Form 3.3-1 Scenario Outline

Facility:	Byron Station	Scenario #:	N23-1
Scenario Source:	New	Op. Test #:	2023-301
Examiners:		Applicants/ Operators:	
Initial Conditions:	(IC 73) 54% RTP, MOL, steady state conditions		
Turnover:	Initiate Containment Vent Release per BCB 400-ECNMT/ROUTINE. Ramp the unit up to 64% power at 1.6 MW/Min. U0-CC Pump, 1A FW PP and 1B HD PP OOS.		
Critical Tasks:	CT-14 – Close containment minipurge isolation valves prior to reporting completion of 1BEP-0 Attachment B CT-36 – Transfer to cold leg recirculation prior to reaching 5% in the RWST		

Event No.	Malf. No.	Event Type*	*Event Description*
1	None	N (BOP, US)	Initiate Containment Vent Release per BCB 400-ECNMT/ROUTINE
2	None	R (ATC, BOP, US)	Ramp up to 64% power at 1.6 MW/Min
3	CC01B CC01A	C, TS, MC (BOP, US)	1B CC Pump Trip 1A CC Pump does not auto start
4	ZDI1CC685 OPEN YP:MCC07A TRUE YPXMCC07A=125	C, MC, TS (BOP, US)	1A RCP thermal barrier leak into CC 1CC685 does not close in manual or auto
5	PN1932 ON	C, MC (ATC,US)	PZR Control Group C SCR firing circuit error (BAR 1-12-C5, PZR PHASE LOSS OR REVERSAL)
6	CV07A	C (ATC, US)	Seal Injection filter plug (manual RX trip required) First RX trip switch does not work
7 **[CT]**	TH06A 540000	M (ATC, BOP, US)	LOCA in containment (ES 1.3)
8 **[CT]**	Smart Scenario Loop	C	Fail signal to trip 1VQ05A/B/C

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control

Critical Tasks:

CT-14: Close containment minipurge isolation valves prior to reporting completion of 1BEP-0 Attachment B (K/A number – Containment System 103-A3.01; importance 3.9/4.2)

- Safety Significance**:** Closing at least one containment isolation valve on each critical Phase A penetration, under the postulated plant conditions constitutes a task that "is essential to safety," because "its improper performance or omission by an operator will result in direct adverse consequences or significant degradation in the mitigative capability of the plant." In particular, the crew has failed to prevent "degradation of any barrier to fission product release." In this case, the containment barrier is needlessly left in a degraded condition.

- Cues: Indication that an automatic isolation of a containment release did not occur with a primary system break in containment.

- Performance Indicator: Manipulation of controls as required to close at least one containment isolation valve to stop the containment release.

- Feedback: ESF system status lamps, or valve position indication on 0PM02J, that at least one containment isolation valve is closed.

CT-36: Transfer to cold leg recirculation prior to reaching 5% in the RWST. (K/A Number – ECCS 006-A4.07, Importance – 4.4/4.4)

- Safety Significance**:** Improper performance or omission by an operator will result in direct adverse consequence(s) or a significant degradation in the mitigative capability of the plant. Correct performance prevents unnecessary challenges to the CSFs of Core cooling and Containment

- Cues: Indication and/or annunciation that safety injection is actuated AND Indication and/or annunciation that RWST level is at or below 46.7% AND Indication that containment sump level is at or above the minimum level required for transfer to cold leg recirculation.

- Performance Indicator: Manipulation of controls as required to transfer to cold leg recirculation and establish ECCS recirculation flow: Valve position indication that the cold leg recirculation flow path is established and Control switch indication that the circuit breakers or contactors for the low-head injection pumps (and other ECCS injection pumps as necessary) are closed

- Feedback: Flow indication of the recirculation of containment sump water through the RHR heat exchangers and into the RCS.

Scenario 23-1 Summary

The scenario will start with Unit 1 at 54% power, MOL, steady state conditions. The crew will be turned over the activity to perform a containment release per BCB 400-ECNMT/ROUTINE. Crew will be directed to ramp the unit up to 120 MW at 1.6 MW/Min. U0-CC Pump, 1A FW PP and 1A HD PP OOS.

Event 1 Initiate Containment Vent Release per BCB 400-ECNMT/ROUTINE
The crew will Initiate a Containment Vent Release per BCB 400-ECNMT/ROUTINE. Performance steps will be from BOP VQ-6 step F.4

Event 2 Ramp up 120 MW per 1BGP 100-3
As directed by the turnover, the crew will initiate a ramp up 120MW power at 1.6 MW/Min. The crew will hold a reactivity brief to review material prepared prior to the beginning of the scenario.The crew will ramp per 1BGP 100-3. After the ramp is initiated and sufficent reactivity maneuvering is observed, and at the lead examiner discretion, continue on with Event 3.

Event 3 1B CC Pump Trip – 1A CC Pump does not auto start
The crew will manually start the 1B CC pump per BAR 1-2-A4 CC PUMP TRIP or OP-AA-103-102-1001 STRATEGIES FOR SUCCESSFUL TRANIENT MITIGATION. The crew will enter Tech Spec 3.7.7 Condition B. Once alarms are clear and system parameters are stable, at the lead examiner discretion, continue to Event 4.

Event 4 1A RCP seal leak into CC will require the isolation of CC to all RCP thermal barriers
The crew will recieve radiation alarms in the CC system and will recognize CC tank level rising. Crew will enter 1BOA PRI-6, COMPONENT COOLING MALFUNCTION to address the leakage. Crew will identify abnormal seal injection flow and 1CC685 did not auto close as expected. Crew will attempt to close 1CC685 and, when unsuccessful, be directed to close 1CC9438 isolating all component cooling flow to the RCP thermal barriers (RCP oil coolers will remain unaffected). The SRO will enter TS 3.6.3 Condition A for containment isolation valve 1CC685 and request direction of the SM to restore barrier flow to the unaffected RCPs, which will be delayed with a duty team challenge and plan development. Once the crew has stabilized and recovered the CC system, at the lead examiner discretion, continue on to Event 5.

Event 5 PZR Control Group C SCR firing circuit error
The crew will respond to alarm 1-12-C5, PZR PHASE LOSS OR REVERSAL. ATC will energize pressurizer back up heaters and trip group C variable heaters allowing spray to maintain pressure control. At lead examiner discretion, once pressure control has been established, continue to Event 6.

Event 6 RCP Seal Injection filter plug - RX Trip required - 1st trip switch does not work
Crew will respond to 1-7-D2, RCP SEAL INJ FILTER HIGH DP. The seal injection filter will ramp from 0% to 100% plugged over 1 minute. Crew will attempt to adjust 1CV121/1CV182 to maintain seal injection flow but will ultimately be unsuccessful. Based on rising RCP pump temperatures, the crew will determine that a trip of the reactor and all reactor coolant pumps is required based on rising RCP temperatures. The first RX trip switch selected by the ATC will not work and use of the second switch will be required. Tripping the reactor will automatically transition the crew to Event 7.

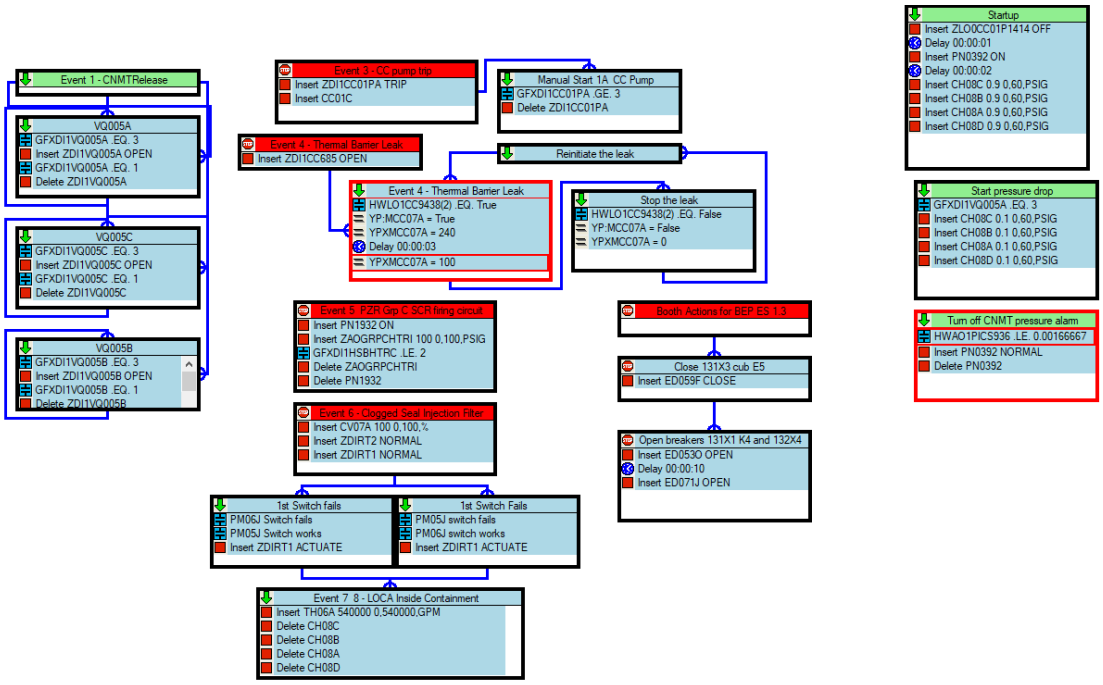
Event 7 & 8: LOCA (ES 1.3) – Containment venting does not auto isolate
The reactor trip will trigger a large break LOCA. The crew will enter 1BEP-0 and perform immediate actions. The crew will identify an automatic SI occurred and the BOP will be dispatched with Attachment B to identify that the containment vent path did not auto isolate. The crew will transition to 1BEP-1 and then to 1BEP ES-1.3 to establish cold leg recirculation. The scenario is complete when

the crew has completed step 10 of 1 BEP ES-1.3 establishing cold leg recirculation and with the concurrence of the lead examiner.

SIMULATOR SETUP GUIDE:

- Verify/perform TQ-BY-201-0113, Attachment 3, NRC EXAM Security Checklist.
- Establish the conditions of IC 73, 54% power, MOL, equilibrium xenon
- Place Simulator in RUN
- Initiate Smart Scenario:
  - Open SMART SCENARIO (Extreme Ace icon)
  - Open file Scenario N23-1 Scenario.ssf
  - Click on the MODE button (near top of screen) and pick EXECUTE
  - Click on the PLAY button (bottom left of screen)
  - There are no pre-loads for this scenario

- Verify the following are included in the Smart Scenario:



Ensure the following equipment is aligned

- 1B CC Pump in running
- Set BAT Flow Controller to 14.7 for 938 ppm boron
- Ensure REMA is available at the Unit Desk
- U-0 CC Pump, 1B HD PP and 1A FW PP all OOS.
- Place “Unit 1 Cnmt. Gaseous Release” on the 0PM02J per BCP 400-ECNMT/ROUTINE 5.2

Provide copies of the following documents:

- BCB 400-ECNMT/ROUTINE complete through step 5.

Turnover Information

Plant Status:

- Unit 1 is at 54% MOL
- 619 MWe
- RCS boron concentration is 936 ppm
- Control bank D @ 150 steps
- Online Risk is Green

Out of Service:

- 1A FW Pump
- 1B HD Pump
- U-0 CC Pump

Protected Equipment:

- 1A & 1C HD Pumps

Shift Activities:

- Initiate Containment Vent Release per BCB 400-ECNMT/ROUTINE and BOP VQ-6, Step F.4 expected duration is 2 hours.
- Ramp the unit to 120 MW at 1.6 MW/m.

Event 1: Initiate Containment Vent Release per BCB 400-ECNMT/ROUTINE

If contacted about concerns with ramping during the release, as SM or Chemistry, state “The ramp and release have been evaluated and may be conducted in parallel.”

If requested, step 2 and 3 of BOP VQ-6 may be marked N/A as it’s been verified that no personnel are working in either unit plenums.

As SM or Chemistry, acknowledge the release in progress if contacted.

Event 2: Ramp up 120 MW per 1BGP 100-3

Acknowledge as **Power Team/SM,** initiation of ramp and all ramp holds.

Acknowledge as **Chemistry**, for notification of ramp.

Event 3: 1B CC Pump Trip – 1A CC Pump does not auto start

At Lead Evaluator’s cue, use Smart Scenario to trip the 1A CC pump by right clicking on the box titled, **Event 3 1B CC pump trip**, and select, **Release.**

As **EO**, acknowledge request to check 1A CC Pump breaker. After 2 minutes, report back that the breaker for the 1A CC Pump has an overcurrent flag.

If an **EO** is dispatched to check the 1A CC Pump or to do post start checks on the 1B CC Pump, wait 2 minutes and then report that the 1 B CC pump is running normally and there is no local reason why the 1A CC pump tripped.

As **SM**, acknowledge entry into TS 3.7.7 for the 1A CC Pump.

As **SM/WEC** acknowledge the request to expedite a RTS on the 0A CC Pump

As **SM** acknowledge the failure, request for writing IR, performing risk assessment and making appropriate notifications.

Event 4: 1A RCP seal leak into CC will require the isolation of CC to all RCP thermal barriers

At Lead Evaluator’s cue, use Smart Scenario to start the Thermal Barrier Leak by right clicking on the box titled, **Event 4 – Thermal Barrier Leak**, and select, **Release**.

If an **EO** is dispatched to check CC surge tank makeup sources isolated, after the normal Aux Building delay, **call on the phone** to report that all normal and emergency sources of makeup are closed to the U-1 CC surge tank.

As Shift Manager acknowledge the failure, on line risk assessment, procedures entered, request for maintenance support, and IR request.

As Shift Manager, acknowledge entry into TS 3.6.3 for 1CC685.

When asked about restoring CC to unaffected RCPs, replay that CC will remain isolated until a duty team challenge can be conducted.

INSTRUCTOR/SIMULATOR RUN AID GUIDE

Event 5: PZR Control Group C SCR firing circuit error

At Lead Evaluator's cue, use Smart Scenario initiate PZR Grp C SCR firing circuit error by right clicking on the box titled, **Event 5 PZR Grp C SCR firing circuit**, and select, **Release.**

As Shift Manager, acknowledge request for writing IR, performing risk assessment and making appropriate notifications

Event 6: RCP Seal Injection filter plug - RX Trip required - 1st trip switch does not work

At Lead Evaluator's cue, use Smart Scenario to plug the RCP seal injection filter by right clicking on the box titled, **Event 6 – Clogged Seal Injection Filter,** and select, **Release.**

If the WEC, Field Supervisor or an EO is contacted to swap seal injection filters, reply in role and state "I'll get a copy of BOP CV-10 and swap the RCP seal injection filters."

As Shift Manager acknowledge the failure, request for writing IR, performing risk assessment and making appropriate notifications.

Event 7 & 8: LOCA (ES 1.3) – Containment vent does not auto isolate

As Shift Manager acknowledge entry into 1BEP 0 and subsequent transition into 1BEP ES-1.3.

When the crew has completed the evaluation (Containment Vent manually terminated, 1SI8804A/B are open and RH flow is initiated), and with the lead examiner's concurrence, place the simulator in freeze.

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: N23-1 Event No.: __1___

Event Description: Initiate Containment Vent Release per BCB 400-ECNMT/ROUTINE

Symptoms/Cues: As directed by Turnover

Time	Position	Applicant's Actions or Behavior
	ATC	• Monitor primary and secondary panels while BOP performs BOP VQ-6. • Provide support and peer checks as requested.
	BOP	• Refer to BCB 400-ECNMT/ROUTINE step 6 and record: o Affected CNMT: **Unit 1** o Release expiration time: **N/A** o Initial CNMT Pressure: **0.9 psig** • Reference BOP VP-6 and: o Review Prerequisites, Precautions, and Limitations and Actions o Verify BCP 400-ECNMTECNMT/ROUTINE Step 5.4 signed for Approval • At 0PM02J: o Verify 0VA02CB, VA Exh Fan 0B Trn 0A in operation • At RMS: o Verify 0VA02CB, VA Exh Fan 0B Trn 0A in operation • At 0PM02J: o OPEN 1VQ005A, Mini-flow Prg Exh Inside Isol Vlv o OPEN 1VQ005B, Mini-flow Prg Exh Outside Isol Vlv o OPEN 1VQ005C, Mini-flow Prg Exh Outlet Isol Vlv • On BCB 400-ECNMT/ROUTINE record release start time • Report containment vent in progress
	US	• Directs BOP to perform BCB 400-ECNMT/ROUTINE
EVALUATOR NOTE:		**After VQ-6 step F.4 is complete and with the lead examiner's concurrence, proceed to Event 2.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __1___ Event No.: __2___

Event Description: Ramp up 120MW Power per 1BGP 100-3

Symptoms/Cues: As directed by Turnover

Time	Position	Applicant's Actions or Behavior

	ATC	• Verify rod position and boron concentration.
		• Conducts reactivity brief
		• Initiate dilution IAW ReMA and BOP CV-5 or BOP CV-5T1
		  • Select STOP on RMCS Makeup Control Switch
		  • Select DIL or ALT DIL on RMCS Mode Select Switch
		  o Enter desired flowrate
		  o Verify/Place 1FK-111 to desired flowrate
		  • Enter desired dilution amount in PW counter
		  • Place RMCS Makeup Control Switch to START
		  o Verify 1CV110B OPEN if in ALT DIL
		  • Verify 1CV111A and B OPEN
		  • Verify proper PW flow on flow recorder 1CD-CX4102
		• Monitors effects of dilution
		  o Turn on PZR backup heaters.

	BOP	• Raise turbine load at 1PM02J or OWS drop 210 by performing the following:
		  • Select SETPOINT.
		  • Enter desired MW/min into the RATE window.
		  • Select ENTER.
		  • Enter desired MW into REF DEMAND window.
		  • Select ENTER.
		  • Select EXIT.
		  o Notify US and RO of pending ramp.
		  • Select GO/HOLD.
		  • Select GO.
		• Verify main turbine load begins to rise.

	US	• Direct Power ascension per turnover. • Direct actions of 1BGP 100-3, POWER ASCENSION to raise power to 100% per 1BGP 100-3T5 LOAD CHANGE INSTRUCTION SHEET FOR RAISING POWER< 15% IN ONE HOUR • Approve/monitor reactivity changes.

Op. Test No.: NRC-23_ Scenario No.: __1___ Event No.: __2___

Event Description: Ramp up 120MW Power per 1BGP 100-3

Symptoms/Cues: As directed by Turnover

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Per NF-AP-440, PWR FUEL CONDITIONING, the ramp rate is limited to 1.6MW/min below 80% (~1000MW) and to 0.6 MW/min at 80% power and above.**
EVALUATOR NOTE:		**After measurable change in power, sufficient reactivity manipulations being observed and with lead examiner's concurrence, initiate the next Event 3.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __1___ Event No.: __3___

Event Description: 1B CC Pump Trip - 1A CC Pump does not auto start

Symptoms/Cues: Annunciator:

- 1-2-A4 CC PUMP TRIP
- 1-2-A7 SEAL WTR HX CC FLOW LOW
- 1-2-B5 CC PUMP DSCH PRESS LOW
- 1-2-D7 CNMT PEN CLG FLOW HIGH HIGH LOW

Disagreement light on the 1B Component Cooling pump

Time	Position	Applicant's Actions or Behavior
	ATC	• Monitor boards and provide support for event
	BOP	• Respond per BAR 1-2-A4 CC PUMP TRIP or OP-AA-103-102-1001 STRATEGIES FOR SUCCESSFUL TRANSIENT MITIGATION • Verify/Start 1B CC Pump • Verify CC System pressure returns to normal
	US	Recognize malfunction of TS Related Component Locate/Determine Applicable LCOs • LCO 3.7.7 Component Cooling Water (CC) System CONDITION, REQUIRED ACTION, and COMPLETION TIME • CONDITION B, One required CC pump inoperable. • B.1 • Required Action – Restore required CC pump to OPERABLE status. • Completion Time – 7 days.
EVALUATOR NOTE:		**After the crew has entered TS 3.7.7, with lead examiner's concurrence, initiate the Event 4.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __1___ Event No.: __4___

Event Description: 1A RCP seal leak into CC will require the isolation of CC to all RCP thermal barriers

Symptoms/Cues: Annunciators:

- 1-7-E4, RCP THERM BARR CC WTR FLOW HIGH LOW
- High radiation on Unit 1 CC HX process monitor (1RT-PR009)
- 1-7-(B,C&D)4, RCP (1B,1C&1D) THERM BARR CC WTR LOW
- 1-7-E3, RCP THERM BARR CC WTR TEMP HIGH

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**The crew will likely enter both 1BOA PRI-1 and 1BOA PRI-6 during this event. Per OP-BY-101-0004, STRATEGIES FOR SUCCESSFUL TRANSIENT MITIGATION, the US may assign 1BOA PRI-6 to the BOP while working through 1BOA PRI-1 with the ATC.**
	ATC	• Recognize PZR Level lowering • Recommend entering 1BOA PRI-1, EXCESSIVE PRIMARY PLANT LEAKAGE UNIT 1 • Maintain PZR level using 1CV121 and 1CV182 • Calculate initial leak rate of about 125 GPM • Verify proper operation of VCT makeup • Support troubleshooting steps of 1BOA PRI-1
	BOP	• Select any related annunciator and respond by referencing the applicable BAR • Recommendation to the US to enter 1BOA PRI-6, COMPONENT COOLING MALFUNCTION • Recognize CC surge tank level rising with the applicable make up valves closed and announce RCS leaking into CC • Complete 1BOA PRI-6 when assigned by the US

Op. Test No.: NRC-23 Scenario No.: 1 Event No.: 4

Event Description: 1A RCP seal leak into CC will require the isolation of CC to all RCP thermal barriers

Symptoms/Cues: Annunciators:

- 1-7-E4, RCP THERM BARR CC WTR FLOW HIGH LOW
- High radiation on Unit 1 CC HX process monitor (1RT-PR009)
- 1-7-(B,C&D)4, RCP (1B,1C&1D) THERM BARR CC WTR LOW
- 1-7-E3, RCP THERM BARR CC WTR TEMP HIGH

Time	Position	Applicant's Actions or Behavior
	US	• Enter 1BOA PRI-6, COMPONENT COOLING MALFUNCTION • Recognize that seal injection flow is available to all RCPs and applicable RCP temperatures are acceptable • CC surge tank level level rising will send the crew to ATTACHMENT B, Step 1 • Verify surge tank makeup sources are isolated • Recognize that 1CC685 did not automatically close and, when it can not be manually closed, will direct closure of 1CC9438 which will isolate CC flow to the RCP thermal barriers and stop the leak • Enter LCO 3.6.3 Containment Isolation Valves for 1CC685 CONDITION, REQUIRED ACTION, and COMPLETION TIME • CONDITION A, 1 flow path with 1 valve inoperaboe. • A.1 • Required Action – Isolate the flow path (manual valve or remove power) • Completion Time – 4 hours.
EVALUATOR NOTE:		**Because the crew is working 1BOA PRI-1 in parallel with 1BOA PRI-6, it is possible that isolation of CC and isolation of letdown may result in the crew identifying letdown as the source of leakage. The crew may reintroduce the leak briefly to determine the correct source.**
	US	• Enter 1BOA PRI-1, EXCESSIVE PRIMARY PLANT LEAKAGE UNIT 1 • Recognize that seal injection flow is available to all RCPs and applicable RCP temperatures are acceptable • Recognize that the leak has stopped or Direct ATC to maintain PZR level and determine the leak rate • Continue through 1BOA PRI-1 to step 36, determine that the leak is stopped, determine that no shutdown is required and exit 1BOA PRI-1.

Op. Test No.: NRC-23 Scenario No.: 1 Event No.: 4

Event Description: 1A RCP seal leak into CC will require the isolation of CC to all RCP thermal barriers

Symptoms/Cues: Annunciators:

- 1-7-E4, RCP THERM BARR CC WTR FLOW HIGH LOW
- High radiation on Unit 1 CC HX process monitor (1RT-PR009)
- 1-7-(B,C&D)4, RCP (1B,1C&1D) THERM BARR CC WTR LOW
- 1-7-E3, RCP THERM BARR CC WTR TEMP HIGH

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**After the crew has closed 1CC9438 and completed 1BOA PRI-6 and 1BOA PRI-1, with lead examiner's concurrence, initiate Event 5.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __1___ Event No.: __5___

Event Description: PZR Control Group C SCR firing circuit error

Symptoms/Cues: Annunciator 1-12-C5, PZR PHASE LOSS OR REVERSAL

Time	Position	Applicant's Actions or Behavior
	ATC	Reference 1-12-C5 annunciator response • Monitor Pressurizer Pressure • Determine cause of alarm • Energize PZR Backup Heaters as necessary to maintain normal system pressure • Trip PZR Htr Group C
	BOP	• Monitor boards and provide support for event
	US	• Notify SM of issue and request shop/duty team assistance
EVALUATOR NOTE:		**After pressure control is restored using BU Heaters and spray, with lead examiner's concurrence, initiate Event 6.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __1___ Event No.: __6___

Event Description: RCP Seal Injection filter plug – Manual RX Trip - 1st trip switch fails

Symptoms/Cues: Annunciator 1-7-D2, RCP SEAL INJ FILTER HIGH DP

Time	Position	Applicant's Actions or Behavior
	ATC	• Respond to 1-7-D2 and recognize that temperatures will quickly exceed the 225º F limit Recommend tripping U-1 Reactor and tripping all RCPs After dierected to trip Rx- Perform immediate operator actions of 1BEP-0 at 1PM05J: • Verify reactor trip: • Rod bottom lights – NOT LIT • Manually trip the reactor (First RX Trip switch will fail to function. Second Switch will cause a RX Trip) • Reactor trip & Bypass breakers – OPEN • Neutron flux – DROPPING • PR channels < 5% • IR SUR is negative

	BOP	• Verify Turbine Trip
		  • Turbine throttle valves – closed
		  • Turbine governor valves – closed
		• Verify power to 4KV busses
		  • Bus 141 – ENERGIZED - YES
		• Bus 142 – ENERGIZED - YES

	US	• Direct ATC to Trip U-1 Reactor, verify U-1 Reactor Trip and then trip all RCPs • Enter 1BEP-0 and direct crew to perform immediate actions • Notify SM of plant status and procedure entry • Request SM evaluation of Emergency Plan conditions
EVALUATOR NOTE:		**Tripping the reactor will insert the fault for events 7 & 8**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __1___ Event No.: __7 & 8___

Event Description: LOCA (ES 1.3) – Containment vent does not auto isolate

Symptoms/Cues: Annunciator 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH
Lowering PZR Level
Rising Charging Flow
Rising Containment Pressure

Time	Position	Applicant's Actions or Behavior

	ATC	• Check SI status
		• SI actuated
		  • SI First OUT annunciator lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1)
		  • SI ACTUATED lit (1-BP-4.1)
		  • SI Equipment running (SI pumps running, CV Cold leg injection SI8801A/B open)
		• SI is required:
		  • Manually actuate SI from both SI switches (1PM05J and 1PM06J) and continue in 1BEP-0

	US	• Directs BOP to 1BEP 0 Attachment B, SI VERIFICATION
	BOP	• Perform 1BEP 0 Attachment B, SI VERIFICATION (pg 26)
EVALUATOR NOTE:		**Crew actions of 1BEP-0 continue on following page.** **BOP actions of 1BEP-0, Attachment B continue on page 26.**

	ATC	• Verify AF system:
		  • AF pumps – BOTH RUNNING – YES
		  • AF isolation valves 1AF13A-H Steam Generator Auxiliary Feedwater Isolation Valve- OPEN
		  • AF flow control valves 1AF005A-H Auxiliary Feedwater Regulating Valves - THROTTLED
		  • AF flow – GREATER THAN 500 GPM
		• Check SG tubes intact:
		  • Secondary radiation level - NORMAL AND STABLE
		• Narrow range levels – NOT RISING IN AN UNCONTROLLED MANNER

Op. Test No.: NRC-23_ Scenario No.: __1___ Event No.: __7 & 8___

Event Description: LOCA (ES 1.3) – Containment vent does not auto isolate

Symptoms/Cues: Annunciator 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH
Lowering PZR Level
Rising Charging Flow
Rising Containment Pressure

Time	Position	Applicant's Actions or Behavior

	ATC	• Check PZR PORVs and Spray Valves
		  • PORVs – CLOSED
		  • Check pressure less than 2315 psig
		• PORV isol valve – at least one ENERGIZED
		• PORV relief path – at least one AVAILABLE
		  • PORV in - AUTO
		  • Isolation valve - open
		• Normal spray valves - CLOSED

	ATC	• ADJUST AF FLOW: • Lower total Feed Flow to approximately 600 gpm

	ATC	• Check steam dumps – AVAILABLE (May not be avail due to Main Steam Isolation)
		  • C-9 Permissive light – NOT LIT
		  • CW Pump - AT LEAST ONE RUNNING

	ATC	• Control RCS Temperature per table:
		  • Adjust Feed Flow
		  • Steam Release

	ATC	• Check pressure in all SGs: • NO SG dropping in an uncontrolled manner. • NO SG Completely Depressurized.

	ATC	• CHECK IF SG TUBES ARE INTACT:
		  • SJAE/Gland Steam Exhaust Gas radiation - HAS REMAINED LESS THAN ALERT ALARM SETPOINT.
		  • SG Blowdown Liquid radiation – HAS REMAINED LESS THAN ALERT ALARM SETPOINT.
		• Main Steamline radiation - HAS REMAINED LESS THAN ALERT ALARM SETPOINT.

Op. Test No.: NRC-23 Scenario No.: 1 Event No.: 7 & 8

Event Description: LOCA (ES 1.3) – Containment vent does not auto isolate

Symptoms/Cues: Annunciator 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH
Lowering PZR Level
Rising Charging Flow
Rising Containment Pressure

Time	Position	Applicant's Actions or Behavior

	ATC	• CHECK IF RCS IS INTACT:
		  • CNMT area radiation monitors - LESS THAN ALERT ALARM SETPOINT - NO
		  • CNMT pressure LESS THN 3.4 psig. - NO
		• CNMT floor drain sump level LESS THAN 46 INCHES.

	Crew	• Transition to 1BEP-1 LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.
EVALUATOR NOTE:		**The crew actions for 1BEP-1 LOSS OF REACTOR OR SECONDARY COOLANT continue on the next page.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __1___ Event No.: __7 & 8___

Event Description: LOCA (ES 1.3) – Containment vent does not auto isolate

Symptoms/Cues: Annunciator 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH
Lowering PZR Level
Rising Charging Flow
Rising Containment Pressure

Time	Position	Applicant's Actions or Behavior

	US	• Implement 1BEP-1 LOSS OF REACTOR OR SECONDARY COOLANT and direct operator actions.
		  • Notifies SM of BEP entry
		  • Requests Emergency Plan evaluation
		• Request STA to come to the control room

	CREW	• CHECK IF RCPS SHOULD BE STOPPED
		  • All RCP's – ALL RUNNING.
		  • ECCS flow:
		  • High head SI flow (1FI-917) - GREATER THAN 100 GPM
		  • RCS pressure - LESS THAN1425 PSIG
		• Manually trip RCPs

	CREW	• Check pressure in all SGs:
		  • NO SG dropping in an uncontrolled manner.
		  • NO SG Completely Depressurized.

	CREW	• Check intact SG level • Narrow range levels – greater than 10% (31% adverse CNMT) • Control feed flow to maintain narrow range levels between 10% (31% adverse) and 50%
	CREW	• Check Secondary radiation normal • Reset CNMT Isol Phase A if necessary • Open all SG Blowdown Sample Isol valves • Direct Chemistry to sample all SGs for activity
	CREW	• Check secondary radiation trends (PPC or Rad Monitoring System) - NORMAL FOR PLANT CONDITIONS • Secondary activity samples - NORMAL (WHEN AVAILABLE)

Op. Test No.: NRC-23 Scenario No.: 1 Event No.: 7 & 8

Event Description: LOCA (ES 1.3) – Containment vent does not auto isolate

Symptoms/Cues: Annunciator 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH
Lowering PZR Level
Rising Charging Flow
Rising Containment Pressure

Time	Position	Applicant's Actions or Behavior

	CREW	• CHECK PZR PORVs AND ISOLATION VALVES:
		  • PORV isol valves - ENERGIZED:
		  • PORVs – CLOSED
		• PORV isol valves - AT LEAST ONE OPEN

	CREW	• CHECK IF ECCS FLOW SHOULD BE REDUCED:
		  • RCS subcooling
		  • Secondary heat sink
		  • RCS pressure - STABLE OR RISING
		  • PZR level - GREATER THAN 12% (28% ADVERSE CNMT)
		• SI Termination Criteria NOT satisfied

	CREW	• CHECK IF CS Pumps SHOULD BE STOPPED (continuous action step)
		  • CS Pumps – ANY RUNNING – YES
		  • Determine number of CS pumps required
		  • WHEN CNMT pressure drops to < 15psig, check both CS pumps running
		  • Check if last CS pump can be terminated - NO
		• 8 hours spray required due to LOCA

	CREW	• CHECK IF RH Pumps SHOULD BE STOPPED
		  • Reset SI, as necessary
		  • Check RCS Pressure
		• RCS Pressure > 325 psig -NO

	CREW	• Check if DGs should be stopped • All busses energized by offsite power (or crosstied to Unit 2) • Stop any unloaded DG and place in standby

Op. Test No.: NRC-23 Scenario No.: 1 Event No.: 7 & 8

Event Description: LOCA (ES 1.3) – Containment vent does not auto isolate

Symptoms/Cues: Annunciator 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH
Lowering PZR Level
Rising Charging Flow
Rising Containment Pressure

Time	Position	Applicant's Actions or Behavior

	CREW	• Initiate Evaluation of plant status
		  • RH pump 1A available
		  • 1SI8811A position lights lit
		  • RH pump 1B available
		  • 1SI8811B position lights lit
		  • Check CC pumps- two running - YES
		  • Check Aux Building Rad trends Normal
		  • Obtain Samples
		  • Evaluate plant equipment for long term recovery
		  • Shut down chiller on non-operating VC train
		• Start additional equipment to assist in recovery

	CREW	• Check if RCS cooldown and depressurization is required • RCS pressure greater then 325psig- NO
	CREW	• Check if transfer to cold leg recirculation is required • Go to 1BEP ES-1.3
EVALUATOR NOTE:		**The crew actions for of 1BEP ES-1.3, TRANSFER TO COLD LEG RECIRCULATION UNIT 1, begin here.**

	CREW	Establish CC flow to RH Heat Exchangers
		• Check open 1CC9473A and 1CC9473B
		• Check CC pumps check 2 running – NO
		• Start Standby CC pump – NO
		  • Open either 1CC9412A or 1CC9412B
		  • Place RH pump with closed 1CC9412 valve in PULL OUT.
		• Check CC flow to RH HX > 5000 gpm – YES

	CREW	Check CNMT sump level:
		• Check CNMT floor water level at least 8 inches - YES
		  • 1LI-PC006
		  • 1LI-PC007

Op. Test No.: NRC-23 Scenario No.: 1 Event No.: 7 & 8

Event Description: LOCA (ES 1.3) – Containment vent does not auto isolate

Symptoms/Cues: Annunciator 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH
Lowering PZR Level
Rising Charging Flow
Rising Containment Pressure

Time	Position	Applicant's Actions or Behavior
	CREW	Align RH pumps suction to CNMT Sump • SVAG switches to close • Check RH Pumps – both running • Check CNMT isolation valves full open • SI8811A • SI8811B • Close RH pump suction from RWST • 1I8812A • 1SI8812B
	CREW	Check SI and CV pumps in ECCS injection mode • SI pumps – any running - YES or • SI8801A or 1SI8801B open - YES

Op. Test No.: NRC-23 Scenario No.: 1 Event No.: 7 & 8

Event Description: LOCA (ES 1.3) – Containment vent does not auto isolate

Symptoms/Cues: Annunciator 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH
Lowering PZR Level
Rising Charging Flow
Rising Containment Pressure

Time	Position	Applicant's Actions or Behavior

	CREW
	
	[CT]
		Align SI and CV pumps for cold leg recirculation
		• Verify CV miniflow valves are closed
		  • 1CV8111
		  • 1CV8114
		  • 1CV8110
		  • 1CV8116
		• Close SI pump miniflow isol valves:
		  • 1SI8813
		  • 1SI8814
		  • 1SI8920
		• Close RH HX discharge crosstie valves:
		  • 1RH8716A
		  • 1RH8716B
		• Open SI and CENT CHG pumps suction header crosstie valves:
		  • 1SI8807A
		  • 1SI8807B
		  • 1SI8924
		• Check RH pump 1A - RUNNING
		• Open RH HX CENT CHG pumps
		  • 1CV8804A
		• Check RH pump 1B - RUNNING
		• Open RH HX SI pumps isol
		  • 1SI8804B

EVALUATOR NOTE:		**Scenario may be terminated after 1SI8804A/B are open and RH flow is initiated.**

EVALUATOR NOTE:		**1BEP-0, Attachment B, SI VERIFICATION actions begin on this page.**
	BOP	**Attachment B action** VERIFY ECCS PUMPS RUNNING: • CENT CHG pumps - RUNNING • RH pumps – RUNNING • SI pumps – RUNNING
	BOP	**Attachment B action** VERIFY ECCS VALVE ALIGNMENT • Group 2 Cold Leg Injection monitor lights required for ECCS valve alignment - LIT
EVALUATOR NOTE:		**RCS pressure is dependent on when evaluated, it is anticipated to be below 1700 psig at this step.**
	BOP	**Attachment B action** VERIFY ECCS FLOW • HHSI flow >100 gpm or SI Pump Discharge flow > 200 gpm - no • RCS pressure <1700 psig • RCS pressure <325 psig - no

	BOP
	
	[CT]
		Attachment B action
		Verify RCFCs running in Accident Mode:
		• Group 2 RCFC Accident Mode status lights - LIT
		Verify CNMT isolation Phase A
		• Group 3 CNMT isolation monitor lights - LIT
		Verify CNMT Ventilation isolation
		• Group 6 CNMT Vent Isol monitor lights – NOT LIT
		  • CLOSE 1VQ005A
		  • CLOSE 1VQ005B
		  • CLOSE 1VQ005C
		Verify CC Pumps
		• CC pumps RUNNING
		Verify SX Pumps running
		• SX pumps – RUNNING
		Check If Main Steamline Isolation Is Required
		• Check SG pressure < 640 psig
		• Check CNMT pressure > 8.2 psig
		  • If either condition is met:
		  • Verify MSIVs and MSIV Bypass valves closed
		  • Manually actuate MS Isolation
		Check if CS is required
		• CNMT pressure has risen to greater than 20 psig - YES
		• Group 6 CS monitor lights - LIT
		• Group 6 Phase B monitor light – LIT
		• Stop all RCPs
		• Check CS Eductor suction flow greater than 15 gpm
		  • 1FI-CS013
		  • 1FI-CS014
		• Check CS Eductor additive flow greater than 5 gpm
		  • 1FI-CS015
		  • 1FI-CS016
		• Verify SX Cooling tower alignment
		  • All eight riser valves open (0SX163A thru H)
		  • All four hot water basin bypass valves closed (0SX162A-D)
		• All eight SX cooling tower fans running in hi speed

	BOP	**Attachment B action** VERIFY FW ISOLATED • FW pumps tripped • FW isolation monitor lights lit • FW pumps discharge valves closed 1FW002A-C • Trip all running HD pumps
	BOP	**Attachment B action** VERIFY BOTH DGs RUNNING: • DG – 1B RUNNING • SX valve open 1SX169B • Dispatch operator locally to check operation

	BOP	**Attachment B action**
		VERIFY GENERATOR TRIP
		• Unit 1 Main Transformer output breakers - OPEN:
		  • GCB 3-4
		  • OCB 4-5
		• Excitation red OFF light is LIT

	BOP	**Attachment B action**
		VERIFY CONTROL ROOM VENTILATION ALIGNED FOR EMERGENCY OPERATIONS:
		• Control Room Outside Air Intake radiation monitors < High Alarm setpoints
		• Operating VC train equipment running Train B
		  • Supply fan 0B
		  • Return fan 0B
		  • M/U fan 0B
		  • Chilled water pump 0B
		  • MCR chiller 0B
		• Operating VC train dampers
		  • M/U fan outlet damper NOT full closed 0VC08Y
		• VC train M/U filter light LIT
		• Operating VC train Charcoal Absorber aligned for train B
		  • 0VC44Y closed
		  • 0VC05Y open
		  • 0VC06Y open
		• Operating VC train M/U filter alignment
		  • 0VC09Y open
		  • 0VC313Y closed
		• Control Room pressure greater than +0.125 inches water on 0PDI-VC038

	BOP	**Attachment B action**
		VERIFY AUXILIARY BUILDING VENTILATION ALIGNED
		• Two inaccessible filter plenums aligned
		  • Plenum A fan 0VA03CB running
		  • Damper 0VA023Y not fully closed
		  • Damper 0VA436Y closed
		  • Plenum C fan 0VA03CF running
		  • Damper 0VA072Y not fully closed
		  • Damper 0VA438Y closed
		Check Aux Building Supply and Exhaust fans
		One Exhaust Fan running for every Supply Fan running

	BOP	**Attachment B action**
		VERIFY FHB VENTILATION ALIGNED
		• Train B fan 0VA04CB running
		  • 0VA055Y open
		  • 0VA062Y not fully closed
		0VA435Y closed

	BOP	**Attachment B action** Maintain UHS Basin level > 80%
	BOP	**Attachment B action** Initiate periodic checking of Spent Fuel Cooling • Dispatch an operator to verify local actions • SFP level is greater than 420 elevation (20 feet from the top of the fuel) SFP temperature STABLE
	BOP	**Attachment B action** Notify Unit Supervisor of the following: • Manual actions taken – Phase A Isolation actions • Failed equipment status • Ownership of Continuous Action Step Attachment B completed
	CREW	**Attachment B action** Shutdown unnecessary plant equipment o As time allows refer to 1BGP 100-4T4, REACTOR TRIP POST RESPONSE GUIDELINE As time allows refer to 1BGP 100-5, PLANT SHUTDOWN AND COOLDOWN
EVALUATOR NOTE:		**The crew actions for of 1BEP-0, REACTOR TRIP OR SAFETY INJECTION, continue on page 19.** **The crew actions for of 1BEP-1, LOSS OF REACTOR OR SECONDARY COOLANT, begin on page 17.** **The crew actions for of 1BEP ES-1.3, TRANSFER TO COLD LEG RECIRCULATION UNIT 1, begin on page 21.**

Form 3.3-1 Scenario Outline

Facility:	Byron Station	Scenario #:	N23-2
Scenario Source:		Op. Test #:	2023-301
Examiners:		Applicants/ Operators:	
Initial Conditions:	(IC79) 28% RTP, MOL, steady state conditions		
Turnover:	Swap bus 156 from the UAT to the SAT to establish a shutdown electrical lineup per BOP AP-200 step F2. Ramp the unit down to 25% power 1BGP 100-4. 1B HD pump tripped and OOS for repairs. The 0G SX fan and 0H SX fan are OOS.		
Critical Tasks:	CT-9 – Manually start SW pumps for safeguards equipment cooling CT-33 – Control AFW to minimize RCS cooldown before exiting CA 2.1		

Event No.	Malf. No.	Event Type*	*Event Description*
-	ZDI1AF01PB STOP FW43	Preload	1B AF PP will not automatically start but can be manually started 1A AF PP auto starts and trips after 5 seconds
1	None	N (BOP, US)	Swap bus 156 from UAT to the SAT
2	None	R (ATC, BOP, US)	Ramp down to 25% power
3	ZDI1CV110B	C, MC (ATC,US)	1CV110B, Boric Acid Blender to Charging Pumps valve fails closed
4	PN1100 ON	TS (US)	CNMT Hatch door Seal Supply Air Press alarm
5	PA0153	C, TS (BOP, US)	SX cooling fan vibration alarm
6	ZDI1CV8401A CLS	C (ATC,US)	1CV8401A, 1A letdown HX inlet valve, failed closed
7	FW02A/B	C (BOP, US)	Only running TDFW PP trips, manual start of the 1A MDFW PP
8	MS08A 4	M (ATC, BOP, US)	1A SG Fault, inside containment, inserted when the 1A MDFW PP is manually started or if the plant trips. (EP-2)
9 **[CT]**	MS01A-D	C	All MSIV's fail to close and can not be manually closed. (CA 2.1)
10 **[CT]**		C	1A SX PP trips and 1B SX PP fails to autostart

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control

Critical Tasks:

CT-9: Manually start SW pumps for safeguards equipment cooling prior to exiting 1BEP 0, REACTOR TRIP OR SAFETY INJECTION UNIT 1
(K/A Number SWS 076-A2.03, Importance 3.9 / 3.7)

- Safety Significance: Failure to manually start at least the minimum required number of SW pumps in an operating safeguards train represents a failure by the crew to "demonstrate the following abilities:
  - Effectively direct or manipulate engineered safety feature (ESF) controls that would prevent a significant reduction of safety margin beyond that irreparably introduced by the scenario
  - Recognize a failure or an incorrect automatic actuation of an ESF system or component"

- Cues: Indication and/or annunciation that SI is actuated AND Indication [and/or annunciation] that less than the minimum required number of SW pumps is running

- Performance Indicator: Manipulation of controls as required to start at least the minimum required number of SW pumps in an operating safeguards train for ESF equipment in operation.

- Feedback: Indication and/or annunciation that at least the minimum required number of SW pumps is running in an operating safeguards train
  - SW low flow condition clear; indication of flow
  - SW low pressure condition clear; indication of pressure.

CT-33: Manually control AF flowrate to not less than 45 gpm per intact SG to minimize the RCS cooldown rate before a severe (Orange path) challenge develops to the integrity CSF
(K/A Number – SF4P 035-A2.01, Importance 4.6/4.4)

- Safety Significance: Improper performance or omission by an operator will result in direct adverse consequence(s) or a significant degradation in the mitigative capability of the plant. Correct performance prevents unnecessary challenges to the CSFs of Integrity and Subcriticality.

- Cues: Indication of uncontrolled depressurization of all SGs, Indication that the RCS cold leg cooldown rate exceeds 100F per hour and flow rate indication that AFW continues to be delivered to the faulted SGs above the rate required in CA 2.1

- Performance Indicator: Manipulation of controls as required to throttle the AFW flow rate sufficiently to prevent an Orange path CSF but not less than that required by CA 2.1

- Feedback: RCS cooldown stops and an Orange path CSF is not identified.

Scenario 23-2 Summary

The scenario will start with at 28% power, MOL, steady state conditions. The crew will be turned over the activity to perform a power supply swap for bus 156. Crew will be directed to ramp the unit down to 25% power per BGP 100-4 and will be provided a turnover of BGP 100-4T1 showing all required items are complete through 30% power with the next required actions occurring when they hold at 25%. 1B HD pump OOS is for overall issue consistency and does not impact this scenario.

Event 1 Swap bus 156 from the UAT to the SAT
The crew will perform a swap of bus 156 from the UAT to the SAT using BOP AP-200 step F2.

Event 2 Ramp to 25% power
As directed by the turnover, the crew will initiate a ramp down to 25% power per BGP 100-4 and will be provided a marked up copy of BGP 100-4T1 showing all required items are complete through 30% power with the next required actions occurring when they hold at 25%. After the ramp is initiated and sufficient reactivity maneuvering is observed, and at the lead examiner discretion, continue on with Event 3.

Event 3 1CV110B Boric Acid Blender to Charging Pumps valve fails to open
During boration operations, the 1CV110B Boric Acid Blender to Charging Pumps valve will fail to open as identified by valve position and Annunciator 1-9-A6 BA FLOW DEVIATION. The ATC will identify the lack of boration flow, reference the BAR, and manually open 1CV110B to initiate boration flow. Once boration flow is established, at the lead examiner's discretion, continue to Event 4.

Event 4 CNMT Hatch Door Seal Supply Air Press alarm
The crew will respond to annunciator 1-1-B2, CNMT HATCH DOOR SEAL TROUBLE. The crew will dispatch an operator to investigate. Air lock supply air pressure will be reported low and, if asked, will report that air can be felt blowing by the outer door gasket. Tech Spec 3.6.2 condition A will be entered.

Event 5 SX cooling fan vibration alarm
The crew will respond to alarm 0-37-E6, SX CLG TWR FAN VIBRATION HIGH. The BOP will identify abnormally high fan amps and will trip the 0F SX fan. The 0G SX fan and 0H SX fan are OOS requiring the SRO to identify and enter Tech Spec 3.7.9 condition B. Once the crew has evaluated cooling, and with the lead examiners concurrence, continue on to Event 6.

Event 6 1CV8401B, 1B letdown HX inlet valve, failed closed
The crew will identify 1CV8401B, 1B letdown HX inlet valve, failed closed resulting in the isolation of letdown flow. The crew will respond to the malfunction and will complete letdown isolation per 1BHC 1-LD. The crew will restore letdown flow through the 1A letdown HX using BOP CV-22 and BOP CV-17. The crew may enter Tech Spec 3.4.13 Cond A for identified leakage depending on severity/duration if 1CV8117, Letdown Line Relief Vlv lifts. Once letdown has been restored,

pressurizer level is trending to normal and with the concurrence of the lead examiner, continue to Event 7.

Event 7 Running TDFW PP Trip (MDFW PP Start or Rx Trip will start the 1A SG Fault after a 20 second time delay)
The 1B TDFW PP will trip and the crew will respond with BHC 1-16-BC1 to start the 1A MDFW PP.

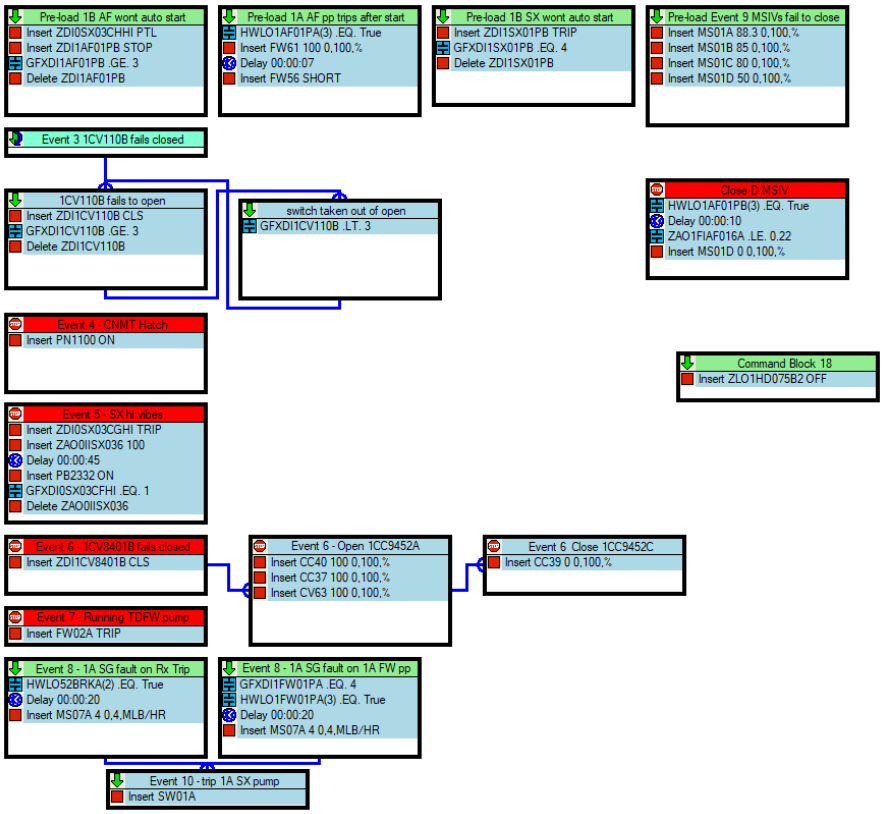
Event 8 1A SG Fault

Starting the 1A MDFW PP or a reactor trip (auto or manual) will start an automatic 20 second timer before inputting a 1A SG Fault inside containment. Fault will result in a Reactor Trip and Safety Injection. 1A SX PP will Trip and the 1B SX PP will start on the sequencer. Crew will enter 1BEP-0 and transition to 1BEP-2.

Event 9 All MSIVs stuck open
Crew will transition from 1BEP-2 to 1BCA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS. The crew will adjust AF flow to control the cooldown of the RCS to eliminate the risk of brittle fracture. All MSIVs will indicate intermediate and after flow to the 1C SG is throttled down to about 50 gpm, the 1D MSIV will finally drift all the way closed allowing exit from 1BCA-2.1 using OAS actions and provide a path to recovery via 1BEP-2.

SIMULATOR SETUP GUIDE:

- Verify/perform TQ-BY-201-0113, Attachment 3, NRC EXAM Security Checklist.
- Establish the conditions of IC 79, 28% power, MOL, equilibrium xenon
- Place Simulator in RUN
- Initiate Smart Scenario:
  - Open SMART SCENARIO (Extreme Ace icon)
  - Open file Scenario N23-2 Scenario.ssf
  - Click on the MODE button (near top of screen) and pick EXECUTE
  - Click on the PLAY button (bottom left of screen)



Ensure the following equipment is aligned

- 1B TDFW PP running
- Set BAT Flow Controller to 19.8 for 1270 ppm boron
- Ensure REMA is available at the Unit Desk
- 1B HD PP OOS
- 0A-0F SX fans running in High Speed, 0G and 0H SX Fan OOS

Provide copies of the following documents:

- 1BGP 100-4T1

Turnover Information

Plant Status:

- Unit 1 is at 29% MOL
- 289 MWe
- RCS boron concentration is 1270 ppm
- Control bank D @ 143 steps
- Online Risk is Green

Out of Service:

- 1B HD PP
- 0H SX Fan for Oil Change
- 0G SX Fan tripped and has been taken OOS for repairs with an estimated work window of 36 hours.

Shift Activities:

- Swap bus 156 from UAT to SAT per 1BGP 100-4 step F.14
    - SM permission and OLR evaluation is complete.
- Ramp the unit down to 250 MW power at 1.6 MW/m.

Event 1: Swap bus 156 from the UAT to the SAT

If contacted as the **SM**:
Confirm they have permission to realign the breakers to feed bus 156 from the applicable SAT.
On Line Risk Evaluation is complete.

Event 2: Ramp to 25% power

Acknowledge as **Power Team/SM,** initiation of ramp and all ramp holds.

Acknowledge as **Chemistry**, for notification of ramp.

Event 3: 1CV110B, Boric Acid Blender to Charging Pumps valve fails closed

At Lead Evaluator's cue, use Smart Scenario to prevent 1CV110B from opening by right clinking on the box titled, **Event 3 1CV110B fails to open**, and select, Release.

Verify 1CV110B remains closed after initiation of first boration.

As **SM**, if contacted, acknowledge failure and actions taken per the BAR.

Event 4: CNMT Hatch Door Seal Supply Air Press alarm

At Lead Evaluator's cue, use Smart Scenario to alarm CNMT Hatch Door Seal Trouble by right clinking on the box titled, **Event 4 CMNT Hatch**, and select, **Release**.

When dispatched as an **EO** to check CNMT Hatch and/or IA alignment (regulator settings), after the required time delay for the AB Operator, report "The Containment airlock appears to have a gasket failure, I can feel air blowing from the outside door seal along the bottom of the door."

As an **EO**, if asked about the status of the door lock, report "Both doors are closed and locked and the tamper seal is intact."

As **WEC** or **SM**, acknowledge a request to prepare to make a Containment Entry.

As **SM**, acknowledge the failure, LCO 3.6.2, request for on line risk assessment and any request for maintenance support or IR generation.

Event 5: SX cooling fan vibration alarm

At Lead Evaluator's cue, use Smart Scenario initiate Event 5, by right clicking on the box titled, **Event 5 SX high vibes** and select, **Release.**

As the **TR EO**, after the required time delay, if the 0F fan is still running, "The 0F SX fan is vibrating excessively." After the 0F fan is shutdown, report "The fan gearbox is leaking."

As **SM**, acknowledge request for writing IR, performing risk assessment, T.S. Entry and making appropriate notifications.

As **SM** or **U-2 US**, acknowledge the need for U-2 to evaluate entry into T.S. 3.7.9

As **SM** or **FS**, if outside wet bulb temp is requested, delay 5 minutes and report "The outside wet bulb temperature is 75F."

INSTRUCTOR/SIMULATOR RUN AID GUIDE

Event 6: 1CV8401B, 1B letdown HX inlet valve, failed closed

At Lead Evaluator's cue, use Smart Scenario to fail closed 1CV8401A by right clicking on the box titled, **Event 6 1CV8401B fails closed**, and select, **Release**.

If dispatched as **EO**, report is 1CV8401B is closed.

When directed as **EO**, to perform local actions to align the 1A LD Hx:

- Use Smart Scenario to open 1CC9452A by right clicking on the box titled, **Open 1CC9452A**, and select, **Release**.
- Wait 6 minutes and report; the local steps of BOP CV-22 through F.2.g have been completed.

If contacted as **SM**, report a flush of 1A Letdown Heat Exchanger is NOT required.

When directed as **EO**, to perform local actions to remove the 1B LD Hx from service:

- Use Smart Scenario to close 1CC9452C by right clicking on the box titled, **Close 1CC9452C**, and select, **Release**.

As **SM** acknowledge the failure, LCOs 3.4.13, condition A (if applicable), on line risk assessment, request for maintenance support, and IR requests.

Event 7: Running TDFW PP Trip (MDFW PP Start or Rx Trip will start the 1A SG Fault after 20 second time delay)

If dispatched as an **EO** to the FW pumps, report no abnormal indications present.

As **SM** acknowledge the failure, on line risk assessment, request for maintenance support and IR request.

As **Chemistry**, acknowledge any request for RCS samples and surveillance performance.

Event 8 & 9: 1A SG Fault & All MSIVs stuck open

The MSIVs failing to close in auto are preloaded with the start of the scenario. The crew will be able to manually actuate the Main Steam Isolation.

As **SM**, acknowledge transition to BEP procedure entries and request for Emergency Plan evaluations.

AS the **EO**, acknowledge direction to check on DGs, Spent Fuel Pool level and temperatures.

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: N23-2 Event No.: __1___

Event Description: Swap bus 156 from the UAT to the SAT

Symptoms/Cues: As directed by Turnover

Time	Position	Applicant's Actions or Behavior
	ATC	• Monitor front panels and provided peer checks as appropriate

	BOP	• Using 1BGP 100-4 step F.14:
		  • Turn ON the Synchro-Scope(SS) for the SAT Feed Breaker to Bus 156
		  • Verify SS locks at the 12 o'clock position
		  • Close ACB 1562, SAT Feed Breaker to bus 156
		  • Open ACB 1561, UAT Feed Breaker to bus 156
		  • Turn off SS for the SAT Feed Breaker to Bus 156

	US	• Direct realignment of the bus 156 feed from the UAT to the SAT per 1BGP 100-4 step F.14
EVALUATOR NOTE:		**After the breaker swap is complete and with the lead examiner's concurrence, proceed to Event 2.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __2___ Event No.: __2 & 3___

Event Description: Ramp to 250 MW power

Symptoms/Cues: As directed by Turnover

Time	Position	Applicant's Actions or Behavior

	ATC	Initiate boration per: BOP CV-6, OPERATION OF THE REACTOR MAKEUP SYSTEM IN THE BORATE MODE or BOP CV-6T1, RCMS OPERATE IN BORATE CHECKLIST:
		• Place MU MODE CONT SWITCH to STOP position.
		• Set MU MODE SELECT to BOR position.
		• Set 1FK-110 BA Boric Acid to Blender controller to desired flowrate (Batches desired)
		• Enter gallons into Boric Acid Totalizer on OWS graphic (6003)
		• Verify totalizer reset
		• Verify 1CV110A Boric Acid to Blender valve & 1CV110B Boric Acid Blender to Charging Pumps valve in AUTO
		• Ensure BA Transfer pp is NOT in Pull Out position
		• Place MAKE-UP CONTROL Switch to START
		• Ensure proper operation of valves & BA pump
		• 1CV110B Opens (fails), 1CV110A Modulates, BA pump is running
		If the ATC determines the failure with 1CV110B while performing the procedure:
		• Place 1CV110B Control Switch to OPEN
		  • Monitor RX Makeup flow on recorder 1CD-CX4102 to verify proper PW and Boric Acid flow
		If Flow Deviation Annunciator sounds:
		• Take action per the BAR 1-9-A6 BA FLOW DEVIATION
		• Determine the reason for the deviation – 1CV110B is CLOSED
		• Place 1CV110B Control Switch to OPEN
		  • Monitor RX Makeup flow on recorder 1CD-CX4102 to verify proper PW and Boric Acid flow
		If the crew is uncertain of the failure:
		• Verify 1CV110B and 1CV111B are closed
		• Place Makeup Control Switch to OFF
		• Verify proper lineup
		  ○ Restart Reactor Makeup system

Op. Test No.: NRC-23_ Scenario No.: __2___ Event No.: __2 & 3___

Event Description: Ramp to 250 MW power

Symptoms/Cues: As directed by Turnover

Time	Position	Applicant's Actions or Behavior

	BOP	• Lower turbine load at 1PM02J or OWS drop 210 by performing the following:
		  • Select SETPOINT.
		  • Enter desired MW/min into the RATE window.
		  • Select ENTER.
		  • Enter desired MW into REF DEMAND window.
		  • Select ENTER.
		  • Select EXIT.
		  o Notify US and RO of pending ramp.
		  • Select GO/HOLD.
		  • Select GO.
		• Verify main turbine load begins to lower.

	US	• Direct Power descension per turnover. • Direct actions of 1BGP 100-4, POWER DESCENSION to lower power to 25% per 1BGP 100-4T3 LOAD CHANGE INSTRUCTION SHEET FOR POWER REDUCTION LESS THAN 15 PERCENT IN ONE HOUR • Approve/monitor reactivity changes.
EVALUATOR NOTE:		**After the failure of 1CV110B has been addressed, sufficient ramping activities have been observed, and with lead examiners concurrence, continue with the Event 4.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __2___ Event No.: __4___

Event Description: CNMT Hatch Door Seal Supply Air Press alarm

Symptoms/Cues: Annunciators:

- 1-1-B2, CNMT HATCH DOOR SEAL TROUBLE alarm is LIT
- SER point 1100 is printed

Time	Position	Applicant's Actions or Behavior
	Crew	• Check BAR for alarm • Dispatch EO to CHECK IA alignment and air regulator settings • Direct EO to adjust door seal supply air regulator.
	US	Recognize malfunction of TS Related Component • Locate/Determine Applicable LCOs o LCO 3.6.2 Containment Air Locks • CONDITION, REQUIRED ACTION, and COMPLETION TIME o CONDITION A, One or more containment air locks with one containment air lock door inoperable • A.1 • Required Action - Verify the OPERABLE door is closed in the affected air lock. • Completion Time 1 hour AND • A.2 • Required Action - Lock the OPERABLE door closed in the affected air lock door • Completion Time 1 hour AND • A.3 • Required Action - Verify the OPERABLE door is locked closed in the affected air lock • Completion Time Once per 31 days • Notifies SM of failure and requests risk evaluation and IR, and maintenance support
EVALUATOR NOTE:		**When the Technical Specification has been determined and with the lead examiner's concurrence, initiate event 5**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __2___ Event No.: __5___

Event Description: **SX cooling fan vibration alarm**

Symptoms/Cues: Annunciator 0-37-E6, SX CLG TWR FAN VIBRATION HIGH
0F SX High Speed Fan Amps indicate High in Red Band

Time	Position	Applicant's Actions or Behavior
	ATC	Monitor primary and secondary panels o Assist with notifications if needed
	BOP	Reference BAR 0-37-E6, SX CLG TWR FAN VIBRATION HIGH • Monitor Fan amps NOT normal • Manually trip 0F SX Fan o Dispatch Field Operators to investigate. Report status to US
	US	Recognize malfunction of TS Related Component • Locate/Determine Applicable LCOs o LCO 3.7.9 Ultimate Heat Sink (UHS) • CONDITION, REQUIRED ACTION, and COMPLETION TIME o CONDITION B, One required SXCT fan inoperable. • B.1 • Verify OPERABLE SXCT fans are capable of being powered by an OPERABLE emergency power source. • Completion Time 1 hour AND • B.2 • Required Action – Restore required SXCT fan to OPERABLE status. • Completion Time 72 hours • Notifies SM of failure and requests risk evaluation and IR, and maintenance support
EVALUATOR NOTE:		**US may evaluate entry into TRM 3.7.e, Tornado Design Basis SXCT Fans. Entry conditions should not be applicable at this time.**
EVALUATOR NOTE:		**After the actions for the fan trip are complete, and with the lead examiner's concurrence, initiate event 6**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __2___ Event No.: __6___

Event Description: **1CV8401A, 1A letdown HX inlet valve, failed closed**

Symptoms/Cues: Annunciators:

- 1-9-B1 LP LTDWN RLF TEMP HIGH

1CV131 throttling closed
1CV8401 closed indication
Letdown line flow indication dropping
Letdown line pressure indication dropping

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Tech Spec 3.4.13 may be applicable if actions to isolate heat exchanger are not accomplished prior to lifting the LP Letdown Relief as indicated by Annunciator 1-9-B1.**

	ATC	• Identify failure of the 1CV8401A
		• Report to US
		• Isolate Letdown per BHC 1-LD
		  ○ CLOSE 1CV8149A/B/C Letdown Orifice Valves
		  ○ CLOSE 1CV459 Letdown Isol Valve
		  ○ CLOSE 1CV460 Letdown Isol Valve

	ATC / BOP	• Check PZR level control in auto: • Place 1CV-121 and 1LK-459 in automatic when PZR level is restored to normal.
EVALUATOR NOTE:		**The crew may choose to put excess letdown online instead of swapping letdown heat exchangers using BOP CV-15, EXCESS LETDOWN OPERATIONS**

Op. Test No.: NRC-23_ Scenario No.: __2___ Event No.: __6___

Event Description: **1CV8401A, 1A letdown HX inlet valve, failed closed**

Symptoms/Cues: Annunciators:

- 1-9-B1 LP LTDWN RLF TEMP HIGH

1CV131 throttling closed
1CV8401 closed indication
Letdown line flow indication dropping
Letdown line pressure indication dropping

Time	Position	Applicant's Actions or Behavior
	BOP	If the crew swaps Letdown Heat Exchangers: • Refer to BOP CV-22 • Verify local steps of BOP CV-22 through F.2.g have been completed • Contact SM for guidance to flush 1B LD HX • ENSURE that the Reactor Coolant Makeup system is set to maintain the same boron concentration as the RCS per BOP CV-7 in the Auto Makeup or Manual mode • PLACE 1CV129, Letdown Hi Temp Demin Divert Valve, to the VCT position • PLACE 1CV112A, Letdown to VCT or HUT Divert Valve Control Switch, to the HUT position. • OPEN 1CV8401B, Ltdwn HX B Inlet Vlv. • CLOSE 1CV8401A, Ltdwn HX A Inlet Vlv. • PLACE 1CV112A, Letdown to VCT or HUT Divert Valve Control Switch, to the VCT position. • PLACE 1CV129, Letdown Hi Temp Demin Divert Valve, to the DEMIN position. • Direct EO to close 1 CC9452C, Ltdwn HX B CC Inlet Isol Vlv. • VERIFY/PLACE TK-0130, Ltdwn HX Outlet Temp M/A Station, in AUTO, and ENSURE that CC130A/B, Ltdwn HX Outlet TCV, maintains temperature (105F - 115F) If the crew decides to use Excess Letdown: • Refer to BOP CV-15 • Verify/Open 1CV8100 • Verify/Open 1CV8112 • Open 1CC937B • Open 1CC9437A • Verify/Close 1HCV-CV123 at 1PM05J • Optional: Place 1CV8143 to the VCT position • Open 1CV8154A/B • Slowly Open 1HCV-CV123 • Ensure temperature is <165F on Ovation graphic 6005

Op. Test No.: NRC-23 Scenario No.: 2 Event No.: 6

Event Description: **1CV8401A, 1A letdown HX inlet valve, failed closed**

Symptoms/Cues: Annunciators:

- 1-9-B1 LP LTDWN RLF TEMP HIGH

1CV131 throttling closed
1CV8401 closed indication
Letdown line flow indication dropping
Letdown line pressure indication dropping

Time	Position	Applicant's Actions or Behavior
	BOP	Restore normal letdown flow per 1BOP C-17, ESTABLISHING AND SECURING NORMAL AND RH LETDOWN FLOW Perform the following at 1PM05J: • Check Letdown Isolated: ○ Verify 1CV8149A, B, & C closed. ○ Verify 1CV459 & 1CV460 closed. ○ Manually close 1CV460 • Check letdown flow path: ○ Verify 1CV8401A, 1CV8324A, 1CV8389A, 1CV8152, and 1CV8160 open. ○ Verify BTRS mode select switch OFF. • Align letdown controllers: ○ Place 1CV-131 in MANUAL and raise demand to 40%. ○ Place 1CV-130 in MANUAL and raise demand to 60%. • Verify charging flow established: ○ Verify 1CV8105 & 1CV8106 open. ○ Throttle 1CV182 and 1CV121 to establish 8-13 gpm seal inj and 100 gpm charging flows. • Establish letdown flow: ○ Open 1CV459 and 1CV460. ○ Open 1CV8149A/B/C to establish 120 gpm letdown. ○ Adjust 1CV131 controller to 360 psig and place in AUTO ○ Adjust 1CC130A/B controller to 90° to 115°F and place in AUTO • Verify 1PR06J in service at RM-11 console.
EVALUATOR NOTE:		**TECH SPEC 3.4.13 ONLY APPLICABLE IF LP LTDWN RELIEF HAS LIFTED AS EVIDENCED BY ANNUNCIATOR 1-9-B2 BEING LIT**
	US	• Direct restoration of Letdown per 1BOA ESP-2 • Notify SM to perform on line risk assessment, request maintenance support and generate IR requires. • Notify Radiation Protection and Chemistry of pending change in CVCS configuration • Direct BOP to perform BOP CV-22, Operation of Letdown or Regen Heat Exchangers to swap Letdown Heat Exchangers.

Op. Test No.: NRC-23 Scenario No.: 2 Event No.: 6

Event Description: **1CV8401A, 1A letdown HX inlet valve, failed closed**

Symptoms/Cues: Annunciators:

- 1-9-B1 LP LTDWN RLF TEMP HIGH

1CV131 throttling closed
1CV8401 closed indication
Letdown line flow indication dropping
Letdown line pressure indication dropping

Time	Position	Applicant's Actions or Behavior

	US	• Recognize malfunction of TS Related Component
		• Locate/Determine Applicable LCOs
		  ○ LCO 3.4.13 RCS Operational Leakage
		• CONDITION, REQUIRED ACTION, and COMPLETION TIME
		  ○ CONDITION A, RCS operational LEAKAGE not within limits for reasons other than pressure boundary LEAKAGE or primary to secondary LEAKAGE.
		  ▪ A.1
		  • Required Action – Reduce LEAKAGE to within limits
		  • Completion Time - 4 hours

EVALUATOR NOTE:		**AFTER LETDOWN HAS BEEN RE-ESTABLISHED AND WITH LEAD EXAMINERS CONCURRENCE, CONTINUE WITH THE NEXT EVENT.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __2___ Event No.: __7__

Event Description: **Running TDFW PP Trip**

Symptoms/Cues: Annunciators:

- 1-16-B1 FW PUMP 1B TRIP
- 1-16-D2 FW PUMP DSCH FLOW HIGH

Feed flow dropping

Time	Position	Applicant's Actions or Behavior
	ATC	• Monitor plant conditions during the runback

	BOP	• Identify/report the loss of 1B FW Pump
		• Implement BHC 1-16-BC1, FW PUMP TRIP
		  • VERIFY/CLOSE the recirc on the Tripped FW Pump.
		  o 1FW012A/B/C
		  o 1FW076
		  • CHECK Turbine Load greater than 700 MW. (No)
		  • VERIFY Auto Start of 1A FW Pump
		  o VERIFY 1A FW pump – RUNNING (No)
		  • Manually Start 1A FW pp:
		  o START aux oil pp for the 1A FW pp.
		  o VERIFY 1FW016 set to 20% demand in MANUAL
		  o START the 1A FW pp
		  o Manually ADJUST 1FW016 to raise discharge flow until feed flow matches steam flow.
		  o VERIFY/PLACE 1FW012A C/S in modulate when ≥4 Mlb/HR.
		  • CHECK FW pump(s) – AT LEAST TWO RUNNING (No)
		  o PERFORM the Following
		  ▪ IF NO FW pp's are running MANUALLY TRIP the reactor (No)
		  ▪ IF ONE FW pp is running (>700 mw), INITIATE A CD/FW Runback (No)
		  ▪ VERIFY turbine load dropping.
		• GO TO 1BOA SEC-1

Op. Test No.: NRC-23_ Scenario No.: __2___ Event No.: __7__

Event Description: **Running TDFW PP Trip**

Symptoms/Cues: Annunciators:

- 1-16-B1 FW PUMP 1B TRIP
- 1-16-D2 FW PUMP DSCH FLOW HIGH

Feed flow dropping

Time	Position	Applicant's Actions or Behavior
	US	• Monitor Hard Card actions
EVALUATOR NOTE:		**The SG Fault will transition the crew to 1BEP 0, REACTOR TRIP OR SAFETY INJECTION UNIT 1 after a 20 second delay.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __2___ Event No.: __8 & 9___

Event Description: 1A SG Fault & All MSIV's fail to close

Symptoms/Cues: Annunciator 1-15-A4 1A S/G FLOW MISMATCH FW FLOW LOW
Annunciator 1-15-E2 MS PRESS LOW
Increased Steam Flow

Time	Position	Applicant's Actions or Behavior
	CREW	• Recognize the indications of a Main Steamline break
EVALUATOR NOTE:		**Actions for 1BEP-0 REACTOR TRIP OR SAFETY INJECTION UNIT 1 are identified in the following steps.**
	ATC	Verify Reactor Trip • Rod bottom lights • Reactor trip & Bypass breakers • Neutron flux STABLE
EVALUATOR NOTE:		**Depending on how long it takes the crew to reach and execute Step 4, a Safety Injection could have occurred automatically. If a SI has not automatically occurred, it is expected that the crew will actuate SI during the following step.**
	ATC	Check SI status • SI actuated • SI First OUT annunciator lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1) - no • SI ACTUATED lit (1-BP-4.1) - no • SI Equipment running (SI pumps running, CV Cold leg injection SI8801A/B open) - no Determine if SI required: • Check PZR pressure < 1829 psig • Check Steamline pressure < 640 psig • Check CNMT pressure > 3.4 psig • If SI is required: - yes

Op. Test No.: NRC-23 Scenario No.: 2 Event No.: 8 & 9

Event Description: 1A SG Fault & All MSIV's fail to close

Symptoms/Cues: Annunciator 1-15-A4 1A S/G FLOW MISMATCH FW FLOW LOW
Annunciator 1-15-E2 MS PRESS LOW
Increased Steam Flow

Time	Position	Applicant's Actions or Behavior
	ATC	Verify AF system: • AF pumps – BOTH RUNNING – No ○ Start 1B AF PP if not already running • AF isolation valves 1AF13A-H - OPEN • AF flow control valves 1AF005A-H - THROTTLED • AF flow – GREATER THAN 500 GPM - Yes Check SG tubes intact: • Secondary radiation level - NORMAL AND STABLE • Narrow range levels – NOT RISING IN AN UNCONTROLLED MANNER
	ATC	Check PZR PORVs and Spray Valves • PORVs - CLOSED • PORV isol valve – at least one ENERGIZED • PORV relief path – at least one AVAILABLE • PORV in - AUTO • Isol valve - OPEN • Normal spray valves - CLOSED
	ATC	Check RCS Temperature • RCPs running – Yes • Tave between 552F and 561F – No ○ Temp < 552F – Yes ○ Close Steam Dumps ○ Reduce AF flow ○ Actuate MS Isolation Check RCPs • RCPs stop if criteria met Check SG Boundaries Intact • No SG Pressure dropping uncontrollably or completely depressurized – No • Transition to 1BEP-2, FAULTED STEAM GENERATOR ISOLATION

Op. Test No.: NRC-23_ Scenario No.: __2___ Event No.: __8 & 9___

Event Description: 1A SG Fault & All MSIV's fail to close

Symptoms/Cues: Annunciator 1-15-A4 1A S/G FLOW MISMATCH FW FLOW LOW
Annunciator 1-15-E2 MS PRESS LOW
Increased Steam Flow

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**The actions of 1BEP-2, FAULTED SEAM GENERATOR ISOLATION, begin here.**

	ATC	CHECK MAIN STEAMLINE ISOLATION:
		• All MSIVs and MSIV bypass valves CLOSED - No
		  • Determines MSIVs and MSIV bypass valves are Not Closed
		  • Manually actuate Main Steamline Isolation
		  • Verify MSIV and MSIV bypass valves are closed – No
		CHECK IF ANY SG SECONDARY PRESSURE BOUNDARY IS INTACT
		• Check pressure in all SGs - ANY SG PRESSURE STABLE OR RISING – No
		Transition to 1BCA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, Step 1

EVALUATOR NOTE:		**The actions of 1BCA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, begin here.**

	ATC
	
	[CT]
		Check Secondary Pressure Boundary
		• Check MSIVs Closed – No
		  o Attempt Main Steam Isolation or Manually Close Valves - No
		• Check MSIV Bypass valves Closed - Yes
		• Check SG PORVs Closed - Yes
		• Check FW to all SGs Isolated - Yes
		• Check SG blowdown isolation valves Closed - Yes
		• Check SG blowdown sample isol valves closed - Yes
		Control Feed Flow to Minimize RCS Cooldown
		• Check cooldown <100F in any 1 hour period – No
		  o Reduce feed flow to 45 GPM for each SG

	ATC	Establish AF Flow >500 GPM to the intact SG Go to 1BEP-2

Op. Test No.: NRC-23 Scenario No.: 2 Event No.: 8 & 9

Event Description: 1A SG Fault & All MSIV's fail to close

Symptoms/Cues: Annunciator 1-15-A4 1A S/G FLOW MISMATCH FW FLOW LOW
Annunciator 1-15-E2 MS PRESS LOW
Increased Steam Flow

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**At this point, the 1D MSIV will finish drifting closed. The crew will continue on with 1BCA-2.1 until they recognize that the 1D SG is intact and transition to 1BEP-2**
EVALUATOR NOTE:		**1BCA-2.1 rechecks things that have already been checked and those steps will not be tracked in this guide as none of them will be actionable. The next step occurs when the crew identifies that they have an intact SG.**
	BOP	Verify Turbine Trip • Turbine throttle valves – Yes • Turbine governor valves – Yes
	BOP	Verify power to 4KV busses • Bus 141 – ENERGIZED • Bus 142 - ENERGIZED
EVALUATOR NOTE:		**The BOP will perform Attachment B of 1BEP 0 starting on Page 26**
	CREW	Recognizes 1D SG is intact and uses the OPERATOR ACTION SUMMARY FOR 1BCA-2.1
	US	• Implements 1BEP-0 REACTOR TRIP OR SAFETY INJECTION UNIT 1 and directs operator actions • Notifies SM of 1BEP-0 entry Requests Emergency Plan evaluation
	US	Directs BOP to perform Attachment B, SI VERIFICATION of 1BEP 0.
	US	Transition from 1BEP-0 to 1BEP-2, FAULTED STEAM GENERATOR ISOLATION. • Notifies SM of BEP entry Requests Emergency Plan evaluation
	US	Transition from 1BEP-2 to 1BCA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, Step 1 • Notifies SM of BCA entry Requests Emergency Plan evaluation

Op. Test No.: NRC-23 Scenario No.: 2 Event No.: 8 & 9	
Event Description: 1A SG Fault & All MSIV's fail to close	
Symptoms/Cues: Annunciator 1-15-A4 1A S/G FLOW MISMATCH FW FLOW LOW Annunciator 1-15-E2 MS PRESS LOW Increased Steam Flow	
Time Position	**Applicant's Actions or Behavior**
EVALUATOR NOTE:	**With the Lead Examiners concurrence, The scenario may be terminated any time after >500 GPM AF flow has been established and the 1B SX pump has been started**

EVALUATOR NOTE:		**1BEP-0, Attachment B, SI VERIFICATION actions begin on this page 1BEP-0 main body actions continue after Attachment B section of guide on page 24.**
	BOP	**Attachment B action** VERIFY ECCS PUMPS RUNNING: • CENT CHG pumps - RUNNING • RH pumps – RUNNING • SI pumps – RUNNING
	BOP	**Attachment B action** VERIFY ECCS VALVE ALIGNMENT • Group 2 Cold Leg Injection monitor lights required for ECCS valve alignment - LIT
	BOP	**Attachment B action** VERIFY ECCS FLOW • HHSI flow >100 gpm or SI Pump Discharge flow > 200 gpm - no • RCS pressure <1700 psig - no • RCS pressure <325 psig - no

	BOP
	
	[CT]
		Attachment B action
		Verify RCFCs running in Accident Mode:
		• Group 2 RCFC Accident Mode status lights - LIT
		Verify CNMT isolation Phase A
		• Group 3 CNMT isolation monitor lights - LIT
		Verify CNMT Ventilation isolation
		• Group 6 CNMT Vent Isol monitor lights – LIT
		• Verify CC Pumps
		• CC pumps RUNNING
		Verify SX Pumps running
		• SX pumps BOTH RUNNING – No
		  • **Start 1B SX PP**
		Check If Main Steamline Isolation Is Required
		• Check SG pressure < 640 psig
		• Check CNMT pressure > 8.2 psig
		  • If either condition is met:
		  • Verify MSIVs and MSIV Bypass valves closed
		  • Manually actuate MS Isolation
		Check if CS is required
		• CNMT pressure has risen to greater than 20 psig - YES
		• Group 6 CS monitor lights - LIT
		• Group 6 Phase B monitor light – LIT
		• Stop all RCPs
		• Check CS Eductor suction flow greater than 15 gpm
		  • 1FI-CS013
		  • 1FI-CS014
		• Check CS Eductor additive flow greater than 5 gpm
		  • 1FI-CS015
		  • 1FI-CS016
		• Verify SX Cooling tower alignment
		  • All eight riser valves open (0SX163A thru H)
		  • All four hot water basin bypass valves closed (0SX162A-D)
		• All eight SX cooling tower fans running in hi speed - no

	BOP	**Attachment B action** VERIFY FW ISOLATED • FW pumps tripped • FW isolation monitor lights lit • FW pumps discharge valves closed 1FW002A-C • Trip all running HD pumps
	BOP	**Attachment B action** VERIFY BOTH DGs RUNNING: • DG – 1B RUNNING • SX valve open 1SX169B • Dispatch operator locally to check operation

	BOP	**Attachment B action**
		VERIFY GENERATOR TRIP
		• Unit 1 Main Transformer output breakers - OPEN:
		  • GCB 3-4
		  • OCB 4-5
		• Excitation red OFF light is LIT

	BOP	**Attachment B action**
		VERIFY CONTROL ROOM VENTILATION ALIGNED FOR EMERGENCY OPERATIONS:
		• Control Room Outside Air Intake radiation monitors < High Alarm setpoints
		• Operating VC train equipment running Train B
		  • Supply fan 0B
		  • Return fan 0B
		  • M/U fan 0B
		  • Chilled water pump 0B
		  • MCR chiller 0B
		• Operating VC train dampers
		  • M/U fan outlet damper NOT full closed 0VC08Y
		• VC train M/U filter light LIT
		• Operating VC train Charcoal Absorber aligned for train B
		  • 0VC44Y closed
		  • 0VC05Y open
		  • 0VC06Y open
		• Operating VC train M/U filter alignment
		  • 0VC09Y open
		  • 0VC313Y closed
		• Control Room pressure greater than +0.125 inches water on 0PDI-VC038

	BOP	**Attachment B action**
		VERIFY AUXILIARY BUILDING VENTILATION ALIGNED
		• Two inaccessible filter plenums aligned
		  • Plenum A fan 0VA03CB running
		  • Damper 0VA023Y not fully closed
		  • Damper 0VA436Y closed
		  • Plenum C fan 0VA03CF running
		  • Damper 0VA072Y not fully closed
		  • Damper 0VA438Y closed
		Check Aux Building Supply and Exhaust fans
		One Exhaust Fan running for every Supply Fan running

	BOP	**Attachment B action**
		VERIFY FHB VENTILATION ALIGNED
		• Train B fan 0VA04CB running
		  • 0VA055Y open
		  • 0VA062Y not fully closed
		0VA435Y closed

	BOP	**Attachment B action** Maintain UHS Basin level > 80%
	BOP	**Attachment B action** Initiate periodic checking of Spent Fuel Cooling • Dispatch an operator to verify local actions • SFP level is greater than 420 elevation (20 feet from the top of the fuel) SFP temperature STABLE
	BOP	**Attachment B action** Notify Unit Supervisor of the following: • Manual actions taken – Phase A Isolation actions • Failed equipment status • Ownership of Continuous Action Step Attachment B completed
	CREW	**Attachment B action** Shutdown unnecessary plant equipment o As time allows refer to 1BGP 100-4T4, REACTOR TRIP POST RESPONSE GUIDELINE As time allows refer to 1BGP 100-5, PLANT SHUTDOWN AND COOLDOWN
EVALUATOR NOTE:		**The crew actions for of 1BEP-0, REACTOR TRIP OR SAFETY INJECTION, continue on page 24.**

Form 3.3-1 Scenario Outline

Facility:	Byron Station	Scenario #:	N23-3
Scenario Source:	New	Op. Test #:	2023-301
Examiners:		Applicants/ Operators:	
Initial Conditions:	(IC 71) 100% RTP, MOL, steady state conditions		
Turnover:	U-2 is in mode 5 in preparation for refiling outage B2R24. 1BOSR FW-M1 is scheduled to be performed early on this shift. A storm front is moving into the area but it may go South of the plant. Unit 2 will be doing a test run of the 2B DG to confirm post maintenance operability.		
Critical Tasks:	CT-4 – Establish AFW flow to SGs CT-24 – Energize at least one AC emergency bus		

Event No.	Malf. No.	Event Type*	*Event Description*
1	None	N (BOP, US)	1BOSR FW-M1
2	NI09C	TS, I (US, BOP)	N-43 fails low
3	FW22D FW22A	C, MC (BOP,US)	1A CD/CB PP trip 1D CD/CB PP will not auto start
4	IMF RX15inc RAISE	I, MC (ATC,US)	Master PZR pressure controller fails high
5	CH08B 10	TS (US)	Containment pressure 1PT-CS935 fails to 10 PSIG
6	FW22B	R (ATC, BOP, US)	1B CD/CB PP Trips requiring a runback
7	RD06	C, MC (ATC,US)	Rods will not move in automatic Rods WILL move in manual
8	ED02C ED02D	M (ATC, BOP, US)	LOOP/Unit Trip 1B DG Fails to start
9 **[CT]**	FW43	C	Loss of 1A DG
10 **[CT]**	ED24A	C	Bus 141 fault, feed breaker trips, transition to BCA 0.0

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control

Critical Tasks:

CT-4: Establish AFW flow to SGs before transition out of E-0 series (K/A Number – AFW 021-A3.01, Importance 4.2)

- Safety Significance**:** Failure to establish feed flow to the generators would result in the need for 1BFR H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK UNIT 1. This process would needlessly challenge the primary RCS boundary both in the steam generator and in containment.

- Cues: Indication and/or annunciation that SI is actuated AND indication and/or annunciation that AFW flow rate is less than the minimum required

- Performance Indicator: Indication of minimum of 500 gpm flow to the Steam Generators or Steam Generator level rising.

- Feedback: Run indication on the 1B AF PP, indication of forward flow into all SGs and lowering RCS hot leg temperature.

CT-24: Energize at least one AC emergency bus within 10 minutes of a Loss of ALL AC per UFSAR (K/A Number – EPE 055-EA1.06, Importance 4.3)

- Safety Significance**:** Failure to energize an ac emergency bus constitutes misoperation or incorrect crew performance in which the crew does not prevent “degraded… emergency power capacity.” Failure to perform the critical task also results in needless “degradation of any barrier to fission product release”.

- Cues: Indication and/or annunciation that both AC emergency buses are de-energized
  - Bus energized lamps extinguished
  - Circuit breaker position
  - Bus voltage
  - EDG status

- Performance Indicator: Indication that at least one AC emergency bus is energized

- Feedback: Indication that at least one AC emergency bus is energized as indicated by successfully starting Safeguards equipment on the affected unit.

Scenario 23-3 Summary

The scenario will start with U-1 at 100% power, MOL, steady state conditions. U-2 is in mode 5 in preparation for refiling outage B2R24. 1BOSR FW-M1 is scheduled to be performed early on this shift. A storm front in moving into the area but it may go South of the plant. Unit 2 will be doing a test run of the 2B DG to confirm post maintenance operability.

Event 1 1BOSR FW-M1, 1B & 1C TURBINE DRIVEN MAIN FEEDWATER PUMP STOP VALVE MONTHLY SURVEILLANCE
The crew will perform 1BOSR FW-M1.
When the surveillance is complete and, with the lead examiners concurrence, continue to Event 2.

Event 2 N-43 Fails low
The crew will identify the failed NI and respond per 1BOA INST-1, NUCLEAR INSTRUMENTATION MALFUNCTION UNIT 1. The crew will verify the plant is stable and bypass/defeat the PR Channel Functions. The crew will enter LCO 3.3.1 Cond A, D and E. At lead examiner discretion, continue to Event 3.

Event 3 1A CD/CB PP trips and 1D CD/CB PP does not auto start
The crew will respond to a trip of the 1A CD/CB PP using BHC 1-17-A9, CD/CB PUMP TRIP and will manually start the 1D CD/CB PP that failed to start in auto. Once the 1D CD/CB PP is running and, at the lead examiners discretion, continue to Event 4.

Event 4 Master PZR pressure controller fails high
The SRO will direct the ATC to respond per BHC 1-RY-P. The ATC will place the controller, 1PK-455A, in manual and maintain PZR pressure in the desired band. The ATC will take manual control of the Master PZR pressure controller, or manual control of spray flow and heaters, to restore pressurizer pressure. Once the plant has been stabilized, and with the concurrence of the lead examiner, continue to Event 5.

Event 5 Containment pressure 1PT-CS935 fails to 10 PSIG
The crew will respond to high containment alarms 1-3-C4 and D4, CNMT PRESS HI and HI-2. The crew will recognize the failed instrument and enter 1BOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL UNIT 1. The SRO will identify and enter Tech Spec 3.3.2 condition A & E. At the direction of the lead examiner, continue with Event 6.

Event 6 CD/FW Runback from the trip of the 1B CD/CB PP
The crew will respond to a trip of the 1B CD/CB PP using BHC 1-17-A9, CD/CB PUMP TRIP. With no other CD/CB PPs to start, the crew will initiate a runback. The crew will enter 1BOA SEC-1. Once the run back is in progress, the rod failure has been addressed (Event 7) and sufficient reactivity manipulations have been observed by the lead examiner, continue to Event 8.

Event 7 Rods will not move in automatic
Rods will be unable to move in automatic. The ATC will identify and address the rod failure during the CD/FW Runback by taking rods to manual. The crew will enter 1BOA ROD-2, FAILURE OF RODS TO MOVE UNIT 1. Transition to Event 8 per Event 6 direction.

Event 8 & 9 LOOP and reactor trip with 1A DG and 1B AF PP not starting.
A storm event will short out the switchyard resulting in the opening of all Unit 1 yard feeder breakers, 3-4 and 4-5 resulting in a trip of Unit 1. Additionally, ACB 5-6 and OCB 6-7 will trip removing power from the U-1 SATs and a fault will propagate to bus 141. The 1B DG starts but the 1A does not. U1 will enter 1BEP 0. The 1B AF PP will not auto start but can be started from the MCR switch. After the

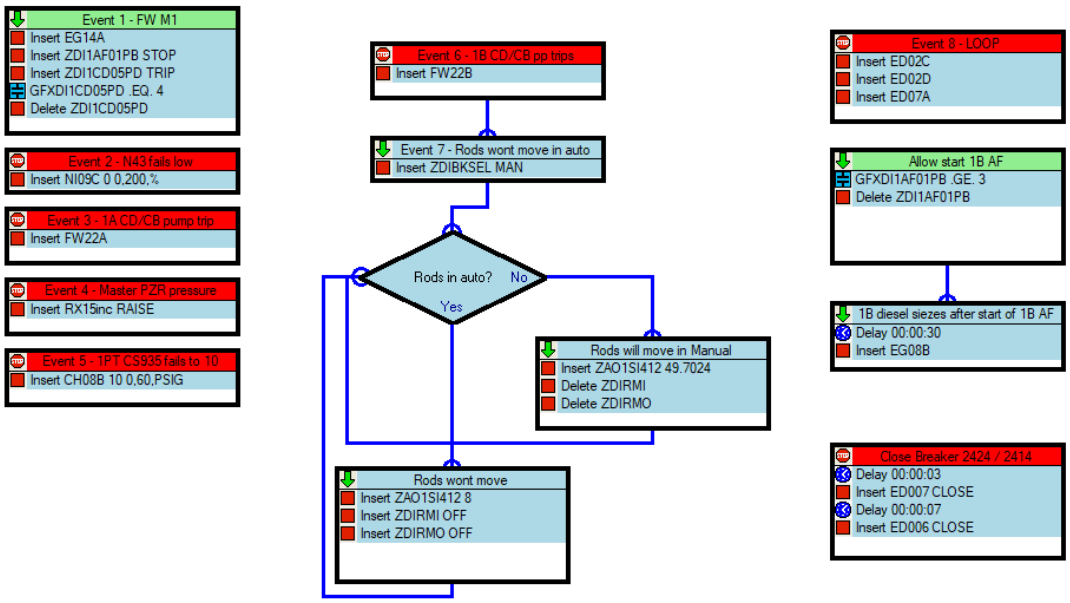
1B AF PP is started, the 1B DG will trip and U-1 will enter 1BCA 0.0. Crew will determine that bus 141 is faulted and will change the recovery plan to use bus 142. The U-2 US will be notified to enter 2BCA 0.3 for bus 142. Once required ESF loads are energized via the 142 cross tie breaker the sim set will be complete.

Event 10 1B DG Trip (1BCA 0.0)
30 seconds after the 1B AF PP is started, the 1B DG will trip and the crew will enter 1BCA 0.0. Crew will determine that bus 141 is faulted and will change the recovery plan to use bus 142. The U-2 US will be notified to enter 2BCA 0.3 for bus 142 and **the crew must restore power to Unit 1 within 10 minutes.** The scenario is complete when the crew successfully cross-ties power from Unit 2 to Unit 1.

SIMULATOR SETUP GUIDE:

- Verify/perform TQ-BY-201-0113, Attachment 3, NRC EXAM Security Checklist.
- Establish the conditions of IC 71, 100% power, MOL, equilibrium xenon
- Place Simulator in RUN
- Initiate Smart Scenario:
  - Open SMART SCENARIO (Extreme Ace icon)
  - Open file Scenario N23-3 Scenario.ssf
  - Click on the MODE button (near top of screen) and pick EXECUTE
  - Click on the PLAY button (bottom left of screen)
  - There are no pre-loads for this scenario

- Verify the following are included in the Smart Scenario:



Ensure the following equipment is aligned

- 1D CD/CB PP in standby
- Set BAT Flow Controller to 13.2 for 938 ppm boron
- Nothing OOS

Turnover Information

Plant Status:

- Unit 1 is at 100% RTP, MOL, steady state conditions
- Unit 2 is in mode 5 in preparation for refiling outage B2R24.
- 1244 MWe
- RCS boron concentration is 938 ppm
- Control bank D @ 221 steps
- Online Risk is Green

Out of Service:

- None

Protected Equipment:

- None

Shift Activities:

- 1BOSR FW-M1, 1B & 1C TURBINE DRIVEN MAIN FEEDWATER PUMP STOP VALVE MONTHLY SURVEILLANCE, has been turned over to your shift on step F.2 to complete.

Event 1: 1BOSR FW-M1, 1B & 1C TURBINE DRIVEN MAIN FEEDWATER PUMP STOP VALVE MONTHLY SURVEILLANCE

As **SM** or **WEC**, if asked, confirm that the SOS/OD is aware of this surveillance being performed and the SM approves.

As the **T-1 EO**, if asked, acknowledge the cycling of FW valves and confirm that the area(s) are clear.

As **SM**, acknowledge the completion of the surveillance.

Event 2: N-43 Fails low

At Lead Evaluator's cue, use Smart Scenario to fail channel N-43 low by right clicking on the box titled, **Event 2 N43 Fails Low**, and select, **Release.**

As **SM**, acknowledge the failure, EAL evaluation for BOA entry, on line risk assessment, request for maintenance support and IR requests.

As **SM**, acknowledge request for support to bypass or trip bistables. Inform the US that "Another NSO is on the way to perform the bistable bypass now."

As **SM**, Acknowledge entry into TS 3.3.1

Event 3: 1A CD/CB PP trips and 1D CD/CB PP does not auto start

At Lead Evaluator's cue, use Smart Scenario to trip 1A CD/CB PP by right clicking on the box titled, **Event 3 1A CD/CB PP trip**, and select, **Release.**

As **T-1 EO**, if asked, report Overcurrent flag up at the 1A CD/CB Breaker

As an **EO**, if asked, report that "The start of the 1D CD/CB looks good locally."

As **T-1/FS/WEC**, if asked, acknowledge the report to complete the shutdown of 1A CD/CB PP per 1BOP CD/CB-2.

As **SM** acknowledge the failure, runback, transition to 1BOA SEC-1, request for writing IR, performing risk assessment and making appropriate notifications.

Event 4: Master PZR pressure controller fails high

At Lead Evaluator's cue, use Smart Scenario to fail 1PK-455A pressure controller high by right clicking on the box titled, **Event 4 Master PZR pressure fails high**, and select, **Release.**

As **SM** acknowledge the failure, on line risk assessment, procedures entered, request for maintenance support, and IR request.

INSTRUCTOR/SIMULATOR RUN AID GUIDE

Event 5: Containment pressure 1PT-CS935 fails to 10 PSIG

At Lead Evaluator's cue, use Smart Scenario initiate 1PT-CS935 failure by right clicking on the box titled, **Event 5 1PT-CS935 fails to 10 PSIG**, and select, **Release.**

As **SM**, acknowledge the failure, EAL evaluation for BOA entry, on line risk assessment, request for maintenance support and IR requests.

As **SM**, acknowledge request for support to bypass or trip bistables. Inform the US that the WEC will brief extra NSOs to locally bypass bistables for the failed channel.

As **SM**, Acknowledge entry into TS 3.3.2

Event 6: CD/FW Runback from the trip of the 1B CD/CB PP

At Lead Evaluator's cue, use Smart Scenario to trip the 1B CD/CB pump by right clicking on the box titled, **Event 6 – 1B CD/CB PP trip,** and select, **Release.**

As **T-1 EO**, if asked, report Overcurrent flag up at the 1B CD/CB Breaker

As **T-1/FS/WEC**, if asked, acknowledge the report to complete the shutdown of 1B CD/CB PP per 1BOP CD/CB-2.

As **SM** acknowledge the failure, runback, transition to 1BOA SEC-1, request for writing IR, performing risk assessment and making appropriate notifications.

Event 7: Rods will not move in automatic

As **SM** acknowledge the rod failure to move in automatic, entry into 1BOA ROD-2 (if applicable), request for writing IR, performing risk assessment and making appropriate notifications.

Event 8 & 9: LOOP and reactor trip with 1A DG and 1B AF PP not starting.

At Lead Evaluator's cue, use Smart Scenario to initiate Event 8 by right clicking on the box titled, **Event 8 – LOOP,** and select, **Release.**

As **SM** acknowledge entry into 1BEP 0 and subsequent transition into 1BEP ES-1.3.

If requested, as the **T1 EO**, report that 1A DG DC Bus #1 lights are out. Working on getting replacement fuses.

If requested, as the **T1 EO**, report that the 1B DG post run checks look good.

Event 9: 1A AF PP Trip

As an **EO(s)** dispatched to check 1A AF PP, report an overcurrent flag up on the cube and no obvious reasons for the pump trip mechanically.

As **SM** acknowledge the rod failure to move in automatic, entry into 1BOA ROD-2 (if applicable), request for writing IR, performing risk assessment and making appropriate notifications.

Event 10: 1B DG Trip (1BCA 0.0)

If requested, as the **T1 EO**, report that the 1B DG appears to have seized and can't be restarted.

If requested, as the **T1 EO**, report that the new fuses have been installed in the 1A DG but it didn't correct the issue and troubleshooting continues.

If requested, as the **FS**, report to the diesels and provide an update that Maintenance and Electrical have been requested to support diesel restoration and additional information will be relayed to the control room as it comes in.

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23 Scenario No.: N23-3 Event No.: 1

Event Description: 1BOSR FW-M1, 1B & 1C TURBINE DRIVEN MAIN FEEDWATER PUMP STOP VALVE MONTHLY SURVEILLANCE

Symptoms/Cues: As directed by Turnover

Time	Position	Applicant's Actions or Behavior
	Crew	• Obtain and review 1BOSR FW-M1, 1B & 1C TURBINE DRIVEN MAIN FEEDWATER PUMP STOP VALVE MONTHLY SURVEILLANCE
	ATC	Monitor control room indications and assist with peer checks as directed.
	BOP	<u>For the 1B TDMFP</u> • VERIFY Low Press Stop Valve Closed Button is not lit. • DEPRESS the High Press Stop Valve Test pushbutton located on the Turbine Driven Main Feedwater Pump control panel or Turbine Driven Feedwater pump control station graphic 6062/6063 for the associated pump to be tested. • SELECT the popup window Header. The border will turn color cornsilk when Selected • DEPRESS the CONFIRM button on the popup to initiate the test. • OBSERVE that the High Press Stop Valve Open light goes OUT and RECORD YES in the appropriate place on Data Sheet D2 • OBSERVE that the High Press Stop Valve closed button ILLUMINATES when the Stop Valve is FULL CLOSED or Local valve movement and RECORD YES in the appropriate place on Data Sheet D2. • OBSERVE that the High Press Stop Valve Test button ILLUMINATES when the Stop Valve is FULL CLOSED or Local valve movement and RECORD YES in the appropriate place on Data Sheet D2. • OBSERVE that the High Press Stop Valve Closed button goes OUT when the Stop Valve starts to stroke back open. • OBSERVE that the High Press Stop Valve Open button ILLUMINATES when the Stop Valve is FULL OPEN and RECORD YES in the appropriate place on Data Sheet D2. • DEPRESS the EXIT button to exit test <u>For the 1C TDMFP</u> • Repeat the steps listed above and collect the applicable data

Op. Test No.: NRC-23_ Scenario No.: N23-3 Event No.: __1___

Event Description: 1BOSR FW-M1, 1B & 1C TURBINE DRIVEN MAIN FEEDWATER PUMP STOP VALVE MONTHLY SURVEILLANCE

Symptoms/Cues: As directed by Turnover

Time	Position	Applicant's Actions or Behavior
	US	• Directs BOP to perform 1BOSR FW-M1, 1B & 1C TURBINE DRIVEN MAIN FEEDWATER PUMP STOP VALVE MONTHLY SURVEILLANCE
EVALUATOR NOTE:		**After Data Sheet D2 is complete, and with the lead evaluator's concurrence, initiate Event 2**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __3___ Event No.: __2___

Event Description: N-43 Fails low

Symptoms/Cues: Annunciators:

- 1-10-A7, ROD DEV POWER RNG TILTS
- 1-10-A4, PWR RNG UPPER DET FLUX DEV HIGH
- 1-10-B4, PWR RNG LOWER DET FLUX DEV HIGH
- 1-10-C4, PWR RNG CHANNEL DEV
- 1-10-E4, OVATION SYSTEM TROUBLE

- N43 Power Range indication drops to zero
- 1NI-43B Fails low

Time	Position	Applicant's Actions or Behavior
	CREW	• Determine N43 Failed Low • Identify entry conditions for 1BOA INST-1, NUCLEAR INSTRUMENTATION MALFUNCTION UNIT 1 o Reference BARs
	ATC	• Check Rod Control Status • ROD BANK SELECT switch in – manual; place switch in MANUAL • Check for Rod Stop – NOT LIT • Check Tave – Tref stable and within 1°F - Yes
	ATC	• Select Operable Channel • Loop Delta-T Recorder • Select OWS graphic 6020, Reactor Temperature Control • Select Delta-T, OP Delta-T, OT Delta-T Recorder soft control button • Select OPERABLE LOOP • Exit window • Check if Rod Control System can be placed in Automatic • Turbine Low Power Interlock C5 (1-BP-5.7) – NOT LIT • Check Tave – Tref deviation - Stable and within 1°F • Place Rod Bank Select switch in - AUTO
	BOP	• Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions • Implement 1BOA INST-1 1BOA INST-1, NUCLEAR INSTRUMENTATION MALFUNCTION UNIT 1, Attachment A PR CHANNEL FAILURE and direct operator actions of 1BOA INST-1

Op. Test No.: NRC-23_ Scenario No.: __3___ Event No.: __2___

Event Description: N-43 Fails low

Symptoms/Cues: Annunciators:

- 1-10-A7, ROD DEV POWER RNG TILTS
- 1-10-A4, PWR RNG UPPER DET FLUX DEV HIGH
- 1-10-B4, PWR RNG LOWER DET FLUX DEV HIGH
- 1-10-C4, PWR RNG CHANNEL DEV
- 1-10-E4, OVATION SYSTEM TROUBLE

- N43 Power Range indication drops to zero
- 1NI-43B Fails low

Time	Position	Applicant's Actions or Behavior

	BOP	• Check SG Levels
		  • SG Levels – Normal and Stable
		• Remove the Failed PR Channel from Service
		  • Select OWS graphic REACTOR TEMPERATURE CONTROL (6020)
		  • Select NI POWER in Signal Selectors box
		  • Select the NI POWER graphic (7100) header to enable the window
		  • Select the PLACE OUT OF SERVICE soft control button for the failed PR channel – N43
		  • Verify the PLACE OUT OF SERIVCE soft control button for the affected PR channel NR-N4 illuminates (red) and use 2nd Highest soft control button is NOT illuminated (grey)
		• Exit window

	BOP	• Bypass / Defeat PR Channel Functions at 1PM07J
		  • Detector Current Comparator
		  • Upper section
		  • Lower section
		  • Miscellaneous Control and Indication section
		  • Power Mismatch Bypass
		  • Rod Stop Bypass
		  • Comparator and Rate Panel
		  • Comparator Channel Defeat
		• Check flux rate alarm – NOT LIT

Op. Test No.: NRC-23 Scenario No.: 3 Event No.: 2

Event Description: N-43 Fails low

Symptoms/Cues: Annunciators:

- 1-10-A7, ROD DEV POWER RNG TILTS
- 1-10-A4, PWR RNG UPPER DET FLUX DEV HIGH
- 1-10-B4, PWR RNG LOWER DET FLUX DEV HIGH
- 1-10-C4, PWR RNG CHANNEL DEV
- 1-10-E4, OVATION SYSTEM TROUBLE

- N43 Power Range indication drops to zero
- 1NI-43B Fails low

Time	Position	Applicant's Actions or Behavior
	BOP	• Place computer points in test / delete from scan for affected PR channel • On the PPC PDMS Test Mode page place the following computer points – IN TEST • N0045, N0046, U1141, U1145 • Delete the following computer points in – FROM SCAN • N0051A • Place the NIS input to DEH – IN TEST (Graphic 5515) • 1NY-NR8043B • Select – TEST • Verify red test light – Illuminates • Verify point quality indicates - Bad
	US	• Notify SM to Locally Bypass Bistables for Failed PR Channel

Op. Test No.: NRC-23 Scenario No.: 3 Event No.: 2

Event Description: N-43 Fails low

Symptoms/Cues: Annunciators:

- 1-10-A7, ROD DEV POWER RNG TILTS
- 1-10-A4, PWR RNG UPPER DET FLUX DEV HIGH
- 1-10-B4, PWR RNG LOWER DET FLUX DEV HIGH
- 1-10-C4, PWR RNG CHANNEL DEV
- 1-10-E4, OVATION SYSTEM TROUBLE

- N43 Power Range indication drops to zero
- 1NI-43B Fails low

Time	Position	Applicant's Actions or Behavior

	US	Recognize malfunction of TS Related Instrumentation
		Locate/Determine Applicable LCOs
		• LCO 3.3.1 Reactor Trip System (RTS) Instrumentation
		  • Function 2 Power Range Neutron Flux
		  • a. High
		  • b. Low
		  • Function 3 Power Range Neutron Flux-High Positive Rate
		CONDITION, REQUIRED ACTION, and COMPLETION TIME
		• CONDITION A - One or more Functions with one or more required channels or trains inoperable.
		  ○ A.1
		  • Required Action - Enter the Condition referenced in Table 3.3.1-1 [CONDITION P]
		  • Completion Time – Immediately
		• CONDITION D - One Power Range Neutron Flux-High channel inoperable
		  ○ D.1
		  • Required Action – Place channel in trip
		  • Completion Time - 72 hours
		• CONDITION E - One channel inoperable
		  ○ E.1
		  • Required Action – Place channel in trip
		  • Completion Time - 72 hours

EVALUATOR NOTE:		**After the actions for the N43 channel failure are complete, the rods have been returned to auto and with lead examiner's concurrence, continue to Event 3.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __3___ Event No.: __3___

Event Description: 1A CD/CB PP trips and 1D CD/CB PP does not auto start

Symptoms/Cues: Annunciator:
- 1-17-A9, CD/CB PUMP TRIP
- 1-16-E1 FEEDWATER NPSH LOW

1A CD/CB PP disagreement light

Time	Position	Applicant's Actions or Behavior
	ATC	• Monitor control room indications and assist with peer checks as directed.
	BOP	• Notify SRO of the 1A CD/CB PP trip. • Take action per BHC 1-17-A9, CD/CB Pump Trip. o Start aux oil pump for the 1D CD/CB PP o VERIFY/START the 1D CD/CB Pump (Yes) o Close the recirc on the 1A CD/CB PP • Perform 1BOA SEC-1 (Attachment C) if directed by the US o Turbine Load >700MW – Yes o Standby CD/CB PP running – No ▪ Start aux oil pump for standby CD/CB PP ▪ Start the standby CD/CB PP o At least 3 CD/CB pumps Running – Yes o Feed flow equal to or greater than steam flow – Yes o Close recirc on tripped pump – Yes o FW pump discharge flow Oscillating – No o Check alarms NOT lit ▪ 1-17-B11 CB Pump DSC FLOW HIGH – Yes ▪ 1-16-E1 FW PUMP NPSH LOW – Yes o Delta I within limits – Yes o PDMS Operable – Yes o 1-10-D7 PDMS Limit Exceeded Not lit – Yes o Restore Plant Conditions as required
	US	• Notify SM of the 1A CD/CB PP trip. • Direct BOP to take actions of BHC 1-17-A9, CD/CB Pump Trip • Monitor actions of BHC 1-17-A9, CD/CB Pump Trip • Notify SM of the 1A CD/CB PP trip and 1D CD/CB PP needing to be manually started. • Notify SM to perform risk evaluation, Initiate IR and conduct a duty team challenge. • Enter 1BOA SEC-1

Op. Test No.: NRC-23 Scenario No.: 3 Event No.: 3

Event Description: 1A CD/CB PP trips and 1D CD/CB PP does not auto start

Symptoms/Cues: Annunciator:

- 1-17-A9, CD/CB PUMP TRIP
- 1-16-E1 FEEDWATER NPSH LOW

1A CD/CB PP disagreement light

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Once the 1D CD/CB PP is running and, at the lead examiners discretion, continue to Event 4**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __3___ Event No.: __4___

Event Description: Master PZR pressure controller fails high

Symptoms/Cues: Annunciator:

- 1-12-C1 PZR PRESS CONT DEV LOW HTRS ON

Master Pressurizer Pressure Controller output lowers
PZR pressure rises

Time	Position	Applicant's Actions or Behavior
	ATC	Reference BHC 1-RY-P PRESSURIZER PRESSURE MALFUNCTION and perform the following at 1PM05J: • CONTROL PZR pressure manually to RESTORE PZR pressure to normal. • Take manual control of 1PK-0455A.
	BOP	• Monitor remainder of MCBs
	US	• Direct the ATC to review/perform BHC 1-RY-P PRESSURIZER PRESSURE MALFUNCTION actions. • Acknowledge report of 1PK-0455A failure and manual PZR pressure control. • Establish a critical parameter for PZR pressure. • Notify SM of Master Pressurizer Pressure Controller failure. Notify SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct failure.
EVALUATOR NOTE:		**While taking control of the master PZR pressure controller is the most direct way to control this failure, the ATC may instead decide to take direct control of the heaters and the spray valve controller. This approach will mitigate thee failure in the same way.**
EVALUATOR NOTE:		**After the ATC has stabilized PZR pressure and with Lead Examiner's concurrence, insert Event 5.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __3___ Event No.: __5___

Event Description: Containment pressure 1PT-CS935 fails to 10 PSIG

Symptoms/Cues: Annunciator:
- 1-3-C4 CNMT PRESS HI-2
- 1-3-D4 CNMT PRESS HIGH

1PT-CS935 reads 10 PSIG

Time	Position	Applicant's Actions or Behavior
	BOP/ATC	• Respond to alarms
	US	• Direct operators to respond per BARs • Enter and direct 1BOA INST-2 OPERATION WITH A FAILED INSTRUMENT CHANNEL • Determine Attachment K applies • Contact WEC to place channel 1PT-935 bistables in bypass • Notify SM to perform on line risk assessment, request maintenance support, and generate IR requests

	US	Recognize malfunction of TS Related Component
		Locate/Determine Applicable LCOs
		• LCO 3.3.2 Engineered Safety Feature Actuation System (ESFAS) Instrumentation (Functions 2.c and function 3.b.(3))
		CONDITION, REQUIRED ACTION, and COMPLETION TIME
		• CONDITION A, One or more functions with one or more required channels or trains inoperable
		• A.1
		  • Require Action – Enter the Condition referenced in Table 3.3.2-1 for the channel(s) or trains(s)
		  • Completion Time – Immediately
		• CONDITION D, One or more functions with one or more required channels or trains inoperable
		• D.1
		  • Require Action – Place channel in trip.
		  • Completion Time – 72 hours
		• CONDITION E, One Containment Pressure Channel inoperable
		• E.1
		  • Required Action – Place channel in bypass
		  • Completion time – 72 hours

Op. Test No.: NRC-23 Scenario No.: 3 Event No.: 5

Event Description: Containment pressure 1PT-CS935 fails to 10 PSIG

Symptoms/Cues: Annunciator:

- 1-3-C4 CNMT PRESS HI-2
- 1-3-D4 CNMT PRESS HIGH

1PT-CS935 reads 10 PSIG

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Once the US has made the applicable Tech Spec determination and with Lead Examiner's concurrence, insert Event 6.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __3___ Event No.: __6&7___

Event Description: CD/FW Runback from the trip of the 1B CD/CB PP and Rods will not move in Automatic.

Symptoms/Cues: Annunciator:

- 1-17-A9, CD/CB PUMP TRIP
- 1-16-E1 FEEDWATER NPSH LOW

1B CD/CB PP disagreement light

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Rods will not move in automatic. Crew may enter BOA ROD-2 after conditions stabilize.**
	ATC	• Recognize that rods are not moving in automatic and will take rods to manual and drive rods in per placard guidance. • Borate as directed by the US and per placard guidance
	BOP	• Notify SRO of the 1B CD/CB PP trip. • Take action per BHC 1-17-A9, CD/CB Pump Trip. • Recognize only 2 pumps are available • Initiate CD/FW Runback o Runback pushbutton o OWS pane G-5512 • Perform 1BOA SEC-1 if directed by the US
EVALUATOR NOTE:		**US may hand 1BOA SEC-1 off to the BOP at any time.**

Op. Test No.: NRC-23 Scenario No.: 3 Event No.: 6&7

Event Description: CD/FW Runback from the trip of the 1B CD/CB PP and Rods will not move in Automatic.

Symptoms/Cues: Annunciator:

- 1-17-A9, CD/CB PUMP TRIP
- 1-16-E1 FEEDWATER NPSH LOW

1B CD/CB PP disagreement light

Time	Position	Applicant's Actions or Behavior

	US	• Acknowledge trip of 1B CD/CB PP
		• Notify SM of plant status, runback and procedure entry.
		• Request SM evaluation of Emergency Plan conditions.
		• Enter 1BOA SEC-1, Attachment C, CD/CB PUMP TRIP, and direct the following operator actions:
		  • Standby CD/CB PP running – No
		  • Attempt start of CD/CB PP - No
		  • Check 3 CD/CB PPs running - No
		  • Check 2 CD/CB PPs running – Yes
		  • Direct CD/FW Runback
		  • Check Turbine Load dropping – Yes
		  • Check rod control in auto – No (Manual due to no automatic rod motion)
		  • Direct ATC (or BOP) to borate as necessary
		  • Check for FW pump flow oscillation – No
		  • Check CD/CB flow restored – No
		  • Check Plant Status
		  ○ Delta I within limits
		  ○ PDMS Operable
		  ○ Check PDMS Limit Exceeded alarm not lit
		  ○ Rod Bank Low Insertion Limit Not Lit
		  ○ Turbine Runback Not Lit
		  ○ C7 Interlock Not Lit
		  • Restore plant conditions
		  • Notify the Shift Manager to do Risk Evaluation
		  • Notify Chemistry to monitor secondary chemistry

EVALUATOR NOTE:		**It is highly likely that the crew will be unable to keep up with the runback from 100% power with 2 CD/CB PPs resulting in a manual trip of the U-1 Reactor.**
EVALUATOR NOTE:		**When the crew trips the reactor or at the Lead Examiner's direction, continue to Event 8.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23 Scenario No.: 3 Event No.: 8&9

Event Description: LOOP and reactor trip with 1A DG and 1B AF PP not starting.

Symptoms/Cues: Annunciators:

- 1-20-A1, LOSS OF OFFSITE POWER
- 1-20-A3, SAT 142-1 LOCKOUT RELAY TRIP
- 1-20-A4, SAT 142-2 LOCKOUT RELAY TRIP
- 1-20-A6, BUS 159 FD BRKR 1592 TRIP
- 1-20-A8, BUS 158 FD BRKR 1582 TRIP
- 1-21-A7, BUS 141 FD BRKR 1412 TRIP
- 1-22-B7, BUS 141 CONT PWR FAILURE
- 1-11-A9, TURBINE TRIP ABOVE P8/Reactor Trip
- 0-35-B1, OCB 4-5 Trip
- 0-35-B2, GCP 3-4 Trip
- 0-35-A1, OCB 5-6 Trip
- 0-35-A2, OCB 6-7 Trip

No Feed Flow to any SG

Time	Position	Applicant's Actions or Behavior
	CREW	• Refer to BARs. ○ Determine Loss of Off-Site Power has occurred. ○ Take immediate actions for a plant trip per 1BEP-0, REACTOR TRIP OR SAFETY INJECTION
	ATC	Verify reactor trip: • Rod bottom lights - LIT. • Reactor trip & Bypass breakers – OPEN. • Neutron flux DROPPING.
	ATC	Check SI Status: • SI First OUT annunciator – NOT LIT. • SI ACTUATED Permissive Light – NOT LIT. • SI Equipment – AUTOMATICALLY ACTUATED. Check SI Required: • PZR Pressure < 1829 PSIG – No • Steamline pressure < 650 PSIG – No CNMT Pressure ≥ 3.4 PSIG - No
	BOP	Perform immediate operator actions of 1BEP-0: • Verify Turbine Trip: • All Turbine throttle valves – CLOSED. • All Turbine governor valves – CLOSED. Verify power to 4KV busses • Bus 141 – NOT ENERGIZED ○ When time permits, try to restore power per 1BOA ELEC-3, LOSS OF 4K ESF BUS Bus 142 - ENERGIZED

Op. Test No.: NRC-23 Scenario No.: 3 Event No.: 8&9

Event Description: LOOP and reactor trip with 1A DG and 1B AF PP not starting.

Symptoms/Cues: Annunciators:

- 1-20-A1, LOSS OF OFFSITE POWER
- 1-20-A3, SAT 142-1 LOCKOUT RELAY TRIP
- 1-20-A4, SAT 142-2 LOCKOUT RELAY TRIP
- 1-20-A6, BUS 159 FD BRKR 1592 TRIP
- 1-20-A8, BUS 158 FD BRKR 1582 TRIP
- 1-21-A7, BUS 141 FD BRKR 1412 TRIP
- 1-22-B7, BUS 141 CONT PWR FAILURE
- 1-11-A9, TURBINE TRIP ABOVE P8/Reactor Trip
- 0-35-B1, OCB 4-5 Trip
- 0-35-B2, GCP 3-4 Trip
- 0-35-A1, OCB 5-6 Trip
- 0-35-A2, OCB 6-7 Trip

No Feed Flow to any SG

Time	Position	Applicant's Actions or Behavior
	US	• Enter/Implement 1BEP-0, REACTOR TRIP OR SAFETY INJECTION • Notifies SM of plant status and procedure entry. • Requests evaluation of Emergency Plan conditions.
EVALUATOR NOTE:		**The crew may start the 1B AF pump at any time. The 1B DG will trip 30 seconds after the 1B AF pump is manually started.**
	US	Transition to 1BEP ES-0.1, REACTOR TRIP RESPONSE, Step 1 • Check RCS Temperature o No RCPs Running – 552F – 561F – Yes • Check Shutdown Reactivity Status o All Rod Bottom Lights Lit – Yes o Any RCPs running – No ▪ Request Chemistry Sample every 15 minutes ▪ Borate when power is available • Check PZR LEVEL CONTROL o Level > 17% - Yes o Charging and Letdown in service – Yes o Trending to Program Level – No ▪ Correct when IA is available • Check PZR Pressure Control o Pressure > 1829 PSIG – Yes o Pressure Stable or Trending to 2235 – Yes • Check FW Status o RCS temp < 564F – Yes o FW Isol monitor lights – LIT - No o Trip running FW pumps – None

Op. Test No.: NRC-23_ Scenario No.: __3___ Event No.: __8&9__

Event Description: LOOP and reactor trip with 1A DG and 1B AF PP not starting.

Symptoms/Cues: Annunciators:

- 1-20-A1, LOSS OF OFFSITE POWER
- 1-20-A3, SAT 142-1 LOCKOUT RELAY TRIP
- 1-20-A4, SAT 142-2 LOCKOUT RELAY TRIP
- 1-20-A6, BUS 159 FD BRKR 1592 TRIP
- 1-20-A8, BUS 158 FD BRKR 1582 TRIP
- 1-21-A7, BUS 141 FD BRKR 1412 TRIP
- 1-22-B7, BUS 141 CONT PWR FAILURE
- 1-11-A9, TURBINE TRIP ABOVE P8/Reactor Trip
- 0-35-B1, OCB 4-5 Trip
- 0-35-B2, GCP 3-4 Trip
- 0-35-A1, OCB 5-6 Trip
- 0-35-A2, OCB 6-7 Trip

No Feed Flow to any SG

Time	Position	Applicant's Actions or Behavior
	[CT]	○ Check total feed flow to SGs >500 GPM – No ▪ SG Level can not be controlled >10% • Manually start the 1B AF PP
EVALUATOR NOTE:		**The 1A DG will trip 30 seconds after the 1B AF pump is manually started**
EVALUATOR NOTE:		**The crew may continue on in 1BEP ES-0.1 but will not hit any actionable steps before transitioning to 1BCA 0.0**

Op. Test No.: NRC-23_ Scenario No.: __3___ Event No.: __10___

Event Description: 1A DG Trip (1BCA 0.0)

Symptoms/Cues: Annunciator:

- 1-21-C7, BUS 141 OVERLOAD OR VOLT LOW
- 1-21-D6, 125V DC BUS 11 GROUND
- 1-21-E8, 125V DC BATT CHGR 11 TROUBLE

Loss of lighting in the Simulator

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		• **Record time loss of all AC power occurred. _____:_____:_____**
	CREW	• Determine Loss of Off-Site Power has occurred.
	ATC	Perform immediate operator actions of 1BCA-0.0: • Manually trip reactor at 1PM05J or 1PM06J. • Verify reactor trip at 1PM05J: • Reactor trip & Bypass breakers - OPEN • Neutron flux – DROPPING
	ATC	Perform immediate operator actions of 1BCA-0.0: • Manually trip reactor at 1PM05J or 1PM06J. • Verify reactor trip at 1PM05J: • Reactor trip & Bypass breakers - OPEN • Neutron flux – DROPPING

	ATC	• Verify RCS isolated:
		  • 1CV8149A, B & C CLOSED.
		  • 1CV459 and 1CV460 CLOSED.
		  • 1RY455A and 1RY456 CLOSED.
		  • 1CV8153A & B CLOSED.
		RCPs NOT RUNNING.

	BOP	Perform immediate operator actions of 1BCA-0.0:
		• Manually Isolate Steam lines at 1PM05J or 1PM06J:
		  • Actuate main steam line isolation.
		  • Verify all MSIVs and MSIV Bypass valves – CLOSED.

	BOP	• Verify AF flow: • AF flow >500 gpm (1B AF train only)

Op. Test No.: NRC-23 Scenario No.: 3 Event No.: 10

Event Description: 1A DG Trip (1BCA 0.0)

Symptoms/Cues: Annunciator:

- 1-21-C7, BUS 141 OVERLOAD OR VOLT LOW
- 1-21-D6, 125V DC BUS 11 GROUND
- 1-21-E8, 125V DC BATT CHGR 11 TROUBLE

Loss of lighting in the Simulator

Time	Position	Applicant's Actions or Behavior

	BOP	• Try to restore power to any/both Unit 1 4KV ESF buses at 1PM01J:
		  • Manually start DGs - No
		  • Check at least one ESF bus energized – none energized
		• Actuate SI from both locations.

	US	• Enter/Implement 1BCA-0.0, LOSS OF ALL AC POWER • Notifies SM of plant status and procedure entry. • Requests evaluation of Emergency Plan conditions.

	US	• Check status of Unit 2 ESF buses:
		  • Bus 241 – energized from SAT.
		  • Notify Unit 2 to implement 2BCA-0.3, RESPONSE TO OPPOSITE UNIT LOSS OF ALL AC POWER.
		  • Bus 242 – energized from SAT.
		• Go to 1BCA-0.0, Step 8.

	BOP / US	• Prepare for ESF Bus crosstie: • Dispatch operator to depress emergency stop push buttons on both U1 DGs. • Reset SI.

	BOP/US
	
	[CT]
		• Check bus 241 ENERGIZED – Yes
		• Check Bus 141 NOT FAULTED:
		  • Place DG 1A feed breaker (ACB 1413) in PULL OUT
		  • Place breakers in PULL OUT
		  • ACB 1411
		  • ACB 1412
		  • ACB 1414
		• Check Bus 141 alarms NOT LIT – No
		
		CROSSTIE BUS 142 to U2:
		• Notify UNIT 2 that Bus 142 will be used for crosstie
		  • Check Bus 142 – NOT FAULTED:
		  • ACB 1423 (DG feed) in PULL OUT.
		  • ACB 1421 (Non-ESF bus tie) in PULL OUT.
		  • ACB 1422 (SAT feed) in PULL OUT.
		  • ACB 1424 (Reserve feed) in PULL OUT.
		  • Verify Bus 142 alarms NOT LIT: -Yes
		  • Annunciator 1-22-A7, BUS 141 FD BRKR ACB 1422 TRIP.
		  • Annunciator 1-22-B8, BRKR 1424 CROSS-TIE OVERCURRENT.
		  • Annunciator 1-22-B9, DG 2A OVERLOAD.
		  • Place ESF loads in PULL OUT:
		  • CENT CHG pumps
		  • RH pumps
		  • SI pumps
		  • 1A AF pump
		  • RCFCs (HI and LO)
		  • CS pumps
		  • CC pumps (1A, 1B, and 0)
		  • SX pumps
		  • MCR chillers
		  • SX Tower Fans (0A, 0B, 0E, and 0F Hi and Lo)
		  • Check ACB 2424 closed
		  • Synch and Close Bus 242/1412 reserve feeder breaker:
		  • **Close ACB 1424**
		  • Check Bus 142 energized.
		  • Check 480 V ESF buses energized
		  • Bus 132X
		  • Bus 132Z

Op. Test No.: NRC-23_ Scenario No.: __3___ Event No.: __10___

Event Description: 1A DG Trip (1BCA 0.0)

Symptoms/Cues: Annunciator:

- 1-21-C7, BUS 141 OVERLOAD OR VOLT LOW
- 1-21-D6, 125V DC BUS 11 GROUND
- 1-21-E8, 125V DC BATT CHGR 11 TROUBLE

Loss of lighting in the Simulator

Time Position	Applicant's Actions or Behavior
EVALUATOR NOTE:	**Record time AC power restored: _____:_____:_____** **Time power restored – time power lost = _____:_____:_____ (<10 minutes)**
EVALUATOR NOTE:	**Scenario may be terminated after bus 142 has been successfully energized from 242 via the crosstie and with the lead examiner's concurrence.**

Form 3.3-1 Scenario Outline

Facility:	Byron Station	Scenario #:	N23-4
Scenario Source:	New	Op. Test #:	2023-301
Examiners:		Applicants/ Operators:	
Initial Conditions:	IC 65 88% RTP, MOL, steady state conditions		
Turnover:	U-1 is at 88% power, steady state, equilibrium Xenon, MOL. Online risk is green. Following completion of turnover, the Shift Manger has directed the crew to swap the RCFC lineup. The 1A MFP is OOS for an oil change.		
Critical Tasks:	CT-13 Manually trip the Turbine CT-43: Establish min feedwater or condensate flow to SG(s) before bleed and feed is required		

Event No.	Malf. No.	Event Type*	*Event Description*
1	None	N (BOP, US)	Swap RCFCs
2	NI09C	C, MC, TS (ATC,US)	Inadvertent Phase A (Alpha Train only)
3	NI09C	C, MC (BOP,US)	1A CW PP trip and discharge valve does not auto close
4	RX28G 0 30	TS, C (US)	1C Loop flow (434) fails low
5	CV16 100	C, MC (ATC,US)	1LT-112 fails high
6	IOR ZDI0PBCW03PA ON	R (US, ATC, BOP)	1A HD (shaft shear) and 1C HD PP will not start requiring a HD runback
7 **[CT]**	RP24A	M (All)	Inadvertent Safety Injection, (1A AF PP starts, 1B AF PP can not be started)
8	TC03	C, MC (BOP,US)	Main Turbine does not trip automatically
9 **[CT]**	IMF FW35B	C	1A AF Pump trips (BFR H.1)

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control

Critical Tasks:

CT-13: Manually trip the Turbine before a severe challenge (ORANGE path) develops to either subcriticality or integrity critical safety function or before transition to 1BCA-2.1, whichever happens first. (K/A Number – 002-A2.04, Importance 4.5)

- Safety Significance**:** Failure to trip the main turbine under the postulated plant conditions causes challenges to CSFs beyond those irreparably introduced by the postulated conditions.

- Cues: Indication and/or annunciation of reactor trip, rod bottom lamps illuminated, reactor trip and bypass breakers status lamps indicate breakers open, excore nuclear instruments show reactor power decreasing through the intermediate range and indication that the main turbine has not automatically tripped, stop valves indicate open, control valves indicate at their full-load position, or indication of uncontrolled depressurization of all SGs.

- Performance Indicator: Manipulation of controls to transfer and manually trip the main turbine – stop valves and/or governor valves indicate closed.

- Feedback: Steam flow indication from all intact SGs decreases to zero, all SGs stop depressurizing, RCS cooldown from intact SG stops.

CT-43: Establish min feedwater or condensate flow to SG(s) before bleed and feed is required (K/A Number – E05-EA1.18, Importance 3.8)

- Safety Significance**:** Failure to establish feedwater flow to any SG results in the crew's having to rely upon the lower-priority action of establishing RCS bleed and feed to minimize core uncover. This constitutes incorrect performance that fails to prevent "degradation of any barrier to fission product release."

- Cues: Extreme (RED path) challenges to the heat sink CSF, indication the RCS pressure remains above the pressure of all SGs, indication that RCS temperature is above the temperature for placing the RHR system in service, indication and/or annunciation that no AFW flow if available after repeated attempts to establish and feed/bleed conditions have not been established.

- Performance Indicator: Manipulation of controls as required to establish feedwater flow into at least one SG

- Feedback: Indication of feedwater flow into at least one SG or increasing water level in at least one SG

Scenario 23-4 Summary

The scenario will start with U-1 at 88% power, steady state, equilibrium Xenon, MOL. Online risk is green. Following completion of turnover, the Shift Manger is directed to swap the RCFC lineup. The 1A MFP is OOS for an oil change. 1B HD PP tripped and is OOS for repairs with a return estimate of 16 hours.

Event 1 Swap RCFCs
After completing shift turnover and relief, the crew will swap RCFCs per Shift Manager. The BOP will start the 1B RCFC and secure the 1D RCFC.

Event 2 Inadvertent Phase A (A Train only)
The crew will identify a Train A spurious phase A actuation and respond using 1BOA PRI-13. The crew will take make control of charging to minimize pressurizer level rise and will start available RCFCs in high speed. US will enter 3.3.2 Condition A and C. Continue to Event 3 after the crew has completed 1BOA PRI-13, notifications have been made and obtaining concurrence from the lead examiner.

Event 3 1A CW PP trip and discharge valve does not auto close
1A CW PP will trip and the BOP will respond to alarm 1-17-A13. The BOP will identify the discharge valve is not intermediate (not closing) and will need to manually close the valve. Continue to Event 5 once the discharge valve has been closed, condenser vacuum is trending toward normal and concurrence has been obtained from the lead examiner.

Event 4 1C Loop flow 434 fails low
1FT434, 1C RCS Flow Loop Transmitter, fails low and 1-13-C3 will alarm. The crew will determine that a channel failure has occurred and implement 1BOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL UNIT 1, Attachment L. Tech Spec 3.3.1 Condition A & K will be entered.

Event 5 1LT-112 fails high
1LT-112 will fail high. This will cause 1-19-D2, LTDWN FLOW DIVERTED TO HUT alarm and letdown flow will divert to the HUT. The Bar will direct the crew to 1BOA INST-2 and, depending on how the BAR is utilized, will direct the ATC to maintain VTC level. The ATC should identify the failed instrument and take manual control to reposition 1CV112A to the “VCT” Position to stop the VCT level loss. The first step of 1BOA INST-2 will give similar guidance to maintain VCT level manually. If the ATC takes the 1CV11A switch to the “VCT” position then second failure will not occur and the crew will select an operable channel. Otherwise, auto makeup to the VCT will be disabled and VCT level will continue to drop until the ATC manually initiates makeup to maintain VCT level. This event is complete when the ATC has taken a manual action to maintain VCT level and an operable channel has been selected.

Event 6 1A HD (shaft shear) and 1C HD PP can not be started requiring a HD runback
The crew will respond to a low FW PP suction pressure condition (which may clear temporarily when the standby CD/CB PP starts) or the HD train tank Hi level alarm. They will identify that the 1A HD pump is running but drawing no amps and pushing no flow. They will further identify that the 1C HD PP did not start as anticipated and that a HD run back is required until 2 HD pumps have been reestablished and the plant has stabilized.

Event 7 Inadvertent Safety Injection, Main Turbine does not trip automatically (1A AF PP starts, 1B AF PP can not be started) An inadvertent Safety Injection signal will occur. The reactor will trip and the crew enter 1BEP-0. The 1B AF pump will not have autostarted and can not be manually started. The 1A AF Pump will auto start.

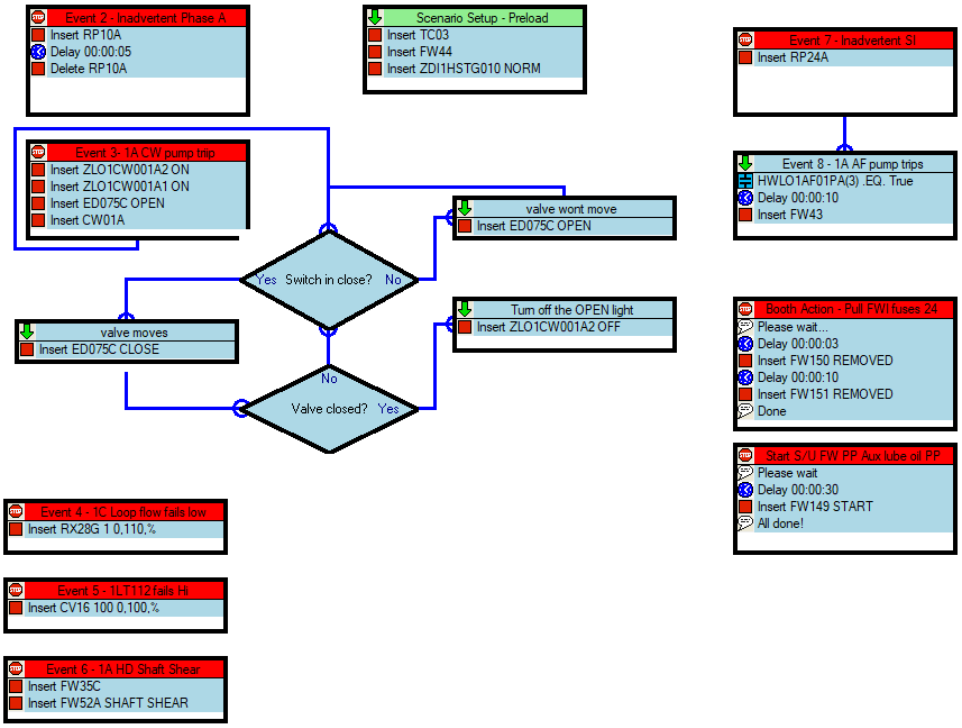
Event 8 1A Main Turbine does not trip automatically
During immediate actions, the BOP will identify that the turbine did not trip and will have to manually trip the turbine.

Event 9 1A AF Pump trips (BFR H.1)
10 seconds after the reactor trip, the 1A AF PP will trip resulting in the loss of the secondary heat sink. The crew will transition to BFR H.1 from 1BEP 0 step 6. The recovery path will be through the use of the start up feedwater pump.

SIMULATOR SETUP GUIDE:

- Verify/perform TQ-BY-201-0113, Attachment 3, NRC EXAM Security Checklist.
- Establish the conditions of IC 65, 88% power, MOL, equilibrium xenon
- Place Simulator in RUN
- Initiate Smart Scenario:
  - Open SMART SCENARIO (Extreme Ace icon)
  - Open file Scenario N23-4 Scenario.ssf
  - Click on the MODE button (near top of screen) and pick EXECUTE
  - Click on the PLAY button (bottom left of screen)

- Verify the following are included in the Smart Scenario:



Ensure the following equipment is aligned

- Verify 1D RCFC is running, 1B RCFC is NOT running
- Verify All CW PPs are running
- Set BAT Flow Controller to 14.5 for 879 ppm boron

OOS Items: 1A FW PP

Turnover Information

Plant Status:

- Unit 1 is at 88%, MOL, steady state conditions
- 1097 MWe
- RCS boron concentration is 879 ppm
- Control bank D @ 194 steps
- Online Risk is Green

Out of Service:

- 1A FW Pump for an oil change estimated return is the end of this shift.

Shift Activities:

- Shift manager has directed a swap of the B and D RCFCs after completion of turnover.

Event 1: Swap RCFCs

If contacted as **SM**, acknowledge procedure entry and completion for RCFC swap.

At the discretion of the lead evaluator and if required, as **SM** contact the crew and direct the swap of 1B and 1D RCFCs.

Event 2: Inadvertent Phase A (A Train only)

At Lead Evaluator's cue, use Smart Scenario to initiate the inadvertent Phase A by right clicking on the box titled, **Event 2 Inadvertent Phase A**, and select, **Release.**

As **SM**, acknowledge the failure, request for writing IR, performing risk assessment and making appropriate notifications.

Event 3: 1A CW PP trip and discharge valve does not auto close

At Lead Evaluator's cue, use Smart Scenario to trip the 1A CW PP by right clicking on the box titled, **Event 3 1A CW PP Trip**, and select, **Release**.

As the **Outsides EO**, when asked to investigate the cause of the 1A CW PP trip, acknowledge the request and state that It'll take about 10 minutes for you to get to the CWPH.

As an **EO**, if dispatched to check the 1A CW PP Breaker, report "1A CW PP has an overcurrent flag up."

As **SM**, acknowledge request for writing IR, performing risk assessment and making appropriate notifications

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Event 4: 1C Loop flow (434) fails low

At Lead Evaluator's cue, use Smart Scenario to initiate RCS Loop Flow Transmitter (1FT434) failing low by right clicking on the box titled, **Event 4 – 1C Loop Flow fails low,** and select, **Release.**

As **SM** acknowledge the failure, entry into 1BOA INST-2, request for writing IR, performing risk assessment, entry into T.S. 3.3.1 entry and making appropriate notifications.

Event 5: 1LT-112 fails high

At Lead Evaluator's cue, use Smart Scenario to fail 1LT-112 output high by right clicking on the box titled, **Event 5 1LT-112 fails high**, and select, **Release.**

As **SM**, acknowledge the failure of VCT Level Channel 1LT-112 (and, if applicable, the failure of auto makeup), entry into 1BOA INST-2, request for writing, preforming risk assessment and making appropriate notifications.

Event 6: 1A HD (shaft shear) and 1C HD PP can not be started requiring a HD runback

At Lead Evaluator's cue, use Smart Scenario initiate Loss of flow from 1A HD PP by right clicking on the box titled, **Event 6 1A HD Shaft Shear**, and select, **Release.**

As the **T1 EO**, if dispatched to look at the 1A or 1C HD PPs, report "There are no obvious issues with either pump locally".

As an **EO**, if dispatched to the 1C HD PP breaker, report "There is an overcurrent flag up on the 1C HD PP Breaker."

As **SM**, acknowledge runback, request for writing IR, performing risk assessment and making appropriate notifications

---

Event 7/8: Inadvertent Safety Injection, Main Turbine does not trip automatically (1A AF PP starts, 1B AF PP can not be started)

At Lead Evaluator's cue, use Smart Scenario to initiate Event 7 Inadvertent SI / 1B SG feedline break & 8 Turbine auto & manual trip failure by right clicking on the box titled, **Event 7 & 8 – Main,** and select, **Release.**

If dispatched to investigate the 1B AF PP, as the **AB EO**, report "The 1B AF pump has an air box trip and will not reset."

As **SM**, acknowledge entry into 1BEP 0, request for writing IR, performing risk assessment and making appropriate notifications

---

Event 9: 1A AF Pump trips (BFR H.1)

10 seconds after the reactor trip, the 1A AF PP will trip sending the crew into BFR H.1 with a success path involving the SU FW PP.

If dispatched to pull FWI fuses, right click the box titled, **Booth Action – Pull FWI fuses,** and select **Release**

If dispatched as an **EO** to start the AOP for the S/U FW PP, right click on the box titled, **Start S/U FW pp Aux Lube oil PP,** and select, **Release** to start the aux oil pump for the S/U feed pump and report that the S/U FW PP Aux oil pump is running.

If dispatched as an **EO** to investigate the trip of the 1A AF PP, report an overcurrent flag up on the breaker.

If Directed by the Lead Evaluator ONLY, after step 16 of BEP 0, as the **STA** call the US and report a red path for the H Safety Function.

As Shift Manager acknowledge the loss of all feedwater sources and transition to 1BFR H.1, request for writing IR, performing risk assessment and making appropriate notifications

When contacted as **SM** to determine if an AF cross tie is necessary, respond with “We will not be using the AF cross tie at this time. Continue on with the procedure.”

If dispatched as an **EO** to check open either 1CB133 or 1FW098, report “The valve is Open.”

When the crew has successfully started the SU FW PP to establish a heat sink, and with the lead examiner’s concurrence, place the simulator in freeze.

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: N23-4 Event No.: __1___

Event Description: Swap RCFCs

Symptoms/Cues: As directed by Turnover

Time	Position	Applicant's Actions or Behavior
	ATC	• Provide peer checks • Monitor control boards
	BOP	• Refer to BOP VP-5, REACTOR CONTAINMENT FAN COOLER START-UP • VERIFY/PLACE 1VP01CB, 1B Lo Speed Control Switch in AFTER TRIP • Start 1VP01CB • VERIFY/RESET alarms • Refer to BOP VP-6, REACTOR CONTAINMENT FAN COOLER SHUTDOWN • Determine which RCFC to shutdown (1D) • Place 1D RCFC Hi Speed control switch in after-trip • Notify SRO of RCFC status
	US	• Direct performance of BOP VP-5 and 6
EVALUATOR NOTE:		**After the RCFCs are swapped and with Lead Examiner's concurrence, enter next event.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __N23-4___ Event No.: __2___

Event Description: Inadvertent Phase A (A Train only)

Symptoms/Cues: Annunciator 1-5-B7, CNMT PHASE A ISOLATION
Group 3 CNMT isol monitor lights – LIT
Phase A CNMT isol valves indication - CLOSED

Time	Position	Applicant's Actions or Behavior

	ATC	• Take manual control of charging
		• Control 1CV121 to minimize PZR level rise
		• Turn off PZR heaters
		• Place PZR spray valve controllers in MANUAL at ZERO DEMAND
		• ESTABLISH NORMAL CHARGING AND LETDOWN ;
		• Open 1CV8105 and 1CV8106
		• Verify Regen HX isolation valves open – 1CV8324A or 1CV8324B
		• Establish letdown per 1BOA ESP-2, RE-ESTABLISHING CV LETDOWN
		CHECK IF RCP SEAL RETURN FLOW SHOULD BE ESTABLISHED:
		• All of the following - SATISFIED:
		  • SEAL WATER HX CC FLOW LOW (1-2-A7) - NOT LIT
		  ○ RCS pressure - GREATER THAN 100 PSIG
		  ○ VCT pressure - BETWEEN 15 PSIG AND 65 PSIG
		• Open seal water return CNMT isol valves to establish seal return flow:
		  ○ 1CV8100
		  • 1CV8112
		• Check No. 1 seal leakoff isol valves - OPEN:
		  • 1CV8141A - D

Op. Test No.: NRC-23_ Scenario No.: __N23-4___ Event No.: __2___

Event Description: Inadvertent Phase A (A Train only)

Symptoms/Cues: Annunciator 1-5-B7, CNMT PHASE A ISOLATION
Group 3 CNMT isol monitor lights – LIT
Phase A CNMT isol valves indication - CLOSED

Time	Position	Applicant's Actions or Behavior
	BOP	• Start available RCFCs in HIGH speed • Determine actuated Train: • 1CV8100 CLOSED • 1WO006A CLOSED • 1WO020A CLOSED • Identify Train A actuated • Check affected train isolated: • Refer to ATTACHMENT A to verify associated valves CLOSED • Reset CNMT Isol Phase A • Open instrument air to CNMT isolation valves 1IA065 and 1IA066 RESTORE CNMT COOLING: • Open all CNMT chilled water valves: o 1WO006A • 1WO006B o 1WO020A • 1WO020B • 1WO056A • 1WO056B

Op. Test No.: NRC-23_ Scenario No.: __N23-4___ Event No.: __2___

Event Description: Inadvertent Phase A (A Train only)

Symptoms/Cues: Annunciator 1-5-B7, CNMT PHASE A ISOLATION
Group 3 CNMT isol monitor lights – LIT
Phase A CNMT isol valves indication - CLOSED

Time	Position	Applicant's Actions or Behavior

	US	• Enter 1BOA PRI-13, RECOVERY FROM INADVERTENT PHASE A CONTAINMENT ISOLATION
		• Determine Alpha train actuated
		• Inform SM of Inadvertent Phase A
		• Locate/Determine Applicable LCOs
		  • LCO 3.3.2 Engineered Safety Feature Actuation System Instrumentation
		  • Function 3a(2), Containment Phase A Isolation Automatic Actuation Logic and Actuation Relays
		  • LCO 3.3.2, CONDITION A – One or more Functions with one or more required channels or trains inoperable
		  ○ A.1
		  • RA - Enter the Condition referenced in Table 3.3.2-1 [CONDITION C]
		  • CT - Immediately
		  • LCO 3.3.2 CONDITION C - One train inoperable
		  ○ C.1
		  • RA – Restore train to OPERABLE status
		  • CT - 24 hours
		• Notify SM of TS entry
		• Notify SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct the controller failure

EVALUATOR NOTE:		**After the crew has completed 1BOA PRI-13 and with the lead examiner's concurrence, initiate Event 3.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __N23-4__ Event No.: __3___

Event Description: 1A CW PP trip and discharge valve does not auto close

Symptoms/Cues: Annunciators:

- 1-17-A3,CW PUMP TRIP

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Crew may choose to enter 1BOA SEC-3 but the impact to condenser vacuum is expected to be minimal if action is taken to close the discharge valve.**
	ATC	• Monitor Boards • Provide Peer Checks as needed
	BOP	• Respond to pump trip alarm • Reference BAR 1-17-A3, CW PUMP TRIP • Recognize discharge valve remains in the open position (expect it to be intermediate) • Take action to close the discharge valve using the switch • Recognize that the valve moves from open to intermediate • Report conditions and actions taken to the US
	US	• Notify the SM of the 1A CW PP trip and manual action needed to close the discharge valve. • Report entry into 1BOA SEC-3 (if applicable) • Notify SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct the controller failure
EVALUATOR NOTE:		**After the crew has taken action to address the 1A CW PP discharge valve not closed automatically and have recognized condenser vacuum is being maintained, with lead examiner's concurrence, initiate Event 4.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __N23-4__ Event No.: __4___

Event Description: 1C Loop flow (434) fails low

Symptoms/Cues: Annunciators:

- 1-13-C3, RCP 1C BRKR OPEN OR FLOW LOW ALERT

Loop 1C Flow 1FI-434 indicates 0% flow

Time	Position	Applicant's Actions or Behavior
	ATC	Check affected RCS Loop flows: • DETERMINE cause of alarm ○ Identify/flag TSLB lights associated with failed channel • Identify/flag failed channel
	BOP	• Monitor boards and provide support for event if needed
	US	• Enter 1BOA INST-2, Operation with a Failed Instrument Channel Unit 1, Attachment L for RCS Loop Flow Channel • Notify SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct the instrument failure, conduct Duty Team Challenge to Bypass or Trip applicable Bistables • Determine applicable Tech Specs: ○ LCO 3.3.1 Reactor Trip System (RTS) Instrumentation Function 10, Reactor Coolant Flow-Low (per loop) ○ For LCO 3.3.1, CONDITION A ▪ Required Actions A.1 (Enter Condition) ▪ Completion Time Immediately ○ For LCO 3.3.1, CONDITION K ▪ Required Action K.1 (Place Channel in Trip) ▪ Completion Time 72 hours • OR ▪ Required Action K.2 (Reduce THERMAL POWER to < P-7) ▪ Completion Time 78 hours
EVALUATOR NOTE:		**Once T.S. determination has been made and with the concurrence of the lead examiner, continue to Event 5**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __N23-4__ Event No.: __5___

Event Description: 1LT-112 Fails High

Symptoms/Cues: Annunciators:

- 1-19-D2, LTDWN FLOW DIVERTED TO HUT
- 1-9-A2, VCT LEVEL HIGH-HIGH/LOW

1CV112A diverts to the HUT

Time	Position	Applicant's Actions or Behavior
	ATC	• Reference BAR 1-9-D2, LTDWN FLOW DIVERTED TO HUT • Recognize failure of 1LT-0112 has failed high and is providing a false high level signal • Check VCT level to ensure proper operation of 1CV112A, Ltdown to VCT or HUT Divert Vlv – No • Place 1CV112A control switch in the VCT position • Take action to initiate makeup to the VCT based on actual VCT level • Recommend entry into 1BOA INST-2, Operation with a Failed Instrument
	BOP	• Monitor boards and provide support for event if needed
	US	• Enter 1BOA INST-2, Operation with a Failed Instrument Channel Unit 1, Attachment V for VCT LEVEL CHANNEL • Direct ATC to select an operable VCT Level Channel • Notify SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct the instrument failure.
EVALUATOR NOTE:		**This event is complete when the ATC has taken a manual action to maintain VCT level, an operable channel has been selected and with the concurrence of the lead examiner, continue to Event 6**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __23-4__ Event No.: __6___

Event Description: 1A HD (shaft shear) and 1C HD PP does not autostart requiring a manual start and HD runback

Symptoms/Cues: Annunciators:

- 1-16-E1, FEEDWATER NPSH LOW
- 1-17-B9 CD/CB PUMP AUTO START
- 1-17-C9 CD/CB PUMP SELECTOR POS WRONG
- 1-17-D3 HD PUMP DSCH FLOW HIGH
- 1-17-D10 CD/CB PUMP LUBE OIL PP AUTO START

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Because this event is a shaft shear and not a trip and it was the CD/CB PPs that auto start, it may take the crew additional time to determine which pump is failed delaying the HD runback. With Reactor power starting at 85%, this delay should not impact the overall strategy for recovery from the event. Looking at pump amps will quickly identify the failed pump.**
	ATC	• Monitor boards and provide support for event • Handle the reactivity aspects for the HD run back
	BOP	• Refer to BOP VP-5, REACTOR CONTAINMENT FAN COOLER START-UP • VERIFY/PLACE 1VP01CB, 1B Lo Speed Control Switch in AFTER TRIP • Start 1VP01CB • VERIFY/RESET alarms • Refer to BOP VP-6, REACTOR CONTAINMENT FAN COOLER SHUTDOWN • Determine which RCFC to shutdown (1D) • Place 1D RCFC Hi Speed control switch in after-trip • Notify SRO of RCFC status
	US	• Enter 1BOA SEC-1, SECONDARY PUMP TRIP UNIT 1 • Notify SM of the HD pump malfunction and runback • Approve the 1A HD PP being placed in PTL if requested • Notify SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct the controller failure
EVALUATOR NOTE:		**After the crew has successfully taken actions to address the 1A HD PP failure, sufficient reactivity control has been observed, power is trending toward 780 MW and with lead examiner's concurrence, initiate Event 7.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23 Scenario No.: N23-4 Event No.: 7 & 8

Event Description: Inadvertent Safety Injection, Main Turbine does not trip automatically and the 1A AF PP starts / 1B AF PP can not be started

Symptoms/Cues: Annunciators:

- Safety Injection First out light lit
- Reactor Trip light lit

Turbine throttle and gov valves - OPEN

Time	Position	Applicant's Actions or Behavior
	ATC	Actuate • Manual reactor trip switch • Manual Safety Injection switch Verify reactor trip: • Rod bottom lights - LIT. • Reactor trip & Bypass breakers – OPEN. • Neutron flux DROPPING.
	ATC	• Check SI Status: • SI First OUT annunciator – LIT. • SI ACTUATED Permissive Light – LIT. • SI Equipment – AUTOMATICALLY ACTUATED. • Either SI pump – RUNNING – (NO). • Either CV pump to cold leg isolation valve OPEN – 1SI8801A/B. Manually actuate SI from 1PM05J and 1PM06J.
	BOP **[CT]**	Perform immediate operator actions of 1BEP-0: • Verify Turbine Trip: • All Turbine throttle valves – OPEN. • All Turbine governor valves – OPEN. • **Manually turbine trip pushbutton will not work requiring all valves be closed at the rapid ramp rate** • **Verify throttle and governor valves CLOSED**
	BOP	Verify power to 4KV busses • Bus 141 – ENERGIZED • Bus 142 - ENERGIZED
	US	• Direct ATC to backup the Reactor Trip and SI signals from the MCB switches • Enter/Implement 1BEP-0 and direct operator actions of 1BEP-0 Notify SM of procedure entry, to perform risk assessment, initiate IR and contact maintenance to investigate/correct the controller failure
	US	Direct BOP to perform Attachment B of 1BEP-0.

Op. Test No.: NRC-23_ Scenario No.: __N23-4__ Event No.: _7 & 8_

Event Description: Inadvertent Safety Injection, Main Turbine does not trip automatically and the 1A AF PP starts / 1B AF PP can not be started

Symptoms/Cues: Annunciators:

- Safety Injection First out light lit
- Reactor Trip light lit

Turbine throttle and gov valves - OPEN

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Crew actions of 1BEP-0 continue below.** **BOP actions of 1BEP-0, Attachment B continue on page 22.**
	ATC/BOP	Verify AF system: • AF pumps – BOTH RUNNING - No • AF isolation valves 1AF13A-H - OPEN • AF flow control valves 1AF005A-H - THROTTLED • AF flow – GREATER THAN 500 GPM – No
EVALUATOR NOTE:		**At this point, the crew will be transitioning to 1BFR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, Step 1. Guide continues in Event 8.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __N23-4___ Event No.: __9___

Event Description: 1A AF Pump trips (BFR H.1)

Symptoms/Cues: Annunciators:

- 1-3-A6, AF PUMP Trip

Loss of AF flow to all generators

Time	Position	Applicant's Actions or Behavior
	CREW	• Recognize a loss of all AF flow to the Steam Generators • Transition to 1BFR-H.1 at Step 6 of 1BEP-0 OR at step 16 of 1BEP-0 based on a CSF red path.
	ATC	Check if secondary heat sink is required: • RCS pressure > non-faulted SG pressure - Yes • RCS temperature > 350°F – Yes Check if bleed and feed is required: • WIDE RANGE level in any 3 SGs – LESS THAN 43% (adverse Cnmt). – No Try to establish AF Flow to at least 1 SG • Check SG Blowdown Isol valves CLOSED – Yes • Check SG Sample isol valves CLOSED – Yes • Check AF Pump SX SUCT VLVS ARMED NOT LIT – Yes • Check AF test valves OPEN – Yes • Check AF pumps BOTH RUNNING - No
EVALUATOR NOTE:		**Based on field reports, crew should realize that neither AF pump is, or will be, available and continue on to Step 4. US will ask the SM to use the AF Unit cross tie and will be told it's not desired at this time. The crew will secure RCPs and move to Step 6.**

Op. Test No.: NRC-23 Scenario No.: N23-4 Event No.: 9

Event Description: 1A AF Pump trips (BFR H.1)

Symptoms/Cues: Annunciators:

- 1-3-A6, AF PUMP Trip

Loss of AF flow to all generators

Time	Position	Applicant's Actions or Behavior

	ATC
	
	[CT]
		Prepare FW System for Restoration
		• Check CD/CB pumps – AT LEAST ONE RUNNING – Yes
		• Close 1FW510-540, 1FW510A-540A and 1FW034A-D
		Reset FW Isolation:
		• Check FW isolation AUX RELAY lights – ANY LIT – Yes
		• Check SI – NOT ACTUATED – No (Goto Step 7f)
		• Dispatch an EO to pull Feedwater Isol fuses
		  ○ 1PA27J:
		  ▪ FU-24
		  ▪ FU-27
		  ○ 1PA28J:
		  ▪ FU-24
		  ▪ FU-27
		Try to establish Main FW Flow to at least one SG:
		• Open applicable 1FW035A-D
		• Check FW pump available:
		  ○ Startup FW pump – Yes
		  ○ 1A FW pump – No
		• Check CD/CB pumps – AT LEAST 2 RUNNING – Yes
		• Prepare Startup FW pump for Operation
		  ○ Check Bus 159 Energized – Yes
		  ○ Check Startup FW pump Aux Oil Pump RUNNING
		  ▪ Dispatch operator to start oil pump if applicable
		  ○ Check 1FW059 OPEN – Yes
		  ○ Place controller for 1FW076 in MODULATE
		  ○ Close Main FW pump recirc valves 1FW012A-C
		  ○ Check Suction isol valve (1CB133) OPEN – Yes
		  ○ Check Recirc isol valve (1FW098) OPEN – Yes
		  ○ **Start Startup FW Pump**
		Control feed flow from the SU FW PP to restore and maintain SG levels

Op. Test No.: NRC-23 Scenario No.: N23-4 Event No.: 9

Event Description: 1A AF Pump trips (BFR H.1)

Symptoms/Cues: Annunciators:

- 1-3-A6, AF PUMP Trip

Loss of AF flow to all generators

Time	Position	Applicant's Actions or Behavior
	US	• Enter/implement 1BFR-H.1 and direct operator actions of 1BFR-H.1. Notify SM of transition from 1BEP 0 to 1BFR-H.1, to perform risk assessment, initiate IR and contact maintenance to investigate/correct the controller failure
EVALUATOR NOTE:		**Scenario may be terminated after the SU FW PP is running, flow to at least one SG has been initiated, applicable SG level(s) are trending up, CETCs are trending down and with the lead examiner's concurrence.**

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**EVALUATOR NOTE: 1BEP-0, Attachment B, SI VERIFICATION actions begin on this page.**
	BOP	**Attachment B action** Verify ECCS pumps running • CENT CHG pumps • RH pumps • SI pumps
	BOP	**Attachment B action** Verify ECCS valve alignment • Group 2 Cold Leg Injection monitor lights lit
	BOP	**Attachment B action** Verify ECCS flow • HHSI flow >100 gpm • RCS pressure NOT <1700 psig o If RCS pressure <1700 psig check SI pp flow > 200 gpm
	BOP	**Attachment B actions** Verify RCFCs running in Accident Mode: • Group 2 RCFC Accident Mode status lights - LIT Verify CNMT isolation Phase A • Group 3 CNMT isolation monitor lights - LIT Verify CNMT Ventilation isolation • Group 6 CNMT Vent Isol monitor lights - LIT Verify CC Pumps • CC pumps - BOTH RUNNING Verify SX Pumps running • SX pumps - BOTH RUNNING Check If Main Steamline Isolation Is Required • Check SG pressure < 640 psig • Check CNMT pressure > 8.2 psig • If either condition is met, then verify MSIVs and MSIV Bypass valves closed Check if CS is required (NOT required)
	BOP	**Attachment B action** Verify FW isolated • FW pumps tripped • FW isolation monitor lights lit • FW pumps discharge valves closed 1FW002A-C • Trip all running HD pumps

Time	Position	Applicant's Actions or Behavior
	BOP	**Attachment B action** Verify both DGs running • SX valves open 1SX169A and B • Dispatch operator locally to check operation Verify Generator Trip • GCB 3-4 and OCB 4-5 open

	BOP	**Attachment B action**
		Verify Control Room ventilation aligned for emergency operations:
		• Control Room Outside Air Intake radiation monitors < High Alarm setpoints
		• Operating VC train equipment running Train A
		  • Supply fan
		  • Return fan
		  • M/U fan
		  • Chilled water pump
		  • MCR chiller 0A
		• Operating VC train dampers
		  • M/U fan outlet damper NOT full closed 0VC24Y
		• VC train M/U filter light LIT
		• Operating VC train Charcoal Absorber aligned for train A
		  • 0VC43Y closed
		  • 0VC21Y open
		  • 0VC22Y open
		• Operating VC train M/U filter alignment:
		  • 0VC25Y – open
		  • 0VC312Y- closed
		• Control Room pressure greater than +0.125 inches water on 0PDI-VC038

	BOP	**Attachment B action**
		Verify Auxiliary Building ventilation aligned
		• Two inaccessible filter plenums aligned
		  • Plenum A fan 0VA03CB running
		  • Damper 0VA023Y not fully closed
		  • Damper 0VA436Y closed
		  • Plenum C fan 0VA03CF running
		  • Damper 0VA072Y not fully closed
		  • Damper 0VA438Y closed
		Check Aux Building Supply and Exhaust fans
		• One Exhaust Fan running for every Supply Fan running

Time	Position	Applicant's Actions or Behavior

	BOP	**Attachment B action**
		Verify FHB ventilation aligned
		• Train B fan 0VA04CB running
		  • 0VA055Y open
		  • 0VA062Y not fully closed
		  • 0VA435Y closed

	BOP	**Attachment B action** Maintain UHS Basin level > 80% Initiate periodic checking of Spent Fuel Cooling • Dispatch operator to locally check SFP level and temperature Notify Unit Supervisor of • Manual actions taken • Failed equipment status • Attachment B completed
	CREW	**Attachment B action** Shutdown unnecessary plant equipment o As time allows refer to 1BGP 100-4T4, REACTOR TRIP POST RESPONSE GUIDELINE o As time allows refer to 1BGP 100-5, PLANT SHUTDOWN AND COOLDOWN
EVALUATOR NOTE		**1BEP-0, REACTOR TRIP OR SAFETY INJECTION, main body actions continue on page 18**

Form 3.3-1 Scenario Outline

Facility:	Byron Station	Scenario #:	N23-5
Scenario Source:	New	Op. Test #:	2023-301
Examiners:		Applicants/ Operators:	
Initial Conditions:	IC 70 10% RTP, BOL, steady state conditions		
Turnover:	U-1 is 10%, BOL, equilibrium xenon and steady state conditions. Following the completion of turnover, place the Reheat Temperature Controller in AUTO per 1BGP 100-3 step 5 and then vent the PRT to GW per BOP RY-3 step F.1. 1A MFP, 1D CD/CB and U0 CC PP are OOS for oil changes.		
Critical Tasks:	CT-12 – Manually actuate main steamline isolation CT-17 – Isolate the faulted SG before transition out of 1BEP-2		
Initial Conditions:	IC 10% RTP, BOL, steady state conditions		

Event No.	Malf. No.	Event Type*	*Event Description*
1	None	N (BOP)	Place Reheat Temperature Controller in AUTO
2	TH18E	C, MC (ATC,US)	Vent PRT to GW system, PRT PRESS HIGH Alarm, 1RY469 does not auto CLOSE
3	Earthquake Code IMF TH04B 20 120	N/A	Seismic Event
4	Earthquake Code ZDI0PBCW03PA	TS (US)	Aftershock results in 1LT558 (1C SG Level Channel) failing low
5	IMF ED10B IMF ED11B	I, TS (BOP,ATC,US)	Trip of Instrument Bus 112
6	ZDI1CV8401A CLS	C (ATC,US)	Trip 1B RCP and Manual Reactor Trip
7 **[CT]**	IMF FW35B	M (ATC, BOP, US)	Large earthquake results in 1B SG Fault inside containment (BEP-2)
8 **[CT]**	TH11B	C	MSIVs fail to close in auto but will close at MSI switch or each individual valve switch.

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control

Critical Tasks:

CT-17: Isolate the faulted SG before transition out of 1BEP-2 (K/A number – APE 040-AA1.03 importance 3.9)

- Safety Significance**:** Failure to isolate a faulted SG can result in challenges to the CSFs Integrity, Subcriticality, and Containment.
- Cues: Steam pressure and flow rate indications that make it possible to identify a single SG as faulted AND valve position and flow rate indication that AFW continues to be delivered to the faulted SG.
- Performance Indicator: Isolate the faulted 1B SG before transition out of 1BEP-2.
- Feedback: Manipulate controls to isolate the faulted the SG by MSIVs indicate closed, feedline isolation valves closed, and indication of AFW flow to the faulted SG is stopped.

CT-12: Manually actuate Main Steamline Isolation prior to meeting entry conditions for BFR S.1 or P.1 (K/A: EPE 040AA1.01; importance – 4.3)

- Safety Significance**:** Failure to isolate uncontrolled steam flow from multiple SGs can result in challenges to the CSFs Integrity, Subcriticality, and Containment.
- Cues: Indication that a main steamline isolation is required and indication that an automatic main steamline isolation did not occur.
- Performance Indicator: Manually actuate main steamline isolation before meeting conditions to enter 1BFR S.1 Response to Nuclear Power Generation (Intermediate Range SUR positive) or 1BFR P.1 Response to Imminent Pressurized Thermal Shock Condition (temperature drop of greater than 100°F in ALL RCS Cold Legs and ALL RCS Cold Legs less than 240°F).
- Feedback: Open MSIV’s indicate closed due to manual action.

Scenario 23-5 Summary

U-1 is 10%, BOL, equilibrium xenon and steady state conditions. Following the completion of turnover, place the Reheat Temperature Controller in AUTO per 1BGP 100-3 step 5 then vent the PRT to the GW system per BOP RY-3 step F.1. The 1A MFP, 1D CD/CB and U0 CC PP are OOS for overall scenario consistency and does not impact the scenario.

Event 1 Place Reheat Temperature Controller in AUTO
The crew will place the Reheat Temperature Controller (RTC) in AUTO per step F.5 of 1BGP 100-3, POWER ASCENSION
When the RTC controller is in auto and the remaining steps are EO field steps, the crew will be prompted, if needed, by the SM to vent the PRC per the turnover. With the concurrence of the lead examiner, continue to Event 2.

Event 2 Vent PRT to GW system, PRT PRESS HIGH Alarm, 1RY469 does not auto CLOSE
The crew will use BOP RY-3, FILLING AND VENTING THE PRESSURIZER RELIEF TANK to lower PRT pressure from 5.6 PSIG to 3 PSIG per the turnover. The Nitrogen regulator will fail high 5 seconds after the 1RY469 is opened. Alarm 1-12-B7, PRT PRESS HIGH will come in about 20 seconds later and 1RY469 will NOT auto close. The ATC will manually close 1RY469 per the BAR and will close 1RY8030 per the BAR actions to isolate the PRT from the N2 regulator. Once the SM has been updated on the evolution and valve failure, and, at the lead examiners discretion, continue to Event 3.

Event 3 Seismic Event
Annunciators 0-38-E5, ACCCELEROGRAPGH ACCEL HIGH, 1-13-E9, LOOSE PARTS MONITORING SYSTEM TROUBLE, and 1-18-D13, H2/STATOR CLG PANEL TROUBLE will be received. The crew will implement 0BOA ENV-4, Earthquake Unit 0A report from the TR operator will be received reporting that he felt the ground shaking. The crew will implement 0BOA ENV-4, Earthquake Unit 0, determine that a seismic event has occurred and enter TRM 3.3.b Condition C.

Event 4 Aftershock results in 1LT558 (1A SG Level Channel) failing low
A small aftershock will occur and 1LT558 will fail low. The crew will implement 1BOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL, Attachment E. Tech Spec 3.3.1 conditions A and E and Tech Spec 3.3.2 conditions A and D will be entered. After the T.S. call has been made, and with the concurrence of the lead examiner, continue to Event 6.

Event 5 Trip of Instrument Bus 112
Instrument Bus 112 and CVT will fail. This will cause a loss of Instrument Bus 112. The crew will identify the loss and respond using 1BOA ELEC-2 LOSS OF INSTRUMENT BUS UNIT 1. Report from the field will indicate damage to the bus. The crew will use 1BOA ELEC-2 LOSS OF INSTRUMENT BUS UNIT 1 Attachment B to respond to the failure. 1BOA INST-1 NUCLEAR INSTRUMENTATION MALFUNCTION will be used to respond to the loss of N42. This will place control rods in manual, remove N42 from service in the PPC, and align bypass and defeat switches for the defeated PR channel. Once Instrument Bus 112 has been addressed, T.S. determined and with the concurrence of the lead examiner, continue to Event 6.

Event 6 Trip 1B RCP
The aftershock from Event 4, also caused a slight shaft misalignment in the 1B RCP resulting in 1B RCP breaker trip. Annunciator 1-13-B3, RCP 1B BRKR OPEN OR FLOW LOW ALERT, will alarm when loop flow drops to 90%. Because reactor power is below P-8, an automatic reactor trip will not occur. The crew will identify 1B RCP trip and the US will order a manual trip of U-1. Once the crew

works through the immediate actions of 1BEP-0, a final earthquake will be felt resulting in events 7 & 8.

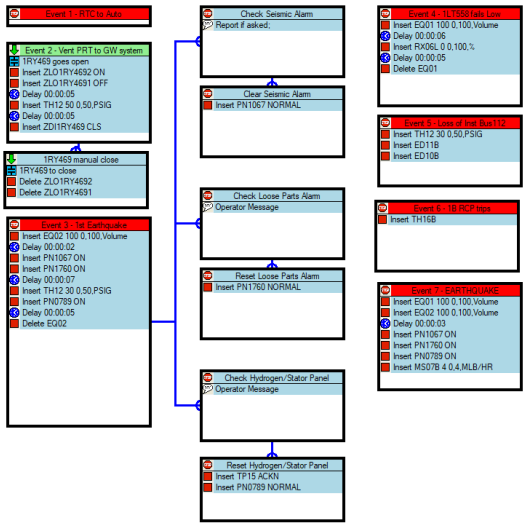
Event 7 Large earthquake results in 1B SG Fault inside containment (BEP-2)
A steamline break will occur on 1B SG inside of CNMT. The crew will re-enter 1BEP-0, REACTOR TRIP OR SAFETY INJECTION. The crew will initiate a manual Safety Injection, if an automatic one has not occurred. The Crew will transition to 1BEP-2 FAULTED STEAM GENERATOR ISOLATION. The scenario is complete when the crew has transitioned from 1BEP-2 to either 1BEP ES-1.1 SI TERMINATION UNIT 1 or 1BEP-1 LOSS OF REACTOR OR SECONDARY COOLING, the 1B SG is isolated and with the lead evaluators concurrence.

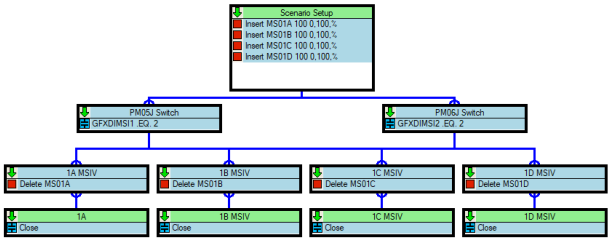
Event 8 MSIVs fail to close in auto but will close with either of the Main Steam Isolate switches or the individual valve control switches
The crew will identify that the MS Isolation valves failed to close in automatic and initiate a MS Isolation via either MCB control switch (or take each MSIV switch to close).

SIMULATOR SETUP GUIDE:

- Verify/perform TQ-BY-201-0113, Attachment 3, NRC EXAM Security Checklist.
- Establish the conditions of IC 70, 10% power, BOL, equilibrium xenon
- Place Simulator in RUN
- Initiate Smart Scenario:
  - Open SMART SCENARIO (Extreme Ace icon)
  - Open file Scenario N23-5 Scenario.ssf
  - Click on the MODE button (near top of screen) and pick EXECUTE
  - Click on the PLAY button (bottom left of screen)

- Verify the following are included in the Smart Scenario:





Ensure the following equipment is aligned

- 1A, 1B and 1C CD/CB PP running with the 1D OOS
- All U-1 CW PP's running
- Set BAT Flow Controller to 14.7 for 1331 ppm boron
- U-0 CC Pump, 1D CD/CB PP and 1A FW PP all OOS

Turnover Information

Plant Status:

- Unit 1 is at 10% BOL, steady state
- 0 MWe
- RCS boron concentration is 1331 ppm
- Control bank D @ 144.5 steps
- Online Risk is Green

Out of Service:

- 1A FW Pump
- U-0 CC Pump
- 1D CD/CB Pump

Shift Activities:

1. Place the Reheat Temperature Controller in AUTO per 1BGP 100-3 step F5
2. Vent the PRT to the GW system per BOP RY-3 step F1

Event 1: Place Reheat Temperature Controller in AUTO

As the **EO supporting the field steps**, when contacted, state that you'll perform steps F.5.d through g of 1BGP 100-3.

As **SM, if directed by the lead examiner,** prompt the US to direct placing the Reheat Temperature Controller to AUTO.

As **SM,** acknowledge the completion of the evolution.

Event 2: Vent PRT to GW system, PRT PRESS HIGH Alarm, 1RY469 does not auto CLOSE

As **SM**, if directed by the lead examiner, prompt the US to vent the PRT to the GW system in accordance with the turnover.

As **RW**, confirm that both Waste Gas Compressors are available and acknowledge that the PRT is being vented to the GW system.

As **RW**, if contacted, acknowledge the PRT has been isolated from the GW system.

As **SM**, acknowledge the issue, request for writing IR, performing risk assessment and making appropriate notifications.

Event 3: Seismic Event

At Lead Evaluator's cue, use Smart Scenario to initiate a Seismic Event by right clicking on the box titled, **Event 3 1st earthquake,** and select, **Release**

After 5 seconds, as the **TR operator**, radio in the following report: "I felt the ground shaking near the SX cooling towers."

As **NSO** dispatched to Seismic Monitoring Instrumentation (U1 AEER, No Radios), report:

- Seismic System Triggered annunciator is lit.
- The red ERROR light is NOT lit.
- The OBE and SSE lights are NOT lit.

If requested to clear the seismic alarm: use Smart Scenario to clear the seismic alarm by right clicking on the box titled, **Clear Seismic Alarm,** and select, **Release**

As **EO** dispatched to check Hydrogen/Stator Panel: use Smart Scenario to reset the Hydrogen/Stator Panel by right clicking on the box titled, **Check Hydrogen/Stator Panel,** and select, **Release.** Report: "All the alarms at the Stator Panel have been reset, there are no locked in alarms and Hydrogen Purity indicates 99% and stable."

Continues on next page

As **NSO** dispatched to Loose Parts Monitoring Instrumentation: use Smart Scenario to reset Loose Parts alarm by right clicking on the box titled, **Reset Loose Parts Alarm,** and select, **Release,** report: The alarm was from Reactor Bottom and Steam Generator A Channel Head. The alarms have cleared and no noise was heard.

As **(USGS) National Earthquake Information Center or WEC/SM after contacting the USGS** report: Epicenter Location is 45 miles Southwest of the plant with a 3.1 Magnitude.

As **Security**, acknowledge the report of a confirmed seismic event.

As **SM**, acknowledge request for writing IR, performing risk assessment and making appropriate notifications

As **SM**, acknowledge entry into 0BOA ENV-4, 1BOA ENV-4 and TRM 3.3.b

Acknowledge information and direction passed to SM, WEC, maintenance, and in plant operators

INSTRUCTOR/SIMULATOR RUN AID GUIDE

Event 4: Aftershock results in 1LT558 (1C SG Level Channel) failing low

At Lead Evaluator's cue, use Smart Scenario initiate 1C SG Level Channel failing low by right clicking on the box titled, **Event 4 1LT558 Fails Low**, and select, **Release.**

As **SM**, acknowledge entry into 1BOA INST 2, OPERATION WITH A FAILED INSTRUMENT CHANNEL

As **SM**, acknowledge entry into Tech Spec 3.3.1 conditions A and E and Tech Spec 3.3.2 conditions A and D.

As **SM/WEC**, acknowledge the request for support to BYPASS bistables.

As **SM/WEC**, acknowledge the request for support to check 1PA54J using BOP FW-21. Once an NSO is dispatched, call the MCR and report that the AMS Trouble Alarm was due to #4 SGC, S/G C level 3% below the Lo-2 Setpoint and all immediate operator actions and subsequent actions are complete per BOP FW-21.

As **SM**, acknowledge request for writing IR, performing risk assessment and making appropriate notifications

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Event 5: Trip of Instrument Bus 112

At Lead Evaluator's cue, use Smart Scenario initiate 1C SG Level Channel failing low by right clicking on the box titled, **Event 5 Loss of Instrument Bus 112**, and select, **Release.**

As **SM**, acknowledge the failure, entry into 1BOA ELEC-2, and evaluate for Emergency Plan.

When dispatched as **EO** to check Instrument Bus 112, Inverter, or Sola Transformer; report "There is an acrid smell in the vicinity of the Instrument Bus 112 and the CVT breaker is tripped open."

As the **AB EO**, acknowledge direction to Place PANM PWR Supply SEL DIV II switch on 1NR13ED to the “ESF BUS” position.

As an **EO or FS**, acknowledge direction to shutdown the 112 inverter per BOP IP-2

As the **SM**, acknowledge entry into 1BOA INST-1, and evaluate for Emergency Plan.

As the **SM**, if requested, direct failed NI channel to be placed in TRIP.

As the **SM**, if requested, acknowledge that Tave-Tref cannot be matched within 1F and with the turbine offline, no adjustment to plant power is needed. (NOTE: This communication can be used as a prompt with the concurrence of the lead evaluator if needed)

As the **WEC/SM**, acknowledge loss of Instrument Bus 112. Acknowledge the request to brief and send additional NSOs in order to trip bistables and align bypass switches.

As **SM**, acknowledge entry into TS 3.8.9.

As **SM**, acknowledge request for writing IR, performing risk assessment and making appropriate notifications.

Event 6: Trip 1B RCP

At Lead Evaluator’s cue, use Smart Scenario to degrade flow in the B RCP loop by right clicking on the box titled, **Event 6 – 1B RCP Trips,** and select, **Release.**

As **EO**, when dispatched to the 1B RCP breaker, report “The 1B RCP PP Breaker is tripped and there is an overcurrent flag up.”

As **SM,** acknowledge the trip of the 1B RCP, Manual Reactor Trip and subsequent entry into 1BEP 0.

As **SM**, acknowledge transition into 1BEP ES-0.1

As **SM,** acknowledge RCP Trip, request for writing IR, performing risk assessment and making appropriate notifications.

Event 7 & 8: Large earthquake results in 1B SG Fault inside containment (BEP-2) & MSIVs fail to close in auto but will close with the Main Steam Isolate switch or each valves control switch

At Lead Evaluator’s cue, use Smart Scenario to initiate 1B MS Line break inside CNMT by right clicking on the box titled, **Event 8, 1B MS Line break**, and select, **Release.**

As **SM**, acknowledge entry into 1BEP 0 procedure entry and request for Emergency Plan evaluations for 1BEP-1 entry.

As **SM**, acknowledge procedure entry and request for Emergency Plan evaluations for 1BEP-1 entry.

As **EO**, acknowledge dispatch for monitoring Unit 1 DG operation and Spent Fuel Pool level and temperature.

As **SM**, acknowledge procedure entry and request for Emergency Plan evaluations for 1BEP-2 entry.

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23 Scenario No.: N23-5 Event No.: 1

Event Description: Place Reheat Temperature Controller in AUTO

Symptoms/Cues: As directed by Turnover

Time	Position	Applicant's Actions or Behavior
	ATC	• Monitor primary and secondary panels. • Provide support and peer checks as requested.
	BOP	• Refer to 1BGP 100-3, POWER ASCENSION step F.5 • IF the REHEAT TEMPERATURE CONTROLLER is in MANUAL, PERFORM the following: o 1). SELECT AUTO on graphic 5502. o 2). SELECT EXECUTE on graphic 7013. • VERIFY/PLACE G1 and G2 in service. o 1). SELECT G1 Service button on graphic 5502. o 2). SELECT IN on graphic 7015. o 3). SELECT EXIT on graphic 7015. o 4). SELECT G2 Service button on graphic 7016. o 5). SELECT IN on graphic 7016. o 6). SELECT EXIT on graphic 7016. • With the Reheat Temperature Controller Panel in AUTO, PERFORM the following: o VERIFY the C/S for 1MS067A/B/C/D is in AUTO. o VERIFY the C/S for 1MS009A/B/C/D & 1MS114A/B/C/D are in AUTO. • With ALL LP inlet temps less than 300F (COLD START), ENSURE 1MS114A, B, C, and D Leak-off Valves, are OPEN at light box 1ZL-MS074. (FIELD STEP) • VERIFY/OPEN 1ES097A, B, C, and D, 1A/B First Stage MSR Vent to Condenser Isol Valves (FIELD STEP) • VERIFY/OPEN 1ES099A, B, C, and D, 1A/B Second Stage MSR Vent to Condenser Isol Valves • VERIFY/CLOSE 1ES100A, B, C, and D, 1A/B First Stage MSR Vent to 15A/B Heater Isol Valves.(FIELD STEP) • VERIFY/CLOSE 1ES101A, B, C, and D, 1A/B Second Stage MSR Vent to 17A/B Heater Isol Valves (FIELD STEP)
	US	• Inform SM that the U1 Reheat Temperature Controller is in auto
EVALUATOR NOTE:		**Once all MCR steps to place the RCT is complete and with lead examiner's concurrence, continue on to Event 2**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __5___ Event No.: __2___

Event Description: Vent PRT to GW system, PRT PRESS HIGH Alarm, 1RY469 does not auto CLOSE

Symptoms/Cues: Annunciator:

- 1-12-B7, PRT PRESS HIGH

PRT Pressure rising instead of lowering as expected

Time	Position	Applicant's Actions or Behavior
	ATC	Refer to 1BOP RY-3, FILLING AND VENTING THE PRESSURIZER RELIEF TANK step F.1 • Venting the PRT to the GW system o VERIFY/OPEN RE9160A, AOV RCDT RE01T to GW Comp Inside o VERIFY/OPEN RE9160B, AOV RCDT RE01T to GW Comp Outside Cnmt Isol Vlv, at PM11J. o VERIFY at least one Waste Gas Compressor available. (CALL RW OPERATOR) o OPEN RY469, AOV U- PRT to GW Comp Isol Vlv, at PM05J. PRESSURE WILL LOWER AND THEN RISE TO ABOVE 6 PSIG OVER THE NEXT 20 SECONDS. ATC WILL RESPOND USING THE ANNUNCIATOR RESPONSE. Refer to BAR 1-12-B7, PRT PRESS HIGH • 1AOV-RY469, PRT to GW Isol Vlv, CLOSES (NO) o Take 1RY469 to CLOSE (Valve will close) • CHECK PRT pressure, level and temp on MCB (ATC will determine that pressure HAS gone up from gas only and will rule out PORV leakby or PW leakby) • CLOSE 1AOV-RY8030, PW to PRT CNMT Isol Vlv • CLOSE 1AOV-RY8033, N2 Supply to PRT Isol VLV. • VENT or DRAIN the PRT, as necessary (will not be done at this time but would require the use of 1BOP RY-4) • Initiate Corrective Action Inform RW of the status of the PRT Report issue and actions taken to the US
	BOP	• Monitor boards and provide support or peer check as required

Op. Test No.: NRC-23 Scenario No.: 5 Event No.: 2

Event Description: Vent PRT to GW system, PRT PRESS HIGH Alarm, 1RY469 does not auto CLOSE

Symptoms/Cues: Annunciator:

- 1-12-B7, PRT PRESS HIGH

PRT Pressure rising instead of lowering as expected

Time	Position	Applicant's Actions or Behavior
	US	• Acknowledge the report of the PRT High Pressure. • Direct ATC to take BAR actions as needed. • Notifies SM pressure regulator failure.
EVALUATOR NOTE:		**After the crew has isolated the PRT from the Nitrogen Regulator, and with lead examiner's concurrence, initiate the Event 3.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: N23-5 Event No.: __3___

Event Description: Seismic Event

Symptoms/Cues: Annunciators:

- 0-38-E5, ACCCELEROGRAPGH ACCEL HIGH
- 1-13-E9, LOOSE PARTS MONITORING SYSTEM TROUBLE
- 1-18-D13, H2/STATOR CLG PANEL TROUBLE

Field report of ground shaking

Earthquake sound in simulator (Medium duration)

Time	Position	Applicant's Actions or Behavior
	CREW	○ Dispatch NSO to Seismic Monitoring Instrumentation ○ Dispatch NSO to Loose Parts Monitoring Instrumentation • Dispatch EO to check Hydrogen/Stator Panel
	ATC	Implement 1BOA ENV-4, EARTHQUAKE UNIT 1 • SECURE ALL FUEL HANDLING ACTIVITES • CHECK IF UNIT SHUTDOWN IS REQUIRED a. Safe shutdown earthquake (SSE) – NO b. Operating basis earthquake (OBE) – NO • GOTO Step 4 • CHECK ELECTRICAL POWER SOURCE OPERABILITY a. Request another NSO to do 1BOSR 8.1.1-1, NORMAL AND RESERVE OFFSITE AC POWER AVAILABILITY WEEKLY SURVEILLANCE • CHECK UNIT-1 CNMT INTEGRITY: a. Dispatch EO to Inspect the penetration areas (Area 5). • Check the following for NORMAL AND STABLE indications a. Containment Pressure – YES b. SX – YES c. CC – YES d. CS – N/A e. SI – N/A f. RH – N/A g. CV – YES h. FW – YES i. MS – YES j. WO – Dispatch the AB EO – YES
	BOP	Support 0BOA ENV-4 Steps as directed by the US

	US	Implement 0BOA ENV-4, EARTHQUAKE UNIT 0 • Notify the Shift Manager to evaluate for EMERGENCY PLAN conditions • Dispatch NSO with a key to locally check seismic monitoring instrumentation status at 0PA02J (U-1 AEER) o Orders ramp to HOLD • ATTEMPT TO DETERMINE LOCATION AND MAGNITUDE OF SEISMIC EVENT • Phone or contact the (USGS) National Earthquake Information Center • Record the Epicenter Location and Magnitude • CHECK SEISMIC INSTRUMENTATION • VERIFY red ERROR light NOT lit • Check Seismic equipment – OPERABLE • CONFIRM SEISMIC EVENT OCCURRED • Check any TWO independent methods: • ACCELEROGRAPH ACCELL HIGH (0-38-E5) alarm – LIT o SSE EXCEEDED (Safe Shutdown Earthquake) alarm – LIT o OBE EXCEEDED (Operating Basis Earthquake) alarm – LIT • National Earthquake Information Center – HAS CONFIRMED PLANT SITE WITHIN AREA AFFECTED BY EARTHQUAKE • Reliable sources at the plant - REPORTED EXPERIENCING SEISMIC EVENT o Reliable sources outside the plant (ie. another station) - REPORTED EXPERIENCING SEISMIC EVENT • Notify Unit NSOs to INITIATE BOA ENV-4 For Both Units • Inform Unit NSOs of seismic monitoring indication(s) obtained from 0PA02J o SECURE All Fuel Handling Activities o NOTIFY Security Of Seismic Event o CHECK Fire Protection Systems o CHECK Common Systems That Penetrate Containment o SECURE Local OPERATION(S) AT SHIFT MANAGER'S DISCRETION o DISPATCH OPERATOR To Inspect Spent Fuel Pool o DISPATCH OPERATOR To Inspect Outside Plant Structures And Equipment o DISPATCH ALL AVAILABLE OPERATORS To Walk Down Plant Systems

Op. Test No.: NRC-23_ Scenario No.: N23-5 Event No.: __3___

Event Description: Seismic Event

Symptoms/Cues: Annunciators:

- 0-38-E5, ACCCELEROGRAPGH ACCEL HIGH
- 1-13-E9, LOOSE PARTS MONITORING SYSTEM TROUBLE
- 1-18-D13, H2/STATOR CLG PANEL TROUBLE

Field report of ground shaking

Earthquake sound in simulator (Medium duration)

Time	Position	Applicant's Actions or Behavior
	US	• Determine applicable Tech Specs: • TRM 3.3.b, Reactor Trip System (RTS) Instrumentation • CONDITION, REQUIRED ACTION, and COMPLETION TIME • For TRM 3.3.b, CONDITION C, Required Action C.1 (Restore to OPERABLE), Completion Time 24 hours; AND Required Action C.2 (Analyze Data to Determine Magnitude), Completion Time 14 days; AND Required Action C.3 (Submit report to PORC), Completion Time 14 days
EVALUATOR NOTE:		**After TRM actions have been entered for seismic actuation and / or at the lead examiners concurrence / direction, continue with event 4**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23 Scenario No.: 5 Event No.: 4

Event Description: Aftershock results in 1LT558 (1C SG Level Channel) failing low

Symptoms/Cues: Annunciators:

- Annunciator 1-15-C5, S/G 1C LVL LO-2 RX TRIP ALERT
- Annunciator 1-10-E4, OVATION SYSTEM TROUBLE
- Annunciator 1-18-E11 AMS TROUBLE
- 1LI-558 1C SG Level Indication at 0%

Earthquake sound in Simulator (Short)

Time	Position	Applicant's Actions or Behavior
	ATC	• Monitor boards and provide support or peer check as required
	BOP	• Refer to the BAR 1-15-C5, S/G 1C LVL LO-2 RX TRIP ALERT • Identify 1LT-558 instrument failed LOW • Report failure to US
	BOP	Remove the failed NR SG level channel from service for the affected SG: • Select OWS graphic STEAM GENERATOR C LEVEL • Select NR LEVEL in SIGNAL SELECTORS box • Select the SG C NR LEVEL graphic (1701) header to enable the window • Select PLACE OUT OF SERVICE for the failed NR SG LEVEL channel • Exit window
	US	Enter and direct actions of 1BOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL Attachment E • Notifies SM of BOA entry • Requests Emergency Plan evaluation • Contact WEC to trip bistables • Contact WEC to BYPASS associated channel in AMS

	US	Recognize malfunction of TS Related Instrumentation
		Locate/Determine Applicable LCOs
		• LCO 3.3.1 Reactor Trip System (RTS) Instrumentation
		  ○ Function 14, Steam Generator (SG) Water Level Low-Low (per SG)
		  • a. Unit 1
		• LCO 3.3.2 Engineered Safety Feature Actuation System Instrumentation
		  ○ Function 5, Turbine Trip and Feedwater Isolation
		  • b. Steam generator (SG) Water Level Hi-Hi (P-14)
		  ○ Function 6, Auxiliary Feedwater
		  • b. SG Water Level Low-Low
		
		CONDITION, REQUIRED ACTION, and COMPLETION TIME
		• LCO 3.3.1, CONDITION A - One or more Functions with one or more required channels or trains inoperable
		  ○ A.1
		  • Require Action - Enter the Condition referenced in Table 3.3.1-1 [CONDITION E]
		  • Completion Time - Immediately
		• LCO 3.3.1, CONDITION E, One channel inoperable
		  ○ E.1
		  • Required Action - Place channel in trip
		  • Completion Time - 72 hours
		  OR
		  ○ E.2
		  • Required Action - Be in MODE 3.
		  • Completion Time - 78 hours
		• LCO 3.3.2, CONDITION A – One or more Functions with one or more required channels or trains inoperable
		  ○ A.1
		  • Required Action - Enter the Condition referenced in Table 3.3.2-1 [CONDITION D]
		  • Completion Time - Immediately
		• LCO 3.3.2 CONDITION D - One channel inoperable
		  ○ D.1
		  • Required Action - Place channel in trip
		  • Completion Time - 72 hours
		  OR
		  ○ D.2.1
		  • Required Action – Be in Mode 3
		  • Completion Time - 78 - hours
		  • AND

Op. Test No.: NRC-23 Scenario No.: 5 Event No.: 4

Event Description: Aftershock results in 1LT558 (1C SG Level Channel) failing low

Symptoms/Cues: Annunciators:

- Annunciator 1-15-C5, S/G 1C LVL LO-2 RX TRIP ALERT
- Annunciator 1-10-E4, OVATION SYSTEM TROUBLE
- Annunciator 1-18-E11 AMS TROUBLE
- 1LI-558 1C SG Level Indication at 0%

Earthquake sound in Simulator (Short)

Time	Position	Applicant's Actions or Behavior
		○ D.2.2 • Required Action - Be in Mode 4 • Completion Time - 84 hours
EVALUATOR NOTE:		**After the actions for the steam generator level channel failure are complete, T.S. has been determined and with lead examiner's concurrence, continue to Event 5.**

Op. Test No.: NRC-23 Scenario No.: 5 Event No.: 5

Event Description: Trip of Instrument Bus 112

Annunciators:

- Annunciator 1-4-B5 BUS 112 INVERTER TROUBLE

Loss of N42 Indication

Time	Position	Applicant's Actions or Behavior

	ATC	Per 1BOA ELEC-2:
		Check Control Channels
		• PZR pressure
		• PZR level
		• T ave
		• Delta T
		• P Impulse
		• SG level
		• Steam Flow
		• Feed Flow
		Check RH Status
		• RH train 1B – OPERATING IN SHUTDOWN COOLING MODE – No
		
		Per 1BOA INST-1
		Check Rod Control Status
		• Rod Bank Select switch in MANUAL – No
		  • Place the ROD BANK SELECT switch to Manual
		Check for Rod Stop
		• Annunciator 1-10-B% PWR RNG FLUX HIGH ROD STOP alarm – Yes
		  • Place the ROD STOP BYPASS switch for N42 on 1PM07J in Bypass.
		Check Tave-Tref Deviation
		  • Tave-Tref – Stable and within 1 degree F – No
		  • Restore Tave-Tref to within 1F – No (Not possible in the current plant configuration)
		Check Flux Rate Trip Alarm
		• Annunciator 1-10-C3 PWR RNG FLUX RATE RX TRIP ALERT not lit – No
		  • Reset N42 NI Channel (Will not reset in the current plant configuration)

	BOP	<u>Per 1BOA ELEC-2:</u>
		Locally energize affected Instrument Bus
		• Check Bus not damaged
		  • EO will report acrid smell in air near bus 112 and the CVT breaker is not closed
		• Identify Instrument Bus 112 is DEAD
		Initiate Evaluation of Plant Status
		• Place PANM PWR SUPPLY SEL DIV II switch on 1NR13ED to ESF BUS position
		  • 1HS-NR004 (439 Q-10 RXB1 – Access from 426 RXB1)
		
		<u>Per 1BOA INST-1</u>
		Check SG Levels
		  • SG Levels - Normal and Stable – yes
		Remove the Failed PR Channel from Service
		  • Select OWS graphic Reactor Temperature Control (6020)
		  • Select NI POWER in Signal Selectors box
		  • Select the NI POWER graphic (7100) header to enable the window
		  • Select the PLACE OUT OF SERVICE soft control button for N42 PR channel
		  • Verify the PLACE OUT OF SERVICE soft control button for N42 PR channel illuminates RED and USE 2nd HIGHEST soft control button is NOT illuminated GREY
		  • Exit window
		Bypass / Defeat PR Channel Functions at 1PM07J
		• Bypass / Defeat N42 functions on 1PM07J
		  • Detector Current Comparator
		  • Upper Section
		  • Lower Section
		  • Miscellaneous Control and Indication section
		  • Power Mismatch Bypass
		  • Rod Stop Bypass
		  • Comparator and Rate Panel
		  • Comparator Channel Defeat
		Place computer points in Test/Delete from Scan for PR Channel N42
		• On the PPC PDMS Test Mode page place the following computer points IN TEST
		  • N0043
		  • N0044
		  • U1143

Op. Test No.: NRC-23 Scenario No.: 5 Event No.: 5

Event Description: Trip of Instrument Bus 112

Annunciators:

- Annunciator 1-4-B5 BUS 112 INVERTER TROUBLE

Loss of N42 Indication

Time	Position	Applicant's Actions or Behavior
		• U1146 • Delete the following computer points FROM SCAN • N0050A • Place the NIS input to DEH – IN TEST (Graphic 5515) 1NY-NR8024B • Select – TEST • Verify red test light illuminates • Verify point quality indicates - BAD Remove control power fuses on 1PM07J for N42
	US	• Enter and direct actions per 1BOA ELEC-2 LOSS OF INSTRUMENT BUS UNIT 1. • Refer to Table B for expected equipment failures • Notifies SM of failure and requests risk evaluation and IR, and maintenance support • Recognize malfunction of TS Related Component • LCO 3.8.9 Distribution Systems - Operating ○ CONDITION B, One AC instrument bus electrical power distribution sub system inoperable ○ B.1 ▪ Required Action – Restore AC instrument bus electrical power distribution subsystem to OPERABLE status ▪ Completion Time – 2 hours • Notify SM of entry into TS 3.8.9

Op. Test No.: NRC-23 Scenario No.: 5 Event No.: 5

Event Description: Trip of Instrument Bus 112

Annunciators:

- Annunciator 1-4-B5 BUS 112 INVERTER TROUBLE

Loss of N42 Indication

Time	Position	Applicant's Actions or Behavior
	US	• Enter and direct actions per 1BOA INST-1 NUCLEAR INSTRUMENTATION MALFUNCTION UNIT 1 • Notifies SM of failure and requests risk evaluation and IR, and maintenance support • Perform actions to place channel in TRIP per Shift Manager as applicable • Direct WEC to brief and dispatch personnel to trip bistables in the AEER. • Recognize malfunction of TS Related Component • LCO 3.3.1 Reactor Trip System (RTS) Instrumentation o CONDITION A, One or more Functions with one or more required channels or trains inoperable o A.1 ▪ Required Action – Enter the Condition referenced in Table 3.3.1-1 for the channel(s) or train(s) ▪ Completion Time – Immediately o CONDITION D, One Power Range Neutron Flux-High channel inoperable o D.1 ▪ Required Action – Place channel in trip ▪ Completion Time – 72 hours o CONDITION E, One channel inoperable o E.1 ▪ Required Action – Place channel in trip ▪ Completion Time – 72 hours • Notify SM of entry into TS 3.3.1
EVALUATOR NOTE:		**After the actions for the 1BOA INST-1 have reached a point that requires personnel outside the MCR and with lead examiner's concurrence, continue to Event 6.**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __5___ Event No.: ___6___

Event Description: Trip 1B RCP

Annunciators:

- 1-13-B3, RCP 1B BRKR OPEN OR FLOW LOW ALERT
- 1-13-E9, LOOSE PARTS MONITORING

Lowering indicated flow in the 1B RCS LOOP

Elevated RCP Stator Temps

Time	Position	Applicant's Actions or Behavior

	ATC	• Respond to 1-13-B3, RCP 1B BRKR OPEN OR FLOW LOW ALERT
		  • Identify 1B RCP has tripped.
		  • Recommend tripping U-1 Reactor
		• Trip U-1 Reactor when directed.
		• Perform Immediate actions of 1BEP-0
		Verify Reactor Trip
		• Rod bottom lights - YES
		• Reactor trip & Bypass breakers - YES
		• Neutron flux STABLE - YES
		Check SI status – SI actuated
		• SI First OUT annunciator lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1) - NO
		• SI ACTUATED lit (1-BP-4.1) - NO
		• SI Equipment running (SI pumps running, CV Cold leg injection SI8801A/B open) - NO
		Determine if SI required:
		• Check PZR pressure < 1829 psig - NO
		• Check Steamline pressure < 640 psig - NO
		• Check CNMT pressure > 3.4 psig - NO
		If SI is required: - NO
		• Dispatch EO to the 1B RCP Breaker to investigate

	BOP	• Perform Immediate actions of 1BEP-0

Op. Test No.: NRC-23 Scenario No.: 5 Event No.: 6

Event Description: Trip 1B RCP

Annunciators:

- 1-13-B3, RCP 1B BRKR OPEN OR FLOW LOW ALERT
- 1-13-E9, LOOSE PARTS MONITORING

Lowering indicated flow in the 1B RCS LOOP

Elevated RCP Stator Temps

Time	Position	Applicant's Actions or Behavior
	US	• Direct ATC to Trip U-1 Reactor • Enter 1BEP-0, REACTOR TRIP OR SAFETY INJECTION and direct immediate actions • Notify SM of tripped 1B RCP Trip and entry into 1BEP-0 • Request SM do risk evaluation • Transition to 1BEP ES-0.1, REACTOR TRIP RESOPONSE
EVALUATOR NOTE:		**Once the crew has completed reporting out the status of 1BEP-0 Immediate actions, transitioned to 1BEP ES-0.1 and with the lead examiner's concurrence, continue on to Event 7**

Form 3.3-2 Required Operator Actions

Op. Test No.: NRC-23_ Scenario No.: __5___ Event No.: ___7&8___

Event Description: Large earthquake results in 1B SG Fault inside containment (BEP-2) & MSIVs fail to close in auto will close with the Main Steam Isolate switch or at the valve

Symptoms/Cues: Annunciator:

- 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH
- 1-10-A5 OP DELTA T HIGH ROD STOP ALERT C-4
- 1-10-E4 OVATION SYSTEM TROUBLE
- 1-10-E5 OVATION ALTERNATE ACTION
- 1-15-B4 S/G 1B FLOW MISMATCH FW FLOW LOW
- 1-15-E2 MS PRESS LOW

Rising Containment Pressure

Time	Position	Applicant's Actions or Behavior

	ATC	• Manually trips the reactor
		• Verify Reactor Trip
		  • Rod bottom lights – ALL LIT
		  • Reactor trip & Bypass breakers – OPEN
		• Neutron flux DROPPING
		• Check SI status
		• SI actuated
		  • SI First OUT annunciator lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1)
		  • SI ACTUATED lit (1-BP-4.1)
		  • SI Equipment running (SI pumps running, CV Cold leg injection SI8801A/B open)
		• Determine if SI required:
		  • Check PZR pressure < 1829 psig
		  • Check Steamline pressure < 640 psig
		  • Check CNMT pressure > 3.4 psig
		• If SI is required:
		• Actuate SI from both SI switches (1PM05J and 1PM06J) and continue in 1BEP-0

Op. Test No.: NRC-23 Scenario No.: 5 Event No.: 7&8

Event Description: Large earthquake results in 1B SG Fault inside containment (BEP-2) & MSIVs fail to close in auto will close with the Main Steam Isolate switch or at the valve

Symptoms/Cues: Annunciator:

- 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH
- 1-10-A5 OP DELTA T HIGH ROD STOP ALERT C-4
- 1-10-E4 OVATION SYSTEM TROUBLE
- 1-10-E5 OVATION ALTERNATE ACTION
- 1-15-B4 S/G 1B FLOW MISMATCH FW FLOW LOW
- 1-15-E2 MS PRESS LOW

Rising Containment Pressure

Time	Position	Applicant's Actions or Behavior

	ATC	• Verify AF system:
		  • AF pumps – BOTH RUNNING
		  • AF isolation valves 1AF13A-H - OPEN
		  • AF flow control valves 1AF005A-H - THROTTLED
		  • AF flow – GREATER THAN 500 GPM
		• Check SG tubes intact:
		  • Secondary radiation level - NORMAL AND STABLE –
		• Narrow range levels – NOT RISING IN AN UNCONTROLLED MANNER

	ATC	• Check PZR PORVs and Spray Valves
		  • PORVs – CLOSED
		  • Check pressure less than 2315
		• PORV isol valve – at least one ENERGIZED
		• PORV relief path – at least one AVAILABLE
		  • PORV in - AUTO
		  • Isolation valve - open
		• Normal spray valves - CLOSED

	ATC	• ADJUST AF FLOW: • Lower total Feed Flow to approximately 600 gpm
	ATC	• Check steam dumps – AVAILABLE • C-9 Permissive light – NOT LIT • CW Pump - AT LEAST ONE RUNNING

	ATC	• Control RCS Temperature per table:
		  • Adjust Feed Flow
		  • Steam Release

Op. Test No.: NRC-23 Scenario No.: 5 Event No.: 7&8

Event Description: Large earthquake results in 1B SG Fault inside containment (BEP-2) & MSIVs fail to close in auto will close with the Main Steam Isolate switch or at the valve

Symptoms/Cues: Annunciator:

- 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH
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- 1-10-E4 OVATION SYSTEM TROUBLE
- 1-10-E5 OVATION ALTERNATE ACTION
- 1-15-B4 S/G 1B FLOW MISMATCH FW FLOW LOW
- 1-15-E2 MS PRESS LOW

Rising Containment Pressure

Time	Position	Applicant's Actions or Behavior

	ATC	• Check if RCPs should be stopped:
		  • All RCP's – ALL RUNNING.
		  • High head flow 1FI-917 > 100 GPM and RCS Pressure < 1425 PSIG.
		  • Trip all RCP's if RCP trip criteria is met

	ATC	• Check pressure in all SGs:
		  • NO SG dropping in an uncontrolled manner – 1A & 1D SG pressures dropping uncontrolled
		  • NO SG Completely Depressurized.

	BOP	• Verify Turbine Trip
		  • Turbine throttle valves – OPEN
		  • Turbine governor valves – OPEN
		  ○ Press manual Trip Button – No
		  ○ Manually run back the turbine at maximum rate at OWS panel G-5501:
		  ▪ Select turbine MANUAL
		  ▪ Select RAPID
		  ▪ Select and hold GV lower arrow
		• Verify power to 4KV busses
		• Bus 141 – ENERGIZED
		• Bus 142 - ENERGIZED

Op. Test No.: NRC-23_ Scenario No.: __5___ Event No.: ___7&8___

Event Description: Large earthquake results in 1B SG Fault inside containment (BEP-2) & MSIVs fail to close in auto will close with the Main Steam Isolate switch or at the valve

Symptoms/Cues: Annunciator:

- 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH
- 1-10-A5 OP DELTA T HIGH ROD STOP ALERT C-4
- 1-10-E4 OVATION SYSTEM TROUBLE
- 1-10-E5 OVATION ALTERNATE ACTION
- 1-15-B4 S/G 1B FLOW MISMATCH FW FLOW LOW
- 1-15-E2 MS PRESS LOW

Rising Containment Pressure

Time	Position	Applicant's Actions or Behavior
	US	• Direct a manual reactor trip and operators perform immediate actions of 1BEP-0, REACTOR TRIP OR SAFETY INJECTION • Implement 1BEP-0, REACTOR TRIP OR SAFETY INJECTION, and directs operator actions. • Notify SM for procedure entry, EP evaluation • Directs BOP to perform Attachment B, SI VERIFICATION of 1BEP 0.

	US	• Implement 1BEP-2 FAULTED STEAM GENERATOR ISOLATION and direct operator actions.
		  • Notifies SM of BEP entry
		  • Requests Emergency Plan evaluation
		• Request STA to come to the control room

EVALUATOR NOTE:		**BOP ACTIONS CONTINUE WITH 1BEP-0 ATTACHMENT B on Page 31.**
EVALUATOR NOTE:		**The crew actions for 1BEP-2 FAULTED STEAM GENERATOR ISOLATION start here**
	ATC **[CT]**	CHECK MAIN STEAMLINE ISOLATION • All MSIVs and bypass valves closed - NO • Manually actuate Main Steamline Isolation (VALVES CLOSE)
	ATC	IDENTIFY Faulted SG: • Any SG pressure dropping in an Uncontrolled manner – 1B SG Any SG completely depressurized

Op. Test No.: NRC-23_ Scenario No.: __5___ Event No.: ___7&8___

Event Description: Large earthquake results in 1B SG Fault inside containment (BEP-2) & MSIVs fail to close in auto will close with the Main Steam Isolate switch or at the valve

Symptoms/Cues: Annunciator:

- 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH
- 1-10-A5 OP DELTA T HIGH ROD STOP ALERT C-4
- 1-10-E4 OVATION SYSTEM TROUBLE
- 1-10-E5 OVATION ALTERNATE ACTION
- 1-15-B4 S/G 1B FLOW MISMATCH FW FLOW LOW
- 1-15-E2 MS PRESS LOW

Rising Containment Pressure

Time	Position	Applicant's Actions or Behavior

	ATC
	
	[CT]
		Isolate Faulted SG:
		• Close AF isolation valves for 1B SG
		  • **1AF013B**
		  • **1AF013F**
		• Check all FW Isolation lights lit for the 1B SG on 1PM04J
		• Verify SG blowdown isolated
		  • **1SD002E**
		  • **1SD002F**
		• Verify SG blowdown sample isolation valve closed
		  • **1SD005C**
		• Verify Main Steamline isolation and bypass valves closed
		  • **1MS001B**
		  • **1MS101B**

	CREW	• Monitor AF Suction Pressure.
		• Check Secondary Radiation.
		  • Reset Phase A
		  • Open SG Blowdown Sample Valves
		  • 1SD005A - D
		  • Request Chemistry sample all SGs for activity
		• Check Secondary radiation trends / secondary activity samples

Op. Test No.: NRC-23 Scenario No.: 5 Event No.: 7&8

Event Description: Large earthquake results in 1B SG Fault inside containment (BEP-2) & MSIVs fail to close in auto will close with the Main Steam Isolate switch or at the valve

Symptoms/Cues: Annunciator:

- 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH
- 1-10-A5 OP DELTA T HIGH ROD STOP ALERT C-4
- 1-10-E4 OVATION SYSTEM TROUBLE
- 1-10-E5 OVATION ALTERNATE ACTION
- 1-15-B4 S/G 1B FLOW MISMATCH FW FLOW LOW
- 1-15-E2 MS PRESS LOW

Rising Containment Pressure

Time	Position	Applicant's Actions or Behavior

	CREW	• Check if ECCS flow can be reduced:
		  • RCS subcooling acceptable
		  • Total feed flow greater than 500 gpm or Narrow Range level in at least one intact SG greater than 31% (adverse)
		  • RCS pressure stable or rising
		• PZR level greater than 28% (adverse)

	CREW	• Transition to 1BEP ES-1.1 SI TERMINATION, Step 1.
EVALUATOR NOTE:		**The scenario can be terminated when the crew has completed all critical tasks, the crew declares the transition to 1BEP ES-1.1 SI TERMINATION OR 1BEP-1 LOSS OF REACTOR OR SECONDARY COOLING and with the concurrence of the lead evaluator.**

EVALUATOR NOTE:		**1BEP-0, Attachment B, SI VERIFICATION actions begin on this page.**
	BOP	**Attachment B action** VERIFY ECCS PUMPS RUNNING: • CENT CHG pumps - RUNNING • RH pumps – RUNNING • SI pumps – RUNNING
	BOP	**Attachment B action** VERIFY ECCS VALVE ALIGNMENT • Group 2 Cold Leg Injection monitor lights required for ECCS valve alignment - LIT
EVALUATOR NOTE:		**RCS pressure is dependent on when evaluated, it is anticipated to be below 1700 psig at this step.**
	BOP	**Attachment B action** VERIFY ECCS FLOW • HHSI flow >100 gpm or SI Pump Discharge flow > 200 gpm - YES • RCS pressure <1700 psig – YES • SI pump flow >200 GPM - YES • RCS pressure <325 psig - NO

	BOP
	
	[CT]
		Attachment B action
		Verify RCFCs running in Accident Mode:
		• Group 2 RCFC Accident Mode status lights - LIT
		Verify CNMT isolation Phase A
		• Group 3 CNMT isolation monitor lights - LIT
		Verify CNMT Ventilation isolation
		• Group 6 CNMT Vent Isol monitor lights – NOT LIT
		Verify CC Pumps
		• CC pumps RUNNING
		Verify SX Pumps running
		• SX pumps – RUNNING
		Check If Main Steamline Isolation Is Required
		• Check SG pressure < 640 psig
		• Check CNMT pressure > 8.2 psig - YES
		  • If either condition is met:
		  • Verify MSIVs and MSIV Bypass valves closed
		  • **Manually actuate MS Isolation**
		Check if CS is required
		• CNMT pressure has risen to greater than 20 psig - YES
		• Group 6 CS monitor lights - LIT
		• Group 6 Phase B monitor light – LIT
		• Stop all RCPs
		• Check CS Eductor suction flow greater than 15 gpm
		  • 1FI-CS013
		  • 1FI-CS014
		• Check CS Eductor additive flow greater than 5 gpm
		  • 1FI-CS015
		  • 1FI-CS016
		• Verify SX Cooling tower alignment
		  • All eight riser valves open (0SX163A thru H)
		  • All four hot water basin bypass valves closed (0SX162A-D)
		• All eight SX cooling tower fans running in hi speed

	BOP	**Attachment B action** VERIFY FW ISOLATED • FW pumps tripped • FW isolation monitor lights lit • FW pumps discharge valves closed 1FW002A-C • Trip all running HD pumps
	BOP	**Attachment B action** VERIFY BOTH DGs RUNNING: • DG – 1B RUNNING • SX valve open 1SX169B • Dispatch operator locally to check operation

	BOP	**Attachment B action**
		VERIFY GENERATOR TRIP
		• Unit 1 Main Transformer output breakers - OPEN:
		  • GCB 3-4
		  • OCB 4-5
		• Excitation red OFF light is LIT

	BOP	**Attachment B action**
		VERIFY CONTROL ROOM VENTILATION ALIGNED FOR EMERGENCY OPERATIONS:
		• Control Room Outside Air Intake radiation monitors < High Alarm setpoints
		• Operating VC train equipment running Train B
		  • Supply fan 0B
		  • Return fan 0B
		  • M/U fan 0B
		  • Chilled water pump 0B
		  • MCR chiller 0B
		• Operating VC train dampers
		  • M/U fan outlet damper NOT full closed 0VC08Y
		• VC train M/U filter light LIT
		• Operating VC train Charcoal Absorber aligned for train B
		  • 0VC44Y closed
		  • 0VC05Y open
		  • 0VC06Y open
		• Operating VC train M/U filter alignment
		  • 0VC09Y open
		  • 0VC313Y closed
		• Control Room pressure greater than +0.125 inches water on 0PDI-VC038

	BOP	**Attachment B action**
		VERIFY AUXILIARY BUILDING VENTILATION ALIGNED
		• Two inaccessible filter plenums aligned
		  • Plenum A fan 0VA03CB running
		  • Damper 0VA023Y not fully closed
		  • Damper 0VA436Y closed
		  • Plenum C fan 0VA03CF running
		  • Damper 0VA072Y not fully closed
		  • Damper 0VA438Y closed
		Check Aux Building Supply and Exhaust fans
		One Exhaust Fan running for every Supply Fan running

	BOP	**Attachment B action**
		VERIFY FHB VENTILATION ALIGNED
		• Train B fan 0VA04CB running
		  • 0VA055Y open
		  • 0VA062Y not fully closed
		0VA435Y closed

	BOP	**Attachment B action** Maintain UHS Basin level > 80%
	BOP	**Attachment B action** Initiate periodic checking of Spent Fuel Cooling • Dispatch an operator to verify local actions • SFP level is greater than 420 elevation (20 feet from the top of the fuel) SFP temperature STABLE
	BOP	**Attachment B action** Notify Unit Supervisor of the following: • Manual actions taken – Phase A Isolation actions • Failed equipment status • Ownership of Continuous Action Step Attachment B completed
	CREW	**Attachment B action** Shutdown unnecessary plant equipment o As time allows refer to 1BGP 100-4T4, REACTOR TRIP POST RESPONSE GUIDELINE As time allows refer to 1BGP 100-5, PLANT SHUTDOWN AND COOLDOWN
EVALUATOR NOTE:		**The crew actions for of 1BEP-1, LOSS OF REACTOR OR SECONDARY COOLANT, begin on page 28.**