1SI8811A Not Open				
• 1B RH Pp Not Running				
• Close 1SI8812B				
• Close 1SI8812B				
• Trip SVAG valve C/S's and then transition to1 BCA-1.1				

EXAMINER'S NOTE:
US directs transition from 1BCA-1.1 since neither train of Emergency Coolant Recirculation could be established.

COMMENTS _____

Transition to 1BCA-1.1 "Loss of Emergency Coolant Recirculation"	**US**	_____	_____	_____
Direct operator actions of 1BCA-1.1 to establish the following conditions:	**US**	_____	_____	_____
• Check Emergency Coolant Recirc Equip Available • At Least One Train Available • 1A RH Pp • 1SI8811A • 1B RH Pp • 1SI8811B	**U-1 AST**	_____	_____	_____
• RWST level LO-2 Alarm Lit	**U-1 AST**	_____	_____	_____
• CNMT sump isol valves OPEN (Dispatch NLO's)	**U-1 AST**	_____	_____	_____
• CNMT Floor water level at least 8" (13" adverse)	**U-1 AST**	_____	_____	_____
• CHECK at least one train of Emergency Recirc Equipment Restored (Answer will be NO)	**U-1 AST**	_____	_____	_____
• RESET SI • DEPRESS both SI reset Pushbutton	**U-1 AST**	_____	_____	_____
• RESET RWST Auto Swapover • Depress SI recirc sump isol valve reset pushbuttons	**U-1 AST**	_____	_____	_____
•* ADD Make-up to RWST as necessary • Initiate BOP SI-13, Filling the RWST	**U-1 AST**	_____*	_____*	_____*
• CHECK Intact S/G Levels • Narrow range level > 10% (31% adverse) • Feed flow maintaining BETWEEN 10-50% S/G level	**U-1 AST**	_____	_____	_____
• Initiate RCS Cooldown to 200°F	**U-1 AST**	_____	_____	_____

TERMINATE SCENARIO

COMMENTS _____

_____

_____

_____

_____

- Classify conditions per minimum applicable EP description **US**_____ _____ _____

  - **SITE EMERGENCY**
    - FS-1

- Identify reportability requirements **US**_____ _____ _____
  - SAF 1.1 - Declaration of an Emergency Class
  - SAF 1.5 - ECCS Injection/Actuation
  - SAF 1.6 - RPS actuation
  - SAF 1.7 - System actuation not including RPS

Facility: Byron Scenario No: #3 Op-Test No: 2008-01

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: Rx Power ~ 100%.

Turnover: Continue to operate at 100% Rx Power.

Event No.	Malf. No.	Event Type*		Event Description
1	NONE	C	BOP SRO	Shutdown the 1A CW Pp
2	NONE	R	RO SRO	Ramp down 50 MW to account for secondary inefficiencies resulting from CW Pp shutdown
3	MF CV23B 20	C	RO SRO	Failure of 1B Letdown Hx
4	MF FW22C	C	BOP SRO	1C CD/CB Pp Trip with Failure of STBY to Auto Start
5	MF CV10 0 60	I	RO SRO	Failure of 1CV121 Controller Low
6	MF FW02A	C	BOP SRO	1FW012B Fails Open
7	MF RP09B	M	TEAM	Rx Trip switch on 1PM05J Fails
8	MF TC03	C	TEAM	Turbine Trip Fails requires Manual Turbine Trip
9	MF FW43	C	TEAM	1A AF Pp Trips
10	MF FW44	C	TEAM	1A AF Pp trips after 1 minute run

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

SCENARIO NUMBER: #3

TITLE: Loss of Heat Sink requiring Bleed and Feed

TURNOVER INFORMATION:

The unit is at 100% power, steady state, equilibrium xenon, MOL.

THIS SCENARIO CONTAINS: The following objectives/K/A's

Start the 1A CW Pp per BOP CW-1
D/G Lube oil leak (Tech. Spec. only)
Load Ramp from 100% down 100 MW
Letdown Hx tube leak (Tech. Spec.)
1C CD/CB Pump trips standby fails to start
1CV121 Controller Fails Low
1B TDFWP Trips, 1A MDFWP doesn't start
Rx Fails to trip from 1PM05J
Turbine Fails to trip must use manual trip pushbutton
1A & 1B AFW Pump's fails to start

COMPLETION CRITERIA: Re-initiate feed flow to the hot dry S/G's

---

CRITICAL TASKS:

1. Manually Trip Rx from 1PM06J.
2. Manually Trip Turbine with manual trip pushbutton.
3. Initiate Bleed and Feed during 1BFR - H.1 when required.

Examinees: US _____
RO _____
BOP _____

Evaluator: _____ Date: _____

- X 1. Perform pre-startup procedures for the facility, including operation those controls associated with plant equipment that could affect reactivity.
- X 2. Manipulate the console controls as required to operate the facility between shutdown and designated power levels.
- X 3. Identify annunciators and condition-indicating signals and perform appropriate remedial action where appropriate.
- X 4. Identify the instrumentation systems and the significance of facility instrument readings.
- X 5. Observe and safely control the operating behavior characteristics of the facility.
- X 6. Perform control manipulations required to obtain desired operating results during normal, abnormal, and emergency situations.
- X 7. Safely operate the facility's heat removal systems, including primary coolant, emergency coolant, and decay heat removal systems and identify the relation of the proper operation of these systems to the operation of the facility.
- X 8. Safely operate the facility's auxiliary and emergency systems, including operation of those controls associated with plant equipment that could affect reactivity or the release of radioactive materials to the environment.
- X 9. Demonstrate or describe the use and function of the facility's radiation monitoring systems, including fixed radiation monitors and alarms, portable survey instruments, and personnel monitoring equipment.
- ___ 10. Demonstrate knowledge of significant radiation hazards, including permissible levels in excess of those authorized, and ability to perform other procedures to reduce excessive levels of radiation and to guard against personnel exposure.
- X 11. Demonstrate knowledge of the emergency plan for the facility, including, as appropriate, the operator's or senior operator's responsibility to decide whether the plan should be executed and the duties under the plan assigned.
- X 12. Demonstrate the knowledge and ability as appropriate to the assigned position to assume the responsibility associated with the safe operation of the facility.
- X 13. Demonstrate the applicant's ability to function within the control room team as appropriate to the assigned position, in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated.

Simulator Scenario Review Checklist

1. The scenario has clearly stated objectives in the scenario summary. — Yes
2. The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue crew into expected events. — Yes
3. The scenario consists mostly of related events. — Yes
4. Each event description consists of: — Yes
   - the point in the scenario when it is to be initiated
   - the malfunction(s) that are entered to initiate the event
   - the symptoms/cues that will be visible to the crew
   - the expected operator actions (by shift position)
   - the event termination point
5. No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event. — Yes
6. The events are valid with regard to physics and thermodynamics. — Yes
7. Sequencing/timing of events is reasonable, and allows for the examination team to obtain complete evaluation results commensurate with the scenario objectives. — Yes
8. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given. If time compression techniques are used, scenario summary clearly indicates. — Yes
9. The simulator modeling is not altered. — Yes
10. All crew competencies can be evaluated. — Yes
11. The scenario has been validated. — Yes
12. The sampling plan indicates that the scenario was not used for training during the requal cycle. Evaluate the need to modify/replace scenario if used. — Yes
13. Total malfunctions inserted: 4-8 ___6___
14. Malfunctions that occur after EOP entry: 1-4 ___3___
15. Abnormal Events: 1-2 ___3___
16. Major Transients: 1-2 ___1___
17. EOPs used beyond primary scram response EOP: 1-3 ___2___
18. EOP Contingency Procedures used: 0-3 ___0___
19. Approximate scenario run time: 45-60 minutes — No
20. EOP run time: 40-70% of scenario run time — Yes
21. Crew Critical Tasks: 2-5 ___3___
22. Technical Specifications are exercised during the test. — Yes

SCENARIO OVERVIEW

The unit is at 100% Rx power, steady state, equilibrium xenon, MOL.

The scenario begins with the operating crew preparing to start the standby Circulating Water Pump. The crew then starts the 1A CW Pp.

TSO calls and orders an emergency load drop of 100 MW. The crew refers to the load Follow Curve to determine the correct amount of boric acid that they will add during the ramp. The crew will reduce turbine load and control reactor parameters during the load reduction.

After the actions to ramp down 100 MW have been completed the online Letdown Heat Exchanger will develop a tube leak into the CC system. The crew will be alerted to the failure by the CC surge tank hi rad alarm. The crew will implement BOA PRI-6, CC Malfunction procedure to address the failure. The SRO should realize that the crew needs to enter the RCS Leakage Tech Spec 3.4.13 for excessive (> 10 gpm) RCS leakage. Once the crew identifies the online Letdown Heat Exchanger as the problem the crew will swap to the standby Letdown Heat Exchanger and isolate both the CV and CC sides of the leaking Letdown Heat Exchanger.

The next failure to occur will be for the 1C CD/CB pump to trip with a failure of the standby pump to start. The crew will take actions to manually start the standby pump while entering BOA SEC-1, Secondary Pump Trip procedure to address any other plant concerns.

Following the CD/CB pump trip the output of the controller for 1CV121 will fail low causing 1CV121 to drift closed reducing charging header flow. The reactor operator will need to take manual control of the controller and restore charging flow so that pressurizer level can be restored.

The 1B TDFWP Trips and the 1A MDFWP doesn't start to provide replacement feedwater flow. The crew will take actions per BOA SEC-1 to runback the Unit to 780 MW however the runback function on the turbine generator will not work so the crew will have to manually reduce turbine load.

The crew will not be able to maintain SG water levels and will have to trip the unit. This is the start of the major transient in which the reactor will not trip from the front panel 1PM05J. The reactor operator will have to use the alternate reactor trip switch located on 1PM06J. The turbine will also fail to trip and must be manually tripped using the trip pushbutton.

The reduction in feedwater results in lowering SG levels and a signal to automatically start the Aux. Feedwater Pumps. The 1A AFW pump starts but trips on overcurrent immediately after its start. The 1B AFW will start and run for 1 minute and then trip. With no AFW pumps running once the crew transitions out of 1BEP-0, the crew should enter 1BFR - H.1.

The crew will need to initiate an RCS bleed and feed once SG wide range levels fall below 27% (43% adverse). The scenario will be terminated when feedwater flow is re-initiated to a hot dry SG.

- Initialize IC-22: "full power, steady state, equilibrium xenon, MOL."
- Lineup control boards.
- Place simulator in run (allow simulator to run during board walkdowns and turnover).
- Type **bat a:/BY-46** and ensure the following insert:
- Perform TQ-BY-201-0113, Appendix A, “Simulator Exam/ Scenario Reset Checklist”

EVENT	TIME	MALF NO.	DESCRIPTION
1	0	N/A	Start Standby CW Pp
2	4	N/A	Ramp Unit from 100% down 100 MW
3	25	????	Failure of A Letdown Hx
4	??	????	1C CD/CB Pp trips Failure of STBY to start
5	??	????	Failure of 1CV121 Controller Low
6	??	????	1B TDFWP Trips 1A MDFWP fails to start
7	??	????	Rx Trip switch on 1PM05J fails
8			Turbine trip fails requires trip via manual trip pushbutton
9	??	????	1A AFW Pp trips on φC overcurrent immediately after starting
10	??	????	1B AFW Pp trips after 1 minute run

EVENT ADDITIONAL INFORMATION

1

Remote functions per event:

2

Remote functions per event:

BRIEF DESCRIPTION Start Standby CW pump

EXPECTED OPERATOR/PLANT RESPONSE	SAT	UNSAT	N/A

(Cue)

- Initial cue is to start standby Circulating Water Pump

(Response)

- Refer to 1BOP CW-1, Circulating Water System Startup **Crew** ____ _____ _____
- Direct actions to start 1A CW Pp **US**____ _____ _____
- BOP refers to 1BOP CW-1 step F.2 **U-1 AST**____ _____ _____
  - Verify local parameters are within spec
  - Start 1CW01PA CW Pp
  - Verify discharge valve 1CW001A is opening
  - Throttle 1CW001A to obtain 38-50 psid across 1A CW Pp

EXAMINER'S NOTE:

COMMENTS _____

EVENT 2

BRIEF DESCRIPTION Ramp Unit from 100% to 95%

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Re-activity manipulation for this scenario.				
(Cue)				
o Per the initial scenario cue.				
(Response)				
• Refer to BGP 100-4, Power Descension	**CREW**			
• Direct actions to lower Rx Pwr	**US**			
• PROGRAM Turbine Controls to ramp down	**U-1 AST**			
• BORATE per BOP CV-6 to control Tave-Tref within desired limits	**U-1**			
• INSERT Control Rods to maintain ΔI and Tave-Tref	**U-1**			
• STOP ramp at 95% Rx Pwr	**US**			

EXAMINER'S NOTE:

COMMENTS

EVENT 3

BRIEF DESCRIPTION Failure of the 1A Letdown Heat Exchanger (Tube Leak)

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Recognize symptoms and respond to a tube leak in the 1A Letdown Heat Exchanger.				
(Cue)				
o Annunciator RM-11 alarm CC Surge Tank Hi-Rad				
o CC Surge Tank level increasing				
o Indicated letdown line flow decreases				
(Response)				
• Refer to BAR's	**U-1 AST/U-1**	____	____	____
• Check CC Surge Tank level				
• Surge tank level > 13%	**U-1**	____	____	____
• Surge tank level stable	**U-1**	____	____	____
• Check CC System status				
• At least one CC Pp running	**U-1**	____	____	____
• CC Pp discharge pressure low alarm not lit	**U-1**	____	____	____
• Check Pzr Level normal and Stable	**U-1**	____	____	____
• Check CC System Temperature				
• CC Pp suction temp high alarm not lit	**U-1**	____	____	____
• CC Hx outlet temp < 120°F	**U-1**	____	____	____
• CC Hx outlet temp < 105°F	**U-1**	____	____	____
• Check RCP Cooling				
• RCP running	**U-1**	____	____	____
• CC flow to RCP's normal with no alarms lit	**U-1**	____	____	____
• CC Hx outlet rad monitor trends normal (won't be normal) Will go to Att B, Step 5	**U-1**	____	____	____
• Check for inleakage from RCP Thermal Barrier				
• RCP Therm Barr CC Wtr Flow alarms Lit OR	**U-1**	____	____	____
• Seal inj flow abnormally Hi (Both will be no goto step 6)	**U-1**	____	____	____
• Isolate CC System Inleakage				
• Check inleakage from RCS (cc rad trends rising)	**U-1**	____	____	____
• Notify Chem to sample CC system for activity	**U-1**	____	____	____
• Locate and Isolate inleakage from 1A L/D Hx	**U-1**	____	____	____
• Locally Isolate CV side of 1A L/D Hx	**U-1**	____	____	____
• Locally Isolate CC side of 1A L/D Hx	**U-1**	____	____	____

EXAMINER'S NOTE:

COMMENTS

EVENT 4

BRIEF DESCRIPTION 1C CD/CB Pp Trips with failure of Standby Pp to auto start

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Recognize symptoms and respond to a trip of the 1C CD/CB Pp with a failure of the standby Pp to auto start.				
(Cue)				
o Annunciator 1PM03J "CD/CB Pp Trip"				
(Response)				
• Direct actions to respond to the tripped CD/CB Pp	**US**			
• Enter 1BOA SEC-1, Secondary Pump Trip	**Crew**			
• Check Turbine Load				
• Check Turbine Load > 700 MW	**U-1 Ast**			
• Check Standby CD/CB Pp Running (failed to auto start)	**U-1 Ast**			
• Start Aux Oil Pp for Standby CD/CB Pp	**U-1 Ast**			
• Start Standby CD/CB Pp	**U-1 Ast**			
• Check at least 3 CD/CB Pp's running	**U-1 Ast**			
• Check FW flow > or = to Steam Flow	**U-1 Ast**			
• Check FW Pp's NOT Cavitating				
• Close recirc valve on tripped CD/CB Pp	**U-1 Ast**			
• Check FW Pp discharge flows Oscillating (shouldn't be)	**U-1 Ast**			
• Check CD/CB Pp Flow Restored				
• Check Alarm Not Lit CB Pp Dsch Flow Hi (1-17-B11)	**U-1 Ast**			
• Check Alarm Not Lit FW Pp NPSH Low (1-16-E1)	**U-1 Ast**			
• Check Plant Status				
• Check Alarm Not Lit PDMS Inop (1-10-E8)	**U-1**			
• Check 1BOL 3.h Pwr Dist Monitoring Sys Not Entered	**U-1 Ast**			
• Check Alarm Not Lit PDMS Limit Exceeded (1-10-D7)	**U-1 Ast**			
• Check Delta I near target	**U-1 Ast**			
• Check Alarm Not Lit Rod Bank Lo Insert Limit (1-10-B6)	**U-1 Ast**			
• Check Alarm Not Lit Turbine runback	**U-1 Ast**			
• Check Alarm Not Lit Loss of Turb Load C7 (1-BP-4.6)	**U-1 Ast**			
• Restore Plant Conditions				
• Adjust Boron Conc. as necessary	**U-1**			
• Verify control in Auto	**U-1 Ast**			
• Review BOP CD/CB-1 & CD/CB-2	**U-1 Ast**			
• Adjust SG blowdown flows and calorimetric inputs	**U-1 Ast**			
• Verify DEHC feedback loop In Service	**U-1 Ast**			
• Notify Chemistry to monitor secondary systems	**U-1 Ast**			
• Return to Procedure and Step in Effect	**US**			

EVENT 5

BRIEF DESCRIPTION The controller for 1CV121 fails low.

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A

Recognize symptoms and respond to the 1CV121 control valve controller output failing low.

(Cue)

- Charging Flow starts lowering.
- RCP seal injection low starts lowering.
- VCT level starts increasing.

(Response)

• PLACE Flow Controller 1FK-121 in Manual	**U-1** ____	____	____	____
• ADJUST Controller Output to re-open 1CV121	**U-1** ____	____	____	____

EXAMINER'S NOTE:
Depending on how fast the Reactor Operator catches the failure the crew may not enter a procedure to correct the failure. The SRO may direct the RO to m place the failed controller to manual and re-establish charging flow. If the crew delays they may enter the BAR for low charging low BAR 1-9-D3, 1BOA PRI-1 Excessive Primary Plant Leakage, or 1BOA RCP-2 Loss of Seal Injection.

COMMENTS

EVENT 6

BRIEF DESCRIPTION 1B TDFWP Trips and the 1A MDFWP does not start.

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Recognize symptoms and respond Main Feedwater Pump trip.				
(Cue)				
• Annunciator (1-16-B1) "FW Pump 1B Trip"				
• Annunciator (1-15-A4) "SG 1A Flow Mismatch FW Flow Low"				
• Annunciator (1-15-B4) "SG 1B Flow Mismatch FW Flow Low"				
• Annunciator (1-15-C4) "SG 1C Flow Mismatch FW Flow Low"				
• Annunciator (1-15-D4) "SG 1D Flow Mismatch FW Flow Low"				
(Response)				
Implement 1BOA SEC-1, Secondary Pump Trip				
• Inform SM of unit status/potential EP event	**US/STA**			
• Close FW Pp Recirc Valve				
• Close 1FW012B	**U-1 Ast**			
• Check Turbine Load				
• Check Turbine Load > 700 MW	**U-1 Ast**			
• Check At Least One FW Pp Running	**U-1 Ast**			
• Restore Feed Flow				
• Check FW Pp 1A Available	**U-1 Ast**			
• Start Aux Oil Pp for 1A FW Pp	**U-1 Ast**			
• Verify 1FW016 controller in Manual at 20% demand	**U-1 Ast**			
• Start 1A FW Pp (Pp Trips on OC immediately)	**U-1 Ast**			
• Reduce Turbine Load				
• Initiate CD/FW Runback	**U-1 Ast**			
• Runback Pushbutton (Will not work)	**U-1 Ast**			
• OWS panel G-5512	**U-1 Ast**			
• Check Turbine Load Dropping	**U-1 Ast**			
• Verify Rod Control in AUTO	**U-1**			
• Initiate Boration as necessary	**U-1**			

EXAMINER'S NOTE:
US directs transition from 1BOA SEC-1 to 1BEP-0, Reactor Trip Response or Safety Injection when he realizes SG levels can not be maintained.

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Implement 1BEP-0, Reactor Trip Response or Safety Injection				
• Manually actuate Reactor Trip from 1PM05J (Trip switch does not work on 1PM05J)	**U-1**	____	____	____
*• Manually actuate Reactor Trip from 1PM06J (Trip switch works on 1PM06J)	**U-1**	____	____	____
• Reactor trip verified • Rod bottom lights • Reactor trip/Bypass breakers • Neutron flux dropping	**U-1**	____	____	____
• Turbine trip verified by (Auto trip fails) • GVs closed • TVs closed • Must use Manual trip pushbutton to actuate Turbine trip	**U-1 AST**	____	____	____
• 4 KV ESF busses are energized • Bus 141 energized • Bus 142 energized	**U-1 AST**	____	____	____
• SI Status • SI is not actuated or required o SI ACTUATED permissive light lit (Not Lit) o SI first out annunciator (Not Lit) o SI equipment automatically actuated (Not running)	**CREW**	____	____	____
• Transition to 1BEP ES-0.1, Reactor Trip Response	**CREW**	____	____	____

COMMENTS _____

EXPECTED OPERATOR/PLANT RESPONSE	SAT	UNSAT	N/A

EXAMINER'S NOTE:
*The 1A AFW Pp trips on Overcurrent after initially starting. The 1B AFW Pp trips after a two minute run. US directs transitions to 1BEP ES-0.1 because SI has not actuated and is not required. The Crew will transition to 1BFR H-1 when **all** SG narrow range levels are < 10% (31% Adverse).*

1BEP ES-0.1, Reactor Trip Response

- Verify Generator Trip **U-1 AST**____ ____ ____
  - Main Transformer Output Breakers Open
    - Verify GCB 3-4
    - Verify OCB 4-5

- Maintain RCS Temperature Control **U-1**____ ____ ____
  - RCP Running RCS Temp stable at or trending to 557F

- Determine if Boration is Required **U-1 AST/U-1**____ ____ ____
  - RCP's Running

- Check FW Status **U-1 AST/U-1**____ ____ ____
  - FW isol monitor lights LIT
  - Trip all HD Pp's
  - Total Feed Flow to SG's > 500 gpm
  - SG Blowdown isol valves closed 1SD002A-H

- Verify all Control Rods Fully Inserted **U-1**____ ____ ____

- Check PZR Level > 17% **U-1**____ ____ ____
  - Check Charging and Letdown in Service
  - PZR Level Trending to Program Level

- Check PZR Pressure Control **U-1**____ ____ ____
  - PZR Pressure > 1829 psig
  - PZR Pressure Stable at or Trending to 2235 psig

- Check SG Level **U-1**____ ____ ____
  - Check Narrow range SG Level > 10% in any SG
  - Control Feed flow to maintain between 10%-50% SG lvl

- Transition to 1BFR H-1, Loss of Heat Sink when all SG narrow range levels drop below 10% and AF flow is < 500 gpm **CREW**____ ____ ____

EXPECTED OPERATOR/PLANT RESPONSE	SAT	UNSAT	N/A

EXAMINER'S NOTE:
US will direct transitions to Step 13 and initiate Bleed and Feed when three SG wide range levels are < 27% (43% Adverse).

- Check if Secondary Heat Sink is Required **U-1**_____ _____ _____
  - RCS Pressure > any Non-Faulted SG Pressure
  - RCS Temperature > 350F

- Check Cent Chg Pp Status **U-1**_____ _____ _____
  - Cent Chg Pp at least one Running

- Check if Bleed and Feed is Required **U-1**_____ _____ _____
  - SG Wide range level in any three SG's < 27% (43% adverse) or
  - PZR pressure > than 2335 psig due to Loss of Heat Sink

- Try to Establish AF to at least one SG **U-1**_____ _____ _____
  - Check SG Blowdown isol Valves Closed 1SD002A-H
  - Check SG Blowdown sample isol Valves Closed 1SD005A-D
  - Prior to initiating feed flow review Att B
  - Check AF Pp SX Suct Vlvs ARMED alarm Not Lit
  - Check AF Pp's Both Running (Attempt manual start)
  - Check AF test valves OPEN 1AF004A&B
  - Check AF isol Valves OPEN 1AF013A-H
  - Check AF Throttle Valves OPEN 1AF005A-H
  - Check Total AF flow > 500 gpm (It won't be)

- Reduce RCP Heat Input Stop all RCP's **U-1**_____ _____ _____

- Prepare FW System for Restoration
  - Check at least one CD/CB Pp Running
  - Place FW Reg valve in Manual at Zero Demand
  - Place FW Bypass Reg Valve in Manual at Zero Demand
  - Place Tempering flow control Valve in Manual at Zero Demand

- Reset FW Isolation Signal **U-1**____ ____ ____
  - Check FW isolation Aux Relay lights Lit
  - Check SI Not Actuated
  - Depress both FW Isolation Reset Pushbuttons
  - Check FW Isol Actd relay lights Not Lit
  - Dispatch an operator to pull FW Isol Relay Fuses

- Try to Establish Main FW flow to at least one SG **U-1**____ ____ ____
  - Check Startup FW Pp or 1A MDFWP available
  - Open FW tempering isol valves 1FW035A-D
  - Check at least two CD/CB Pp's running
  - Check Bus 159 Energized
  - Verify Startup FW Pp Aux Oil Pp Running
  - Verify Discharge Valve 1FW059 Open
  - Open recirc valve 1FW076 and place c/s to Modulate
  - Close Main FW Pp recirc valves 1FW012A-C
  - Start Startup FW Pp (Pp won't start)

- Try to establish 1A MDFWP (Unavailable previously) **U-1**____ ____ ____

- Try to establish Condensate Booster Pp flow **U-1**____ ____ ____
  - Close FW Pp recirc valves
  - Start Aux Oil Pp for selected Pp
  - Open selected FW Pp discharge valve 1FW002A-C, 1FW016, & 1FW059
  - Check SI Not Actuated
  - Check RCS Pressure < 1930 psig P-11 Lit (It won't be)
  - Depressurize RCS to 1880 psig by Opening one PZR PORV to drop SG pressure So CB Pp's can inject into the SG

EXAMINER'S NOTE:

US will direct transitions to Step 13 and initiate Bleed and Feed when three SG wide range levels are < 27% (43% Adverse). Step 13 through 16 must be perform without delay to ensure adequate core cooling is maintained.

•* Establish RCS Feed Path **U-1**_____* _____* _____*
- Stop all RCP's
- Actuate SI

•* Verify RCS Feed Path **U-1 AST/U-1**_____* _____* _____*
- Check Cent Chg Pp's at least one running or
- Check SI Pp's at least one running
- Check ECCS Valve Alignment Group 2 Injection lights Lit

•* Establish RCS Bleed Path **U-1 AST/U-1**_____* _____* _____*
- Verify PZR PORV isol Valves Energized and OPEN
- Open PZR PORV's 1RY455A &1RY456

•* Verify Adequate RCS Bleed Path **U-1 AST/U-1**_____* _____* _____*
- Verify PZR PORV Both Open
- Verify PZR PORV's isolation valves Both Open

EXAMINER'S NOTE:
Once RCS Bleed and Feed has been established the 1B AF Pp will become available. The scenario will end when the crew re-establishes feed flow to a Hot Dry SG per Att B.

Attachment B Feed Flow Limitations:

3 After Initiation of Bleed and Feed with Stable or Dropping Core Exit Temperatures

A. Feed any non-dry SG's as follows:
- If SG feedlines are not voided, then feed non-dry SG at desired rate
- If SG feedlines are voided, then feed the non-dry SG between 60-80 gpm for 10 minutes prior to restoring desired feedwater flow.

B. If all SG's are dry, then feed one SG as follows:
- Feed associated SG between 60-80 gpm for 10 minutes
- After the 15 minutes, feed at a rate NOT to exceed 100 gpm
- When associated SG Wide Range level is > 10% feed flow may be raised as desired

TERMINATE SCENARIO

COMMENTS _____

- Classify conditions per minimum applicable EP description **US**_____ _____ _____

  - **SITE EMERGENCY**
    - FS-1

- Identify reportability requirements **US**_____ _____ _____
  - SAF 1.1 - Declaration of an Emergency Class
  - SAF 1.5 - ECCS Injection/Actuation
  - SAF 1.6 - RPS actuation
  - SAF 1.7 - System actuation not including RPS

Facility: Byron Scenario No: #4 Op-Test No:

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: Rx Power ~ 4%.

Turnover: Rx is at ~ 4% power steady state, MOL.

Event No.	Malf. No.	Event Type*		Event Description
1	NONE	N	BOP SRO	Perform Main Turbine Oil Checks per 1BGP 100-2
2	IMF NI35B	I	RO SRO	Intermediate Range NI N-35 fails low
3	NONE	R	RO SRO	Increase or decrease Rx Pwr to > 10% or < P-6
4	IMF SPT01B	I	BOP SRO	1D S/G Steam Pressure Transmitter 1PT-544 fails low
5	IMF IPP05 600	I	RO SRO	Turbine Impulse Pressure Detector 1PT-505 fails high
6	IOR ZDI1CV CL	C	BOP SRO	L/D Hx TCV 1CC130A fails closed
7	IMF FW19B 3.5	M	TEAM	1C SG Feed Line Break inside Cnmt.
8	IMF DG08B	C	TEAM	1B D/G fails to start
9	IMF THO3C	M	TEAM	1C SGTR at 400gpm

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

SCENARIO NUMBER: #4

TITLE: _____

TURNOVER INFORMATION:

The unit is at 4% power, steady state, MOL.

THIS SCENARIO CONTAINS: The following objectives/K/A's

Perform Main Turbine Oil Checks per 1BGP 100-2
Intermediate Range NI N-35 becomes INOP (fails down scale)
Increase Rx Power to >10% or Decrease Rx Power to < P-6
1D S/G Steam Pressure Transmitter 1PT-544 fails low
Turbine Impulse Pressure Detector 1PT-505 Fails High
L/D Hx TCV 1CC130A fails closed
Respond to a Feedline Break Inside Cnmt on 1C S/G
Respond to a Failure of the 1A MSIV to Close
Respond to a Failure of 1B D/G to Start
Respond to a SGTR on 1C S/G

COMPLETION CRITERIA: Re-initiate feed flow to the hot dry S/G's

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CRITICAL TASKS:

1. Manually Trip Rx from 1PM06J.
2. Manually Trip Turbine with manual trip pushbutton.
3. Initiate Bleed and Feed during 1BFR - H.1 when required.

Examinees: US _____
RO _____
BOP _____

Evaluator: _____ Date: _____

- X 1. Perform pre-startup procedures for the facility, including operation those controls associated with plant equipment that could affect reactivity.
- X 2. Manipulate the console controls as required to operate the facility between shutdown and designated power levels.
- X 3. Identify annunciators and condition-indicating signals and perform appropriate remedial action where appropriate.
- X 4. Identify the instrumentation systems and the significance of facility instrument readings.
- X 5. Observe and safely control the operating behavior characteristics of the facility.
- X 6. Perform control manipulations required to obtain desired operating results during normal, abnormal, and emergency situations.
- X 7. Safely operate the facility's heat removal systems, including primary coolant, emergency coolant, and decay heat removal systems and identify the relation of the proper operation of these systems to the operation of the facility.
- X 8. Safely operate the facility's auxiliary and emergency systems, including operation of those controls associated with plant equipment that could affect reactivity or the release of radioactive materials to the environment.
- X 9. Demonstrate or describe the use and function of the facility's radiation monitoring systems, including fixed radiation monitors and alarms, portable survey instruments, and personnel monitoring equipment.
- ___ 10. Demonstrate knowledge of significant radiation hazards, including permissible levels in excess of those authorized, and ability to perform other procedures to reduce excessive levels of radiation and to guard against personnel exposure.
- X 11. Demonstrate knowledge of the emergency plan for the facility, including, as appropriate, the operator's or senior operator's responsibility to decide whether the plan should be executed and the duties under the plan assigned.
- X 12. Demonstrate the knowledge and ability as appropriate to the assigned position to assume the responsibility associated with the safe operation of the facility.
- X 13. Demonstrate the applicant's ability to function within the control room team as appropriate to the assigned position, in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated.

Simulator Scenario Review Checklist

1. The scenario has clearly stated objectives in the scenario summary. — Yes
2. The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue crew into expected events. — Yes
3. The scenario consists mostly of related events. — Yes
4. Each event description consists of: — Yes
   - the point in the scenario when it is to be initiated
   - the malfunction(s) that are entered to initiate the event
   - the symptoms/cues that will be visible to the crew
   - the expected operator actions (by shift position)
   - the event termination point
5. No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event. — Yes
6. The events are valid with regard to physics and thermodynamics. — Yes
7. Sequencing/timing of events is reasonable, and allows for the examination team to obtain complete evaluation results commensurate with the scenario objectives. — Yes
8. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given. If time compression techniques are used, scenario summary clearly indicates. — Yes
9. The simulator modeling is not altered. — Yes
10. All crew competencies can be evaluated. — Yes
11. The scenario has been validated. — Yes
12. The sampling plan indicates that the scenario was not used for training during the requal cycle. Evaluate the need to modify/replace scenario if used. — Yes
13. Total malfunctions inserted: 4-8 ___6___
14. Malfunctions that occur after EOP entry: 1-4 ___3___
15. Abnormal Events: 1-2 ___3___
16. Major Transients: 1-2 ___1___
17. EOPs used beyond primary scram response EOP: 1-3 ___2___
18. EOP Contingency Procedures used: 0-3 ___0___
19. Approximate scenario run time: 45-60 minutes — No
20. EOP run time: 40-70% of scenario run time — Yes
21. Crew Critical Tasks: 2-5 ___3___
22. Technical Specifications are exercised during the test. — Yes

SCENARIO OVERVIEW

The unit is at 4% Rx power, steady state, MOL.

The scenario begins with the operating crew preparing to perform the Main Turbine Oil System Checks per 1BGP 100-2. This will complete 1BGP 100-2 in preparation for the Mode change to MODE 1.

Intermediate Range Nuclear Instrumentation channel N-35 fails low. The down scale alarm will come in and N-35 will need to be declared inoperable. Crew will perform 1BOA Instr-1 for the failed NI channel. Tech Spec 3.3.1 conditions A and F must be entered. Condition F requires Thermal Power be decreased < P-6 or be increased > P-10 within 2 hours. The crew will have to decide which action to take. Whichever action the crew takes, it will account for the reactivity manipulation for this scenario.

The scenario should be set up to have one TDFWP running when the crew takes the shift. The crew may also want to roll the main turbine while increasing reactor power. This may be a distraction with only three crew members, need to ensure they complete reactivity manipulation. After reactivity manipulation has been completed, the crew will respond to a failure of 1PT-544, the 1D S/G steam pressure channel failing low. The BOP will take manual control of the 1D Feed Reg Valve and restore S/G level to normal. The Unit Supervisor will enter Tech Spec 3.3.2 and 3.3.4.

TSO calls and orders an emergency load drop of 100 MW. The crew refers to the load Follow Curve to determine the correct amount of boric acid that they will add during the ramp. The crew will reduce turbine load and control reactor parameters during the load reduction.

After the actions to ramp down 100 MW have been completed the online Letdown Heat Exchanger will develop a tube leak into the CC system. The crew will be alerted to the failure by the CC surge tank hi rad alarm. The crew will implement BOA PRI-6, CC Malfunction procedure to address the failure. The SRO should realize that the crew needs to enter the RCS Leakage Tech Spec 3.4.13 for excessive (> 10 gpm) RCS leakage. Once the crew identifies the online Letdown Heat Exchanger as the problem the crew will swap to the standby Letdown Heat Exchanger and isolate both the CV and CC sides of the leaking Letdown Heat Exchanger.

The next failure to occur will be for the 1C CD/CB pump to trip with a failure of the standby pump to start. The crew will take actions to manually start the standby pump while entering BOA SEC-1, Secondary Pump Trip procedure to address any other plant concerns.

Following the CD/CB pump trip the output of the controller for 1CV121 will fail low causing 1CV121 to drift closed reducing charging header flow. The reactor operator will need to take manual control of the controller and restore charging flow so that pressurizer level can be restored.

The 1B TDFWP Trips and the 1A MDFWP doesn't start to provide replacement feedwater flow. The crew will take actions per BOA SEC-1 to runback the Unit to 780 MW however the runback function on the turbine generator will not work so the crew will have to manually reduce turbine load.

The crew will not be able to maintain SG water levels and will have to trip the unit. This is the start of the major transient in which the reactor will not trip from the front panel 1PM05J. The reactor operator will have to use the alternate reactor trip switch located on 1PM06J. The turbine will also fail to trip and must be manually tripped using the trip pushbutton.

The reduction in feedwater results in lowering SG levels and a signal to automatically start the Aux. Feedwater Pumps. The 1A AFW pump starts but trips on overcurrent immediately after its start. The 1B AFW will start and run for 1 minute and then trip. With no AFW pumps running once the crew transitions out of 1BEP-0, the crew should enter 1BFR - H.1.

The crew will need to initiate an RCS bleed and feed once SG wide range levels fall below 27% (43% adverse). The scenario will be terminated when feedwater flow is re-initiated to a hot dry SG.

- Initialize IC-22: "full power, steady state, equilibrium xenon, MOL."
- Lineup control boards.
- Place simulator in run (allow simulator to run during board walkdowns and turnover).
- Type **bat a:/BY-46** and ensure the following insert:
- Perform TQ-BY-201-0113, Appendix A, “Simulator Exam/ Scenario Reset Checklist”

EVENT	TIME	MALF NO.	DESCRIPTION
1	0	N/A	Perform Main Turbine Oil Checks per 1BGP 100-2
2	4	N/A	Intermediate Range NI N-35 fails low
3	25	????	Increase Rx Power to >10% or Decrease Rx Power to < P-6
4	??	????	S/G Steam Pressure Transmitter 1PT-544 fails low
5	??	????	
6	??	????	
7	??	????	
8			
9	??	????	
10	??	????	

EVENT ADDITIONAL INFORMATION

1

Remote functions per event:

2

Remote functions per event:

EVENT 1

BRIEF DESCRIPTION Main Turbine Oil Checks per 1BGP 100-2

EXPECTED OPERATOR/PLANT RESPONSE	SAT	UNSAT	N/A

(Cue)

- Initial cue is to perform Main Turbine Oil Checks per 1BGP 100-2.

(Response)

- Refer to 1BGP 100-2, Plant Startup **Crew** ____ ____ ____
- Direct actions to perform step F.24 Main Turbine Oil Checks **US**____ ____ ____
- BOP refers to 1BGP 100-2 step F.24 **U-1 AST**____ ____ ____
  - Stop 1TG06E, Turning Gear Motor and Ensure zero speed
  - Place 1TO08P, Turbine Lift Oil Pps to OFF
  - Place 1TO5P, Emergency Oil Pp in Auto(After-Trip)
  - Place 1TO07P, Turbine Seal Oil Backup pump in Pull Out
  - Place 1TO06P, Bearing Oil Pp in Auto (After-Trip)
  - Place 1TO05P, Emergency Oil Pp in Pull Out.
    Ensure that the Bearing Oil Pp starts at approx. 12 psig
  - **PLACE** 1TO07P, Turb Seal Oil Backup Pp, in AUTO (AFTER-TRIP).
  - **PLACE** 1TO06P, Bearing Oil Pump, in PULL OUT. **ENSURE** that the Turbine Seal Oil Backup Pp starts at approximately 12 psig.
  - **PLACE** the switch for 1TO07P, Turbine Seal Oil Backup Pp, in the START (AFTER-CLOSE) position.
  - **START** 1TO06P, Bearing Oil Pump. **ENSURE** bearing oil pressure is 14 - 18 psig.
  - **PLACE** 1TO05P, Emergency Oil Pump, in AUTO (AFTER-TRIP).

> ***NOTE:***
> This switch position is necessary to permit automatic stopping of the Bearing Lift Pumps when Main Turbine speed is increased above approximately 600 rpm.

  - **PLACE** 1TO08P, Turbine Brng Lift Pps, in the AUTO position.
  - **VERIFY** that the Main Turbine Shaft is not rotating, then **START** 1TG06E, Turning Gear Motor, per BOP TG-15.
  - **VERIFY** 1TG06E, Turning Gear, GEAR ENGD light is ON and that the ZERO SPEED light goes OFF.

COMMENTS _____

BRIEF DESCRIPTION Intermediate Range NI N-35 becomes INOP (fails down scale)

EXPECTED OPERATOR/PLANT RESPONSE	SAT	UNSAT	N/A

(Cue)

- Intermediate Range NI N-35 fails down scale.

(Response)

• Enter 1BOA INST-1 for N-35 failure	**US**____	____	____	
• Check Power Range Permissive P-10 LIT	**RO**____	____	____	
• Check IR Channels Only One Failed	**RO**____	____	____	
• Check reactor power > 1x10-5% RTP (> P-6)	**RO**____	____	____	
• Within 2 hours the crew must • Reduce Rx Pwr to < 1x10-5% RTP (< P-6) OR • Raise Rx Pwr to > 10%	**RO**____	____	____	
• Refer to Tech Specs 3.3.1 and 3.3.4	**RO**____	____	_____	

COMMENTS _____

EVENT 3

BRIEF DESCRIPTION Increase Reactor Power to > 10% within the next 2 hours

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Re-activity manipulation for this scenario.				
(Cue)				
o Per Tech Spec 3.3.1 Cond. F				
(Response)				
• Refer to BGP 100-3, Power Ascension	**CREW**			
• Direct actions to Raise Rx Pwr to > 10%	**US**			
• Pull control rods to increase Rx Pwr	**U-1**			
• Verify Steam Dump valves open in Steam Pressure Mode when Rx Pwr increases	**U-1 AST**			
• Maintain ΔI on target	**U-1**			
• STOP Rx Pwr increase when > 10%	**US**			

EXAMINER'S NOTE: ΔI control should start as early in the power range as practical. It is desirable to have ΔI on target. This will help reduce the potential of a ΔI transient. Controlling ΔI at low power with CBC may lead to a ΔI transient as the reactor is increased in power.

COMMENTS

EVENT 4

BRIEF DESCRIPTION 1D S/G Steam Pressure Transmitter 1PT-544 fails low

EXPECTED OPERATOR/PLANT RESPONSE	SAT	UNSAT	N/A

Recognize symptoms and respond to the failure of 1D S/G Steam Pressure Transmitter 1PT-544.

(Cue)

o
o
o

(Response)

• Refer to 1BOA INST-2	**US**____	____	____	
• S/G Level Normal				
• Place Feed Reg Valve in Manual	**U-1**____	____	____	
• Verify adequate Feedwater ΔP	**U-1**____	____	____	
• Restore S/G Level to a stable condition	**U-1**____	____	____	
• Locally Trip Bistables for Affected Channel				
• 1PT-544 Lo Press SI / Stm Line Isol PB544B	**U-1**____	____	____	
• 1PT-544 Hi Stm Rate Isol PB544A	**U-1**____	____	____	
• Refer to Tech Spec's 3.3.2 and 3.3.4	**US**____	____	____	

COMMENTS _____

EVENT 5

BRIEF DESCRIPTION Turbine Impulse Pressure Detector (1PT-505) Fails High.

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Recognize symptoms and respond to 1PT-505 failure				
(Cue)				
o Annunciator (1-14-D1) "TAVE CONT DEV HIGH"				
o Control rod outward motion				
o T_{REF} rising on 1TR-0412				
(Response)				
Implement 1BOA ROD-1 "UNCONTROLLED ROD MOTION" and direct operator actions to establish the following conditions:	***US***	_____	_____	_____
• *Check turbine power stable*	***U-1 AST***	_____	_____	_____
• *Check Rod Control Status*	***U-1***	_____	_____	_____
• *Place Rod Control in manual*				
• *Check Rod Control inputs*	***U-1 AST***	_____	_____	_____
• *Identify 1PT-505 failure*				
Implement 1BOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL" Attachment D and direct operator actions to establish the following conditions:	**US**	_____	_____	_____
• Place rod control in MANUAL	**U-1**	_____	_____	_____
• Restore steam dumps	**U-1 AST**	_____	_____	_____
• 1PT-505 channel defeated	**U-1/U-1 AST**	_____	_____	_____
• Operator dispatched to trip bistable for 1PT-505	**U-1**	_____	_____	_____
• Check T_{AVE}-T_{REF} deviation	**U-1**	_____	_____	_____
• Rod control returned to AUTO (NO auto withdrawal available)	**U-1**	_____	_____	_____
• Check ATWS Mitigation System	**U-1**	_____	_____	_____
• Trip AMS bistable				
• Check P-13 interlock NOT lit	**U-1 AST**	_____	_____	_____
• Review Tech Spec 3.3.1, Rx Trip Instrumentation (Verify or place P-13 in required state in 1 hour)	**US/STA**	_____	_____	_____
• Inform SM of unit status/EP potential	**US/STA**	_____	_____	_____
• Notify IM Dept. to investigate 1PT-505 failure	**US/STA**	_____	_____	_____
• Acknowledges failure report and performs EP eval	**SM**	_____	_____	_____

EXAMINER'S NOTE:

COMMENTS _____

EVENT 6

BRIEF DESCRIPTION Letdown Heat Exchanger Temperature Control valve fails closed.

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Recognize symptoms and respond Main Feedwater Pump trip.				
(Cue)				
• Annunciator (1-8-C5) "LTDWN Hx OUTLET TEMP HIGH"				
(Response)				
Implement BAR 1-8-C5				
• U-1 RO will have to determine cause of problem	**U-1**____	____	____	____
• U-1 RO Takes Manual control of 1CC130A and Opens Control valve	**U-1**____	____	____	____
• U-1 RO may have to re-align letdown flow through demins By placing 1CV129 into demin position and back to Auto	**U-1**____	____	____	____

EVENT _____

BRIEF DESCRIPTION 1B SG Feedline Break Inside CNMT

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Recognize symptoms and respond to conditions requiring a Rx trip				
(Cue)				
o Cnmt pressure rising				
o 1B SG level dropping				
o Annunciator (1-15-B9) "S/G 1B LEVEL DEVIATION HIGH LOW"				
o 1B SG FW flow > steam flow				
o Annunciator (1-1-A2) "CNMT DRAIN LEAK DETECT FLOW HIGH"				
(Response)				
Initiate a manual Rx trip/announce a Rx trip	**CREW**	____	____	____
Implement 1BEP-0 "REACTOR TRIP OR SI"	**US**	____	____	____
Immediate operator actions of 1BEP-0 establish the following conditions:				
• Reactor is tripped	**U-1**	____	____	____
• All rod bottom lights lit				
• Rx Trip and Bypass breakers open				
• Neutron flux dropping				
• Turbine is tripped	**AST**	____	____	____
• TVs closed				
• GVs closed				
• 4 KV ESF busses are energized	**AST**	____	____	____
• Bus 141 energized				
• Bus 142 energized				
• SI Status				
• SI is actuated/required	**CREW**	____	____	____
o SI ACTUATED permissive light lit				
o SI first out annunciator lit				
o SI equipment automatically actuated				
• Actuate SI	**U-1/AST**	____	____	____

COMMENTS _____

EVENT B (con't.)

BRIEF DESCRIPTION 1B SG Feedline Break Inside CNMT

EXPECTED OPERATOR/PLANT RESPONSE	SAT	UNSAT	N/A
• FW isolated • FW pumps tripped • FWI monitor lights lit • FW pump discharge valves closed (1FW002A-C)	**AST**____	____	____
• ECCS pumps running • CV pumps running • RH pumps running • SI pumps running	**U-1**____	____	____
• RCFCs running in accident mode • RCFC accident mode status lights lit	**AST**____	____	____
• CNMT Phase A valves closed • Group 3 monitor lights lit	**AST**____	____	____
• CNMT VENT isolation valves closed • Group 6 monitor lights lit	**AST**____	____	____
• AF pumps running • AF pumps running • 1AF013 valves open • 1AF005 valves throttled	**AST**____	____	____
• CC pumps running	**AST**____	____	____
• SX pumps running	**AST**____	____	____
• Main Steamlines are isolated (1A MSIV does NOT close) • Attempt to close 1A MSIV	**U-1/AST**____	____	____
• Containment Spray is not required • Cnmt pressure < 20 psig	**AST**____	____	____
• Verify total AF flow • > 500 gpm • Control feed flow to maintain SG NR level between 10%(31%) - 50% • No SG level rising in an uncontrolled manner (may identify rising level and isolate 1AF013A/E)	**AST**____	____	____

COMMENTS _____

EVENT B (con't.)

BRIEF DESCRIPTION 1C SG Feedline Break Inside CNMT

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
• ECCS valves aligned with flow • Group 2 cold leg injection monitor lights lit • > 100 gpm on indicator 1FI-917	**U-1**			
• Check at least 1 PZR PORV relief path available	**U-1**			
• Generator tripped • Switch yard breakers open • PMG breaker open	**AST**			
• Diesel Generators running • 1A Diesel Generator running *• Attempt to start 1B Diesel Generator • 1SX169A open • Operator dispatched	**AST**	*	*	*
• Ventilation aligned for emergency operation	**U-2 AST /AST**			
• PZR PORVs and spray valves closed	**U-1**			
• RCS temperature < 557°F	**U-1**			
• RCPs running	**U-1**			
• Inform SM of unit status/potential EP event	**US/STA**			
Recognize symptoms and respond to a faulted steam generator in accordance with 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" **(Cue)** o 1B SG depressurizing in an uncontrolled manner o 1B SG is completely depressurized. **(Response)**				
Announcement of faulted steam generator symptoms	**CREW**			
Transition to 1BEP-2 "FAULTED SG ISOLATION"	**US**			
Coordinate/direct operator actions to:	**US**			
• Isolate/close MSIVs & MSIV bypass valves (1A MSIV open)	**AST**			
• Identify at least 1 non-faulted SG	**AST**			
*• Isolate 1C SG before transition out of 1BEP-2 • AF valves closed (1AF013B/F) o Main feedwater isolated o 1B SG PORV closed (1MS018B) o Blowdown isolation/sample valves closed (1SD002E/F, 1SD005C)	**US/AST**	*	*	*
• Monitor AF pump suction pressure	**AST**			
• Transition to 1 BEP-1 “LOSS OF REACTOR OR SECONDARY COOLANT”				

Examiner’s Note: *Crew may transition to BEP-3, SGTR, based on radiation monitor trends from BEP-2. SGTR will occur when 1AF013C is closed.*

EVENT C

BRIEF DESCRIPTION SGTR – 1C SG (450 gpm)

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
Recognize and diagnose/respond to a SGTR in accordance with 1BEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT" OAS				
(Cue)				
o 1C Steam Generator Level / Pressure rising in an uncontrolled manner				
(Response)				
Announce indications of a SGTR	**CREW**			
Transition from 1BEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT" to 1BEP-3 "SGTR"	**US**			
• RCPs running	**U-1**			
* Identify the 1C SG as the ruptured SG and isolate prior to transition to 1BCA-3.1	**US/AST**	*	*	*
o 1A SG PORV in auto and closed	**AST**			
o 1SD002A & B closed	**AST**			
o Attempt closure of 1A MSIV - MSLI	**AST**			
o Main FW pump turbine HP stop valves closed	**AST**			
o Steam dump valves closed	**AST**			
• 1MS067A-D and 1MS009A-D closed	**AST**			
• 1GS001 and 1GS004 closed	**AST**			
• 1MS107A and B closed (local operation)	**AST**			
o 1B/1D SG PORVs used to stabilize RCS temp. at 557°F	**AST**			
• 1AF013A/E closed	**AST**			

Examiner's Note: *Crew should not feed ruptured S/G if Narrow range level is < 10% (31% Adverse Cnmt).*

• Check Ruptured S/G Pressure Greater than 320 psig	**U-1**			

Transition from 1BEP-3 SGTR to 1BCA-3.1, SGTR with Loss of Reactor Coolant Subcooled Recovery Desired.

COMMENTS

EVENT C

BRIEF DESCRIPTION SGTR – 1C SG (450 gpm)

EXPECTED OPERATOR/PLANT RESPONSE	SAT	UNSAT	N/A
• Reset SI if Necessary • Depress both SI reset pushbuttons • Verify SI Actuated permissive light NOT LIT • Verify Auto SI Blocked permissive light LIT	**U-1**____	____	____
• Reset Containment Isolation • Reset Cnmt Isol Phase A if necessary • Reset Cnmt Isol Phase B if necessary • Check SACs any running • Open instrument air Cnmt Isol Valves • Open 1IA065 • Open 1IA066	**U-1**____	____	____
• Verify all AC Busses Energized by Offsite Power • Bus 141 • Bus 156 • Bus 142 • Bus 157 • Bus 143 • Bus 158 • Bus 144 • Bus 159	**AST**____	____	____
• Check if CS should be Stopped • CS pumps run lights LIT • Reset CS signal • Spray Add Tank Lo-2 Level lights LIT	**AST**____	____	____
Examiner's Note: *Crew should not feed ruptured S/G if Narrow range level is < 10% (31% Adverse Cnmt).*			
• Check Ruptured S/G Level • Narrow Range level > 10% (31%)	**AST**____	____	____
• Check if RH Pps should be Stopped • RCS pressure > 325psig (It will be) • RCS pressure Stable or Rising (It will be) • Stop RH Pps and place in standby	**U-1**____	____	____

COMMENTS _____

EVENT C

BRIEF DESCRIPTION SGTR – 1C SG (450 gpm)

EXPECTED OPERATOR/PLANT RESPONSE		SAT	UNSAT	N/A
• Initiate Evaluation of Plant Status • Check Aux Bldg Radiation Trends • Place Hydrogen Monitors in service per BOP PS-9 • Consult TSC for obtaining samples • Evaluate equipment needed to assist in plant recovery • At Shift Managers discretion prepare Hydrogen Recombiners to run per BOP OG-10	**Crew**			
• Check if S/G Secondary Pressure Boundaries are Intact • No S/G Pressure Dropping in an Uncontrolled Manner • No S/G Completely Depressurized	**Crew**			
• Check Intact S/G Levels • Narrow range levels > 10% • Control feed flow to maintain narrow ranges 18%-50%	**Crew**			
• Initiate RCS Cooldown to 200°F • Maintain C/D rate in RCS Cold Legs < 100 °F / Hr • Check PZR Pressure < 1930 psig P-11 LIT • Block Steamline Isol Signal • Dump Steam from Intact S/G's to initiate a Cooldown	**Crew**			

Examiner's Note: *Crew should use Intact S/G's to establish a 100 °F / Hr cooldown rate. Based on cold leg temperatures the crew may have already exceeded the 100 °F / Hr due to the SGTR.*

TERMINATE SCENARIO

COMMENTS

- Classify conditions per minimum applicable EP description **US**_____ _____ _____

  - **SITE EMERGENCY**
    - FS-1

- Identify reportability requirements **US**_____ _____ _____
  - SAF 1.1 - Declaration of an Emergency Class
  - SAF 1.5 - ECCS Injection/Actuation
  - SAF 1.6 - RPS actuation
  - SAF 1.7 - System actuation not including RPS