Facility: Byron_____ Scenario No.: N17-1_____ Op-Test No.: 2017-301__

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: Unit 1 is at full power, steady state, MOL, 845 ppm boron, equilibrium xenon.

Turnover: 1A CV pump is expected to be returned to service by end of shift from an oil change. Tech Spec 3.5.2 Condition A (ECCS trains) and TRM 3.1.d. Condition A (Charging pumps-operating) have been entered. 1BOL 5.2 and 1BOL 1.d have been initiated. 1A FW Pp is Out of Service for maintenance. Online Risk is Yellow. Protected Equipment: 1B CV Pump, 1B DG, ACB 1423, 1VD01CB, 1B FW Pump and 1C FW Pump.
Generation Dispatch will be requesting Byron U-1 to reduce load by 100 MWe at 4 mw/min

Event No.	Malf. No.	Event Type*	Event Description
1		N (BOP) R (ATC, SRO)	Generation Dispatch requests Byron Unit 1 to lower power 100MWe at 4 MW/min due to grid demand.
2	MF RX21A 1700	I (ATC, SRO) TS (SRO)	1PI-455A fails low; causing PZR heaters to energize and sprays to close if open. The RO will implement BHC 1-RY-P and select an operable PZR pressure controlling channel. 1BOA INST-2 will be entered and TS 3.3.1, TS 3.3.2, and TS 3.3.4 will be entered.
3	IOR ZAI1SK509C 25 120 IOR ZDI1SK509C MAN	C (BOP, SRO)	1C FW Pp Speed Controller fails low then swaps to manual; Flow from 1C FW Pp will lower causing high flow from 1B FW pump. The crew will adjust 1C FW Pp in manual per BHC 1-SG to restore normal feedwater flow. The controller will be operated in manual for the remainder of the scenario.
4	MF CV10 200 30 135	C (ATC, SRO)	1CV121 fails open; 1CV121 will slowly fail open. ATC will establish manual control of charging flow per BAR 1-9-D3.
5	MF RP10B ZLO1FP0102 ON ZLO1FP0101 OFF	C (BOP, SRO) TS (SRO)	Inadvertent Containment Phase A isolation; the crew will refer to BAR 1-5-B7 and implement 1BOA PRI-13 Recovery from an Inadvertent Phase A Containment Isolation. BOP will attempt to manually close failed open 1FP010 Fire Protection Outside Isol Vlv. Crew will then continue to reset CNMT Phase A, establish Instrument Air to Containment and regain normal PZR pressure control. US will enter TS 3.6.3 and TS 3.3.2.
6	MF TP01B RF TP14A	C (BOP, SRO)	GC pump trip; 1B GC pump trips, 1A GC pump will not auto start. BOP will perform actions of BHC 1-18-A14 to manually start the 1A GC pump.
7	MF NI08G 0 MF RP09A MF RP01 (preload)	M (ALL)	NI channel N43 detector failure causing an OTΔT reactor trip signal and Train A FW isolation occurs; the reactor will fail to automatically trip. The crew will enter 1BEP-0, Reactor Trip or Safety Injection and manually trip the reactor (manual reactor trip is successful.)
8	MF CV01B MF FW43 MF FW44 (preload) ZDI1RY456 AUTO (preload)	M (ALL)	Loss of Heat Sink / Feed and Bleed The following occur when the reactor trips: 1B CV pump will trip Aux Feedwater pumps will not start 1RY456 will not open

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

SCENARIO OVERVIEW

Unit 1 is at full power, MOL, steady state, 845 ppm boron, equilibrium xenon. 1A CV pump is tagged out and for an oil change and is expected to be returned to service by end of shift. Tech Spec 3.5.2 Condition A (ECCS trains) has been entered in addition to LCO 3.1.d. Condition A (Charging pumps-operating) 1BOL 5.2 and 1BOL 1.d have been initiated. 1A FW Pp is Out of Service for maintenance. Online Risk is Yellow. Protected Equipment: 1B CV Pump, 1B DG, ACB 1423, 1VD01CB, 1B FW Pump and 1C FW Pump.
Generation Dispatch will be requesting Byron U-1 to reduce load by 100 MWe at 4 mw/min.

After completing shift turnover and relief, Generation Dispatch will request Unit 1 to lower power 100MWe at 4 MW/min due to grid demand.

1PI-455A fails low; causing PZR heaters to energize and sprays to close if open. The RO will implement BHC 1-RY-P and select an operable PZR pressure controlling channel. 1BOA INST-2 will be entered and TS 3.3.1, TS 3.3.2, and TS 3.3.4 will be entered.

1C Main Feed Pump Speed Controller fails low then swaps to manual
Flow from 1C FW Pp will lower causing high flow from 1B FW pump. The BOP will adjust 1C FW Pp in manual per BHC 1-SG to restore normal feedwater flow. The controller will be operated in manual for the remainder of the scenario.

1CV121 fails open
1CV121 will slowly fail open. The RO will establish manual control of charging flow per BAR 1-9-D3. Automatic operation of 1CV121 will not be available for the remainder of the scenario.

Inadvertent Containment Phase A isolation
The crew will refer to BAR 1-5-B7 and implement 1BOA PRI-13 Recovery from an Inadvertent Phase A Containment Isolation. BOP will attempt to manually close failed open 1FP010 Fire Protection Outside Isol Vlv. Crew will then continue to reset CNMT Phase A, establish Instrument Air to Containment and regain normal PZR pressure control. US will enter TS 3.6.3 and TS 3.3.2.

GC pump trip
1B GC pump trips, 1A GC pump will not auto start. BOP will perform actions of BHC 1-18-A14 to manually start the 1A GC pump.

NI channel N43 detector failure causing an OTΔT reactor trip signal and inadvertent FW isolation occurs.
The reactor will fail to automatically trip. The crew will enter 1BEP-0, Reactor Trip or Safety Injection and manually trip the reactor (manual reactor trip is successful.)

Loss of Heat Sink / Feed and Bleed
The following events will occur when the reactor is tripped:

1B CV pump will trip.
Auxiliary Feedwater Pumps will fail to start (automatically and manually).

The crew will transition to 1BEP ES-0.1, Reactor Trip Response. The STA will monitor status trees and identify a RED path on HEAT SINK and notify the US. The crew will transition to 1BFR-H.1, Loss of Secondary Heat Sink. Due to no CV pumps running the crew will be directed to initiate bleed and feed. When bleed path is initiated PZR PORV 1RY456 will not open. The crew will open Reactor Head vent valves to complete the bleed path.

Completion criterion: crew has initiated RCS bleed and feed so that the RCS depressurizes sufficiently for intermediate-head injection to occur per 1BFR H.1.

Critical Tasks

1. Manually trip the reactor from the control room prior to exiting 1BEP 0. (ERG Critical Task number – CT-1) (K/A: EPE 029-EA1.08; importance - 4.5/4.5)
2. Initiate RCS bleed and feed so that the RCS depressurizes sufficiently for intermediate-head injection to occur prior to 1200 ^{o}F [Red Path condition for Core Cooling C.1]. (ERG Critical Task number – CT-46) (K/A: 010-A4.03; importance - 4.0/3.8)

SIMULATOR SETUP GUIDE:

- Verify/perform TQ-BY-201-0113, Appendix A, Simulator "Ready for Training" Checklist.
- Establish the conditions of IC 171, full power, MOL, steady state, equilibrium xenon.
- Verify / Place 1B CV pump in operation
- Verify / Place the following control switches in PTL
    - 1A CV pump
    - 1A FW Pp
    - 1A FW Pp Lube Oil Pp
- Verify / Close 1FW002A
- Adjust potentiometer for 1CV182 to 4.5 turns
- Place clearance order INFO tag on the following control switches:
    - 1A CV Pp
    - 1A FW Pp C/S
    - 1A FW PP Lube Oil Pp
    - 1FW002A
    - 1FW012A
- Place Protected Equipment placards at the following locations:
    - 1B CV Pp C/S
    - 1B DG C/S
    - ACB 1423 C/S
    - 1VD01CB C/S
    - 1B FW Pp
    - 1C FW Pp
- Change online risk placard to YELLOW
- Open SimView file s:\opensim\Monitor\NRC.uvl and collect data
- Open and run caep file N17-1.cae
- Verify the following are inserted: (from summary page)

Malfunctions	**Event**	**Delay**	**Initial**	**Ramp**	**Final**	**Current**
FW43 AUX FW PP FAILS TO START 1A	None	00:00:00			True	True
FW44 AUX FW PP FAILS TO START 1B	None	00:00:00			True	True
RP01 AUTOMATIC REACTOR TRIP FAILURE	None	00:00:00			True	True
FW03 S/U FW PP FAILS TO START	None	00:00:00			True	True
Lights						
ZLO1FP0102	None	00:00:00			On	On
ZLO1FP0101	None	00:00:00			Off	Off
ZLOMLB337	None	00:00:00			Off	Off
ZLO1FW002A1	None	00:00:00			Off	Off
Switches						
ZDI1RY456	None	00:00:00			Auto	Auto
Remote Functions						
TP14A	None	00:00:00			Open	Open

Triggers	
Event 3:	ZLO52BRKA(2).GT.0
Command 3:	IMF CV01B

Turnover Information:

- Unit 1 is at full power, MOL, equilibrium xenon
- 1246 MWe
- RCS boron concentration is 845 ppm
- Control bank D 221 steps

- 1A CV pump is tagged out and for an oil change and is expected to be returned to service by end of shift. Tech Spec 3.5.2 Condition A (ECCS trains) has been entered in addition to LCO 3.1.d. Condition A (Charging pumps-operating) 1BOL 5.2 and 1BOL 1.d have been initiated.

- 1A FW Pp is Out of Service for maintenance.

- Online Risk is Yellow

- Protected Equipment:
    - 1B CV Pump
    - 1B DG
    - ACB 1423
    - 1VD01CB
    - 1B FW Pump
    - 1C FW Pump

- Generation Dispatch will be requesting Byron U-1 to reduce load by 100 MWe at 4 mw/min.
- Reactivity plan and reactivity brief to be performed by crew prior to taking the shift.

Event 1: Lower power 100 MWe at 4 MW/min

As Generation Dispatch, contact the MCR by phone (call x3812) and request Unit 1 lower power 100 MWe at 4 MW/min due to grid demand.

Acknowledge as chemistry/rad protection requests for RCS samples (if required).

Acknowledge as Generation Dispatch initiation of ramp.

Event 2: Pressurizer pressure channel 1PT-455 fails low

IMF RX21A 1700 to fail 1PT-455 low

As SM acknowledge the failure, E-Plan evaluation, LCOs 3.3.1, conditions A, E and K, 3.3.2, conditions A and D, and 3.3.4, condition A entries, on line risk assessment, request for maintenance support, and IR requests.

Note: If the crew requests the Shift Manager to determine if the ramp should continue: report the crew may continue ramp when plant has been stabilized.

Event 3: 1C Main Feed Pump Speed Controller fails low then swaps to manual

I**OR ZAI1SK509C 25 120** to cause 1C FW Pp speed to lower

WHEN 1B FW Pump High Discharge Flow alarm is received:

IOR ZDI1SK509C MAN
Wait 5 seconds:
DOR ZDI1SK509C

If dispatched as EO to investigate the cause of the failure, report there are no visible problems at the 1C FW Pp.

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

Event 4: 1CV121 fails open

I**MF CV10 200 30 135** to cause 1CV121 to slowly fail open

If dispatched as EO to investigate 1CV-121, report valve is responding normally.

If contacted as Radwaste Operator to check abnormal sump run times: report no abnormal sump run times.

SM acknowledge failure, online risk evaluation and IR initiation

Event 5: Inadvertent Containment Phase A isolation

IMF RP10B to cause an inadvertent Train B Phase A CNMT Isolation
Wait 5 seconds
DMF RP10B

As SM acknowledge the failure, E-Plan evaluation, LCO 3.6.3, conditions A entry, on line risk assessment, request for maintenance support, and IR requests.

Event 6: 1B GC pump trip with 1A GC Pump autostart failure

NOTE: If crew initiates a reactor trip due to this event, continue by inserting malfunctions for next event.

IMF TP01B

When dispatched to investigate tripped GC pump:
MRF TP15 ACKN to reset the H2/Stator panel alarm

If dispatched as EO to investigate cause of 1B GC Pp trip**,** report the 1B GC pump motor is very hot to the touch, but is not burning. Report 1A GC pump is running normally.

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

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Event 7: NI channel N43 detector failure causing an OTΔT reactor trip signal

IMF NI08G 500 to cause a failure of PR N43 high resulting in an OTΔT reactor trip signal
IMF RP09A to cause an inadvertent FW isolation

As SM Acknowledge procedure entry and request for Emergency Plan evaluations, and STA to monitor BSTs, and begin to monitor BSTs.

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

Event 8: Loss of Heat Sink / RCS Feed and Bleed

IMF CV01B (inserted via trigger)
IMF FW43 (preload)
IMF FW44 (preload)

As SM Acknowledge procedure entry and request for Emergency Plan evaluations.

As EO dispatched to investigate equipment:
- **1B CV Pump breaker:** Overcurrent relay has target up
- **1A AF pump breaker:** Overcurrent relay has target up
- **1B AF pump:** Engine appears to be seized

Op-Test No.: _2017-301___Scenario No.: _N17-1_ Event No.: __1__

Event Description: ____ Lower power 100 MWe at 4 mw/min _____

Time	Position	Applicant's Actions or Behavior
	CUE	Direction from Generation Dispatch to lower power 100 MWe at 4 MW/min
	US	• Acknowledge request to lower power 100 MWe at 4 Mw/min. • Implement actions of 1BGP 100-4, POWER DESCENSION. o Perform pre-job brief per HU-AA-1211 "PRE-JOB, HEIGHTENED LEVEL OF AWARENESS, INFREQUENT PLANT ACTIVITY, AND POST JOB BRIEFINGS" for load ramp
	CREW	• Review applicable Precautions, and Limitations and Actions of 1BGP 100-4.
	RO	• Verify rod position and boron concentration. • Initiate boration as required per BOP CV-6 or BOP CV-6T1. • Determine required boric acid volume. o Perform boration boundary calculation per 1BGP 100-4T3. o Refer to Rema for ramp. • Determine desired boric acid flow rate. • Perform the following at 1PM05J: • Set 1FK-110 BA Flow Control to desired boration rate. • Set 1FY-0110 BA Blender Predet Counter to desired volume. • Place MAKE-UP MODE CONT SWITCH to STOP position. • Place MODE SELECT SWITCH to BORATE position. • Place MAKE-UP MODE CONT SWITCH to START. • Verify proper operation of valves and BA transfer pump (1CV110B open, Boric Acid Transfer Pump running, 1CV110A throttles open, proper BA flow indicated on recorder). o Turn on PZR backup heaters o Monitor for boration affects
	BOP	• Lower turbine load at 1PM02J or OWS drop 210 by performing the following:: • Select SETPOINT. • Enter 1168 MW into REF DEMAND window • Select ENTER. • Enter 4.0 MW/min into the RATE window. • Select ENTER. • Select EXIT. o Notify US and RO of pending ramp. • Select GO/HOLD. • Verify GO/HOLD button illuminates. • Verify HOLD illuminated RED. • Select GO. • Verify GO illuminates RED. • Verify main turbine load begins to lower.

Op-Test No.: _2017-301___Scenario No.: _N17-1_ Event No.: __1__

Event Description: ____ Lower power 100 MWe at 4 mw/min _____

Time	Position	Applicant's Actions or Behavior
	RO/ BOP	• Monitor reactor power and turbine load lowering: • Monitor NI's, Tave, ∆I, Axial Offset, PZR press/level at 1PM05J. • Monitor MWe and DEHC system response at 1PM02J or OWS drop 210. • During boration, monitor the following at 1PM05J and HMI: o Monitor VCT level. o Verify boration auto stops at preset value. o Return Reactor Makeup System to automatic at current boron concentration.
		After measurable change in power and lead examiner concurrence, insert the next event.

Op-Test No.: _2017-301___Scenario No.: _N17-1_ Event No.: __2__

Event Description: ___1PT-455 fails low _____

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator PZR PRESS LOW (1-12-B1) LIT • Annunciator PZR PRESS LOW RX TRIP STPT ALERT (1-12-A1) LIT • Annunciator PZR PRESS CONT DEV HTRS ON (1-12-C1) LIT

	RO	• Identify 1PT-455 has failed LOW
		• Identify heaters are on and spray valves are shut
		• Report failure to US.
		• Perform the following at 1PM05J per BHC 1-RY-P:
		  • SELECT Operable PZR Pressure controlling channel (Place PZR pressure control select C/S to CH-457/CH-458)
		  ○ Actions may be completed per 1BOA INST-2, Attachment B:

	CREW	○ Refer to BARs. • Identify entry conditions for 1BOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL".
	BOP	○ Refer to BARs • Monitor secondary panels • Assist RO as requested
	US	• Monitor NSO prompt actions using BHC 1-Summary • Enter/Implement "1BOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment B, "PRESSURIZER PRESSURE CHANNEL FAILURE" and direct NSO to perform actions of 1BOA INST-2 • Notify SM of plant status and procedure entry. • Request evaluation of Emergency Plan conditions. ○ Direct placing load ramp on hold

	RO	• Perform actions of 1BOA INST-2, Attachment B:
		• Check PZR pressure at 1PM05J:
		  • PZR pressure – normal on 1PI-456, 457, & 458.
		  • Manually restore PZR pressure using 1PK-455A.
		  • Verify operable PZR pressure control channel selected
		  ○ Place 1PK-455A in manual and restore PZR pressure to normal.

	BOP	○ Place load ramp on hold
	CREW	○ Discuss change in logic operation of PZR PORVs

Op-Test No.: _2017-301___Scenario No.: _N17-1_ Event No.: __2__

Event Description: ___1PT-455 fails low_____

Time	Position	Applicant's Actions or Behavior

	RO	• Check PZR PORVS, spray valves, and heaters at 1PM05J:
		  • PZR PORVs closed.
		  • PZR spray valves normal for plant conditions.
		  • PZR heaters normal for plant conditions.
		• Check PZR pressure control in auto at 1PM05J:
		  • Check the following components in AUTO:
		  • PZR PORV 1RY455A
		  • PZR PORV 1RY456
		  • PZR spray valve 1RY455B
		  • PZR spray valve 1RY455C
		  • Master PZR pressure controller 1PK-455A.
		  • If 1PK-455A is in manual from initial response, place in AUTO.
		• Select operable recorders at 1PM05J:
		  • Place PZR pressure select switch to CH-456, CH-457, or CH-458.
		  • Place loop ΔT recorder select switch to 1B, 1C, or 1D.
		  • Check P11 interlock at 1PM05J:
		  • RCS pressure >1930 – P11 NOT LIT

	CREW	○ Request NSO support to bypass bistables
		EVALUATOR NOTE: The bistables will not be bypassed to make the upcoming events work properly.

Op-Test No.: 2017-301 Scenario No.: N17-1 Event No.: 2

Event Description: 1PT-455 fails low

	US	• Determine applicable Tech Specs
		  • LCO 3.3.1 Reactor Trip System (RTS) Instrumentation
		  • Function 6, Overtemperature ΔT
		  • Function 8a, Pressurizer Low Pressure
		  • Function 8b, Pressurizer High Pressure
		  • CONDITION, REQUIRED ACTION, and COMPLETION TIME
		  • For LCO 3.3.1, CONDITION A, RA A.1, CT Immediately
		  • For Function 6, CONDITION E, RA E.1 (channel in trip) CT 72 hours OR E.2 (Mode 3), CT 78 hours;
		  • For Function 8a, CONDITION K, RA K.1 (channel in trip) CT 72 hours OR K.2 (reduce power below P-7) CT 78 hours;
		  • For Function 8b, CONDITION E, RA E.1 (channel in trip) CT 72 hours OR E.2 (Mode 3), CT 78 hours).
		  • LCO 3.3.2 Engineered Safety Feature Actuation System (ESFAS) Instrumentation
		  • Function 1d, Pressurizer Low Pressure
		  • CONDITION, REQUIRED ACTION, and COMPLETION TIME
		  • For LCO 3.3.2, CONDITION A, RA A.1, CT Immediately
		  • For Function 1d, CONDITION D, RA D.1 (channel in trip) CT 72 hours OR D.2.1 (Mode 3), CT 78 hours AND D.2.2 (Mode 4, CT 84 hours;
		  NOTE: The following may also be identified as an entry for the Degraded Equipment Log though more than the required number of channels remain operable:
		  ○ Function 8b, Pressurizer Pressure P-11
		  • LCO 3.3.4 Remote Shutdown System
		  • Function 4, Pressurizer Pressure
		  • CONDITION, REQUIRED ACTION, and COMPLETION TIME
		  • For Function 4 CONDITION A, RA A.1, CT 30 days;
		○ Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct instrument failure.

		EVALUATOR NOTE: After the actions for the pressurizer pressure channel failure are complete and with lead examiners concurrence, insert the next event.

Op-Test No.: _2017-301___Scenario No.: _N17-1_ Event No.: __3__

Event Description: ___1C Main Feed Pump Speed Controller fails low then swaps to manual____

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator FW Pump Discharge Flow High (1-16-D2) is LIT • 1B FW Pump flow high • 1C FW Pump flow lowering • 1C FW pump controller in manual
	CREW	• Identify lowering speed of 1C FW Pp • Identify raising speed of 1B FW Pp • Identify 1C FW pp speed control swapped to MANUAL
	BOP	• Raise demand on 1SK-509C in MANUAL to restore 1C FW Pp discharge flow
	US	○ Direct NSO to stop ramp / reactivity changes (if in progress) ○ Notify SM of failure, request IR
EVALUATOR NOTE: The crew may perform actions of BHC 1-SG, Steam Generator Level to restore FW flow to normal		

	BOP	• *Perform actions of BHC 1-SG*
		  • *Place 1C FW pump controller 1SK-509C to manual*
		  • *Adjust parameter to pre-failed value*
		  ○ *CLEAR integral from FW Reg Vlv controllers as required*
		  ○ *Place controllers to Auto as required*

	US	• *Monitor NSO prompt actions using BHC 1-Summary*
	RO	○ Monitor RCS Tave and reactivity effects caused by secondary feedflow changes. ○ Assist BOP with BAR response
	BOP	• Check Feed Flow restored
		EVALUATOR NOTE: After the actions to control feed water flow are complete and with lead examiners concurrence, insert the next event.

Op-Test No.: _2017-301___Scenario No.: _N17-1_ Event No.: __4__

Event Description: ____1CV121 fails open_____

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-9-D3, CHG LINE FLOW HIGH LOW LIT • Charging flow RISING • VCT level LOWERING
NOTE: Crew may enter 1BOA PRI-1 for Excessive Primary Leakage		
	US	• Direct manual control of 1CV121
	RO	• Place 1FK-121 in MANUAL • Lower charging flow • Balance charging flow with letdown to restore and stabilize PZR level
	BOP	○ Review BARs • Monitor primary and secondary panels as RO responds to CV malfunction
	US	○ Notify SM of failure, request IR ○ Direct NSO to stop ramp / reactivity changes (if in progress)
If Crew enters 1BOA PRI-1 for Excessive Primary Leakage		
	US	• *(If 1BOA PRI-1 is entered) Notify SM for procedure entry and EAL evaluation*
	RO/BOP	• *Check Charging Pumps running* • *Throttle 1CV121 and 1CV182 to maintain PZR Level*
If Crew isolates and bypasses 1CV121 (May use P&ID or BOP CV-26)		
	RO/BOP	• *Direct EO to open 1CV8387B while RO/BOP closes 1CV121*
	RO/BOP	• *Adjust 1CV182 to maintain proper seal injection flow*
	RO/BOP	• *Direct EO to close 1CV8384A & B to isolate 1CV121*
		EVALUATOR NOTE: After the actions to control charging flow are complete and with lead examiners concurrence, insert the next event.

Op-Test No.: _2017-301___Scenario No.: _N17-1_ Event No.: _ _5__

Event Description: _____Inadvertent Containment Phase A isolation_____

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator CNMT PHASE A ISOLATION (1-5-B7) is LIT • Group 3 CNMT isolation monitor lights LIT • Phase A CNMT isolation valve indications -CLOSED
	CREW	• Identify CNMT isolation valves closed • Recognize inadvertent CNMT Phase A Isolation
	CREW	• Identify entry conditions for 1BOA PRI-13, "RECOVERY FROM INADVERTANT PHASE A CONTAINMENT ISOLATION"
	US	• Acknowledge report of inadvertent CNMT Phase A Isolation. • Contact SM to perform E-Plan evaluation, risk assessment, initiate IR, and contact maintenance to investigate/correct failure. • Implement 1BOA PRI-13, "RECOVERY FROM INADVERTANT PHASE A CONTAINMENT ISOLATION" and direct NSO to perform actions of 1BOA PRI-13. ○ Direct NSO to stop ramp / reactivity changes (if in progress)
	RO	• Take manual control of charging • Control 1CV121 to minimize PZR level rise • Turn off PZR heaters
	BOP	• Start available RCFCs in HIGH speed • Determine actuated Train: • Identify Train B actuated • Check affected train isolated – • Refer to ATTACHMENT B to verify associated valves CLOSED • Identify 1FP010 indicates open and report to US
	US	• Determine applicable Tech Specs • LCO 3.6.3 Containment Isolation Valves • 1FP010 • CONDITION, REQUIRED ACTION, and COMPLETION TIME • CONDITION A, RA A.1 (isolate penetration …) CT 4 hours AND A.2 (Verify flow path isolated), CT Once per 31 days • LCO 3.3.2 Engineered Safety Feature Actuation System (ESFAS) Instrumentation • Function 3a(2), Containment Phase A Isolation Automatic Actuation Logic and Actuation Relays • CONDITION, REQUIRED ACTION, and COMPLETION TIME • For LCO 3.3.2, CONDITION A, RA A.1, CT Immediately • For Function 3a(2),, CONDITION C, RA C.1 (restore to OPERABLE) CT 24 hours OR C.2.1 (Mode 3), CT 30 hours AND C.2.2 (Mode 5), CT 60 hours. • Notify SM of TS entry
	RO / BOP	• Reset CNMT Isol Phase A
	RO	• Place PZR spray valve controllers in MANUAL at ZERO DEMAND

Op-Test No.: _2017-301___Scenario No.: _N17-1_ Event No.: __5__ Event Description: _____Inadvertent Containment Phase A isolation_____		
	BOP	• Open instrument air to CNMT isolation valves 1IA065 and 1IA066
	RO	• Control heaters and sprays to restore PZR pressure to normal
EVALUATORS NOTE: The scenario may be continued with the next event after CNMT Instrument Air isolation valves are open		
	RO / BOP	○ 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
		EVALUATOR NOTE: After the actions for restoring CV charging are complete and with lead examiners concurrence, insert the next event.

Op-Test No.: 2017-301 Scenario No.: N17-1 Event No.: 6

Event Description: 1B GC Pump Trip with 1A GC pump auto start failure

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator STATOR CLG WTR PUMP TRIP (1-18-A14) is LIT • Annunciator H2/STATOR CLG PANEL TROUBLE (1-18-D13) is LIT • Annunciator GEN STATOR COIL WTR FLOW LO/LO-2 (1-19-E6) is LIT • 1B GC Trip light lit
	BOP	• Perform actions of Hard Card BHC 1-18-A14 • VERIFY/START the standby GC pump – start 1A GC pump o Refer to BAR 1-18-A14 o Dispatch operator to investigate the 1B GC pump trip
	RO	• Monitor primary and secondary panels
EVALUATORS NOTE: The unit will trip if the 1A GC pump is not started within 45 seconds.		
	US	• Monitor NSO prompt actions using BHC 1-Summary o Direct NSO to stop ramp / reactivity changes (if in progress) • Notify SM of failure, request IR
		EVALUATOR NOTE: After the actions for the GC pump trip are complete and with lead examiners concurrence, insert the next event.

Op-Test No.: _2017-301___Scenario No.: _N17-1_ Event No.: __7__

Event Description: _NI channel N43 detector failure causing an OTΔT reactor trip signal_

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator OTΔT RX TRIP (1-11-B4) LIT • TSLB-3 RC LOOP 1A OTΔT – TB411C light LIT • TSLB-3 RC LOOP 1A OTΔT – TB411C light LIT
	CREW	○ Note failure of PR N43 channel • Note RED FIRST OUT alarm LIT • Note failure of reactor to TRIP
	CREW	• Identify entry conditions for 1BEP-0, "REACTOR TRIP OR SAFETY INJECTION"
	US	• Order U-1 Reactor trip • Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions • Enter/Implement 1BEP-0 and direct operator actions of 1BEP-0
	RO **[CT-1]**	Perform immediate operator actions of 1BEP-0: • Step 1: Verify reactor trip ○ Rod bottom lights - NOT LIT ○ Reactor trip & Bypass breakers – NOT OPEN ○ Neutron flux – NOT DROPPING • **Actuate reactor trip from 1PM05J** • **Actuate reactor trip from 1PM06J** • Verify reactor trip: ○ Power range channels <5% ○ IR SUR is negative
	BOP	Perform immediate operator actions of 1BEP-0: • Step 2: Verify Turbine Trip • All Turbine throttle valves - CLOSED • All Turbine governor valves - CLOSED • Step 3: Verify power to 4KV busses • ESF Buses – BOTH ENERGIZED (141 & 142)
	CREW	• Step 4: Check SI Status ○ SI First OUT annunciator – NOT LIT ○ SI ACTUATED Permissive Light – NOT LIT ○ SI Equipment – AUTOMATICALLY ACTUATED ○ Either SI pumps – NOT RUNNING ○ Either CV pump to cold leg isolation valve NOT OPEN – 1SI8801A/B • Recognize SI is NOT Actuated • Check if SI Required • Pzr Pressure – NOT < 1829 # • Steamline Pressure – NOT < 640# • CNMT Pressure – NOT > 3.4# • Recognize SI is NOT required

Op-Test No.: _2017-301___Scenario No.: _N17-1_ Event No.: _7___

Event Description: _NI channel N43 detector failure causing an OTΔT reactor trip signal_

Time	Position	Applicant's Actions or Behavior
	US	• Transition to 1BEP ES-0.1, Reactor Trip Response • Direct STA to monitor BST • Notify SM of procedure entry • Request evaluation of Emergency Plan conditions • Direct the actions of 1BEP ES-0.1
EVALUATORS NOTE: The sim booth communicator will act as the STA and monitor status trees. When NR level in all SGs is < 10%, the crew will be notified to implement 1BFR-H.1		
	RO	• Step 1: Check RCS temperatures • Maintain RCS temperature at 557°F • Step 2: Check Shutdown Reactivity • All rod bottom lights LIT • Step 3: Control charging to control Pzr Level at normal level • Step 4: Check Pzr pressure trending to normal pressure
	BOP	• Step 5: Check FW status • If RCS < 564°F, verify FW isolation complete and trip running FW pumps • Check SG feed flow – NOT > 500 GPM
EVALUATORS NOTE: The crew may pursue any of 3 different methods of restoring feedwater flow per 1BEP ES-0.1 Step 5 RNO. They are listed in RNO order below (FW will not be restored)		
	CREW	• Attempt to manually start AF pumps. • NEITHER AF pump will start from MCR

	CREW	• Implement Attachment C to restore FW
		• Check Bus 159 - energized
		• Check at least 2 CD/CB pumps – running with recirc valves in AUTO
		• Check FW recirc valves 1FW012A/B/C – closed
		• Place FW Reg valves, Bypass Reg valves and tempering valves in MANUAL at Zero demand
		• Reset FW isolation
		  • Press both FW ISOL reset PB
		  • Press both FW ISOL AUX RELAY PB
		  • Check FW ISOL AUX RELAY lights – NOT lit
		• Start S/U FW Pp Aux Oil Pump
		• Open 1FW059
		• Place 1FW076 in MODULATE
		• Start S/U FW Pp – Fails to start
		  • Close 1FW059 and 1FW076
		  • Stop the S/U FW Pp Aux Oil Pump

	CREW	• Locally start AF pump(s) per 1BOA ELEC-5, Local Emergency Control of Safe Shutdown Equipment, Att A for the 1A AF Pp and Att D for the 1B AF Pp
		  • EO to report 1A AF Pp breaker will not close locally
		  • EO to report 1B AF Pp will not start locally from 383 or 364

Op-Test No.: _2017-301___Scenario No.: _N17-1_ Event No.: _7___

Event Description: __NI channel N43 detector failure causing an OTΔT reactor trip signal_

Time	Position	Applicant's Actions or Behavior
EVALUATORS NOTE: The crew will continue in 1BEP ES-0.1 until NR level in all SGs is < 10%, and the crew is notified to implement 1BFR-H.1. Actions for 1BFR H.1 are on page 20.		

	BOP	• Verify SG blowdown isolation valves are closed
		• Check SG levels
		• Check AC Power status
		  • Verify Generator Trip
		  • Verify PMG breaker open
		  • Verify all AC busses energized by offsite power
		• Transfer steam dumps to Steam Pressure mode
		  • Check steam dumps available: C9 NOT lit and MSIVs open
		  • Place MS header pressure controller in manual and reduce to 0
		  • Place steam dump mode selector to STM PRESS mode
		  • Adjust MS header pressure controller to control steam pressure

	RO/BOP	• Check 1D RCP running
		• Align SR instrumentation
		  • Place Boron Dilution Alert alarm bypass switches in NORMAL
		  • Place Scaler Timer power to ON
		  • Verify audible count rate
		• Shutdown unnecessary plant equipment
		  • Trip running HD pumps
		  • Shutdown FW pumps per BOP FW-2
		  • Check SX tower operation, NDCT operation, CW System
		• Maintain plant stable
		  • PZR Pressure at 2235 psig
		  • PZR level at programmed level
		  • SG levels – cannot be maintained
		  • RCS temp – stable at 557°F

	US	• Direct an NSO to perform 1BEP ES-0.1, Attachment D
	CREW	• Go to 1BGP 100-5, Plant Shutdown and Cooldown

Op-Test No.: _2017-301___Scenario No.: _N17-1_ Event No.: __8___

Event Description: __Loss of Heak Sink / RCS Bleed and Feed _

Time	Position	Applicant's Actions or Behavior
	US	• Implement 1BFR-H.1, Loss of Secondary Heat Sink • Notify SM of procedure transition and request EAL evaluation

	CREW	• Check RCS pressure > SG pressure
		• Check RCS temperature > 350°F
		  • Check at least 1 CV pump running - NONE RUNNING
		  • Stop All RCPs
		  • GO TO Step 14

	CREW
	
	[CT-46]
		• **Establish Feed Path by actuating SI**
		• Verify RCS Feed Path:
		  • ECCS pump status - At least one SI pump running
		  • ECCS valve alignment – Group 2 Cold Leg injection lights LIT
		• **Establish RCS Bleed Path**
		  • Verify PZR PORV isol valves energized
		  • Verify PZR PORV isol valves BOTH OPEN
		  • **Open BOTH PZR PORVs**
		  • **Identify 1RY456 failed to OPEN**
		• Verify adequate RCS Bleed path
		  • Both PZR PORVS OPEN Identify 1RY456 failed to open
		  • Both PZR PORV isol valves OPEN
		• **Open Reactor Head Vent valves on 1PM11J**
		  • **1RC014A**
		  • **1RC014B**
		  • **1RC014C**
		  • **1RC014D**

EVALUATOR NOTE: Terminate the scenario after the crew has initiated and verified RCS Bleed and Feed or at lead examiner's discretion.		

Facility: Byron Scenario No.: N17-2 Op-Test No.: 2017-301

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: Unit 1 is at 10^{-3}% power, BOL, 1343 ppm boron, Reactor startup in progress

Turnover: CBD @ 118 steps, ready to raise power to 2-3% using control rods. SM directs raising pressure in 1B SI accumulator prior to raising power. Online risk is green.

Event No.	Malf. No.	Event Type*	Event Description
1	None	N (BOP, SRO) TS (SRO)	**The BOP will raise 1B SI accumulator pressure** using BOP SI-8.
2	None	R (ATC, SRO)	**Raise power to 2-3% using control rods;** The crew will establish a startup rate to raise reactor power and stabilize at 2-3% power.
3	MF ED11B	TS (SRO)	**Loss of instrument inverter 112 will occur;** Inst bus will be powered from CVT. US will determine TS 3.8.7 applies.
4	IOR ZDI1VP05CA STOP	C (BOP, SRO)	**Reactor Cavity Vent Fan Trip;** The 1A Reactor Cavity Vent fan trips. The BOP will take action of the BAR 0-33-C5 to start the 1B Reactor Cavity Vent fan per BOP VP-7.
5	MF RX13A 100	I (ATC, SRO) TS (SRO)	**Pressurizer level transmitter 1LT-459A;** the controlling channel, fails high. The RO will select an operable channel per BAR 1-12-B3 and the crew will re-enter 1BOA INST-2. The US will determine TS 3.3.1 applies.
6	MF FW22B	C (BOP, SRO)	**1B CD/CB pump trip;** the BOP will perform actions of BHC 1-17-A9 to start the standby CD/CB pump and the crew will enter 1BOA SEC-1, Secondary Pump Trip.
7	MF RD02M12	C (ATC, SRO)	**Control rod M12 drops into the core;** the crew will enter 1BOA ROD-3 for a dropped or misaligned rod. The crew will be directed to trip the reactor at step 3 with a dropped rod and less than 5% reactor power.
8	ED15D	M (ALL)	**Loss of all offsite power** when the reactor trips a loss of offsite power will occur for Unit 1. The crew will enter 1BCA 0.0.
9	EG08A EG08B	C	**1A and 1B DG will fail to automatically start**. The crew will enter 1BCA 0.0, LOSS OF ALL AC POWER. When safety injection is actuated at step 5 of 1BCA 0.0 the 1B DG will automatically start energizing Bus 142.
10	MF TH11B 15 10 30	C	**PZR PORV 1RY456 will open when the loss of offsite power occurs.** The crew will close the PZR PORV to stop the loss of RCS inventory.

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

SCENARIO OVERVIEW

Unit 1 is at 10^{-3}% power, BOL, 1343 ppm boron, Reactor startup in progress. Online risk is green. CBD @ 118 steps, ready to raise power to 2-3% using control rods. SM directs raising pressure in 1B SI accumulator prior to raising power.

The BOP will raise 1B SI accumulator pressure using BOP SI-8
The will request raising 1B SI Accumulator pressure to 625 psig prior to raising reactor power.

Raise power to 2-3% using control rods
The crew will establish a startup rate to raise reactor power and stabilize at 2-3% power.

Loss of instrument inverter 112 will occur.
Inst bus will be powered from CVT. US will determine TS 3.8.7 applies.

Reactor Cavity Vent Fan Trip
The 1A Reactor Cavity Vent fan trips. The crew will take action of the BAR 0-33-C5 to start the 1B Reactor Cavity Vent fan per BOP VP-7.

Pressurizer level transmitter 1LT-459A
The controlling channel Pressurizer level channel fails high. The RO will select an operable channel per BAR 1-12-B3 and the crew will re-enter 1BOA INST-2. The US will determine TS 3.3.1 applies.

1B CD/CB pump trip
The BOP will perform actions of BHC 1-17-A9 to start the standby CD/CB pump and the crew will enter 1BOA SEC-1, Secondary Pump Trip.

Control rod M12 drops into the core
The crew will enter 1BOA ROD-3 for a dropped or misaligned rod. The crew will be directed to trip the reactor at step 3 with a dropped rod and less than 5% reactor power.

Loss of all offsite power
When the reactor trips a loss of offsite power will occur for Unit 1. The crew will enter 1BCA 0.0.

1A and 1B DG will fail to automatically start
The crew will enter 1BCA 0.0, LOSS OF ALL AC POWER. When safety injection is actuated at step 5 of 1BCA 0.0 the 1B DG will automatically start energizing Bus 142.

PZR PORV 1RY456 will open after the loss of offsite power occurs.
The crew will close the PZR PORV to stop the loss of RCS inventory.

Completion criterion: The scenario is complete when the crew has transitioned from 1BCA 0.0 to 1BEP 0.

Critical Tasks

1. Energize at least one ac emergency bus before placing safeguards equipment hand switches in the pull-to-lock position.
   (ERG Critical Task number – CT-24) (K/A: EPE 055-EA1.02; importance - 4.3/4.4)

2. Manually close the open PZR PORV prior to completing step 4 of 1BCA 0.0.
   (ERG Critical Task number – CT-22) (K/A: EPE 009-EA1.15; importance – 3.9/4.1)

SIMULATOR SETUP GUIDE:

- Verify/perform TQ-BY-201-0113, Appendix A, Simulator "Ready for Training" Checklist.
- Establish the conditions of IC 172, 10^{-3}% power, BOL, equilibrium xenon.
- Verify online risk placard to Green
- Verify Feed Reg Bypass valves are in AUTO
- Verify 1B SI Accumulator pressure is 605 psig
- Provide the crew with copies of the following mark-up as appropriate:
  - 1BGP 100-2
  - 1BGP 100-2T1
  - Startup REMA
- Open SimView file s:\opensim\Monitor\NRC.uvl and collect data
- Open and run caep file N17-2.cae
- Place simulator in FREEZE until the crew has entered the simulator
- Ensure the following are inserted: (on summary page)

Malfunctions	Event	Delay	Initial	Ramp	Final	Current
EG08A DG SEIZURE DG- 1A	None	00:00:00			True	True
EG08B DG SEIZURE DG- 1B	None	00:00:00			True	True
RP15R SAFEGUARDS SEQ FAILURE T9B	None	00:00:00			True	True

Triggers:	
Event 1:	ZLO52BRKA(2).GT.0
Command 1:	IMF ED15D
Event 3:	ZDISIA2.GT.0
Command 3:	DMF EG08B
Event 5:	ZDISIA1.GT.0
Command 5:	DMF EG08B
Event 7:	ZLO52BRKA(2).GT.0
Command 7:	IMF TH11B (from summary page)
Event 9:	ZDI1RY456(3).LT.1
Command 9:	DMF TH11B

Turnover Information:

Unit 1 is at 10^{-3}% power, BOL, equilibrium xenon

Online Risk is Green

Reactor startup is in progress, currently at step 17 of 1BGP 100-2

BGP flowchart 1BGP 100-2T1 is in progress

All secondary and turbine actions of 1BGP 100-2 have been completed.

A REMA has been provided to assist with the continuation of the reactor startup.

Currently Control Bank D position is 118 steps

RCS boron concentration is 1343 ppm

During a board walk down it was noted 1B SI Accumulator pressure indicating 605 psig. The Shift Manager directs raising 1B SI Accumulator pressure to ~625 psig prior to continuing with the reactor startup.

The crew is to review 1BGP 100-2 Precautions, Prerequisites, and Limitations and Actions, and Startup REMA prior to taking the shift.

The crew is directed to establish conditions of 2-3% reactor power using control rods.

The crew does not have permission to enter Mode 1.

Event 1: Raise 1B SI Accumulator pressure

When directed to align high pressure nitrogen:
MRF NT78 OPEN

Report nitrogen Tube Trailer Manifold Discharge Valve is OPEN

Report 0NT078, High Pressure Hookup Isolation Valve is OPEN

Is asked, report nitrogen pressure is 2000 psig.

As SM acknowledge entry into LCO 5.1 when filling the 1B SI Accumulator

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Event 2: Raise power to 2-3% using control rods

As SM acknowledge changing power level

Event 3: Loss of instrument inverter 112 will occur

IMF ED11B to cause a loss of Instrument Inverter 112

If dispatched to check Instrument Inverter 112:
Light lit: P2 – Bypass Source Supplying load
Light NOT lit: P1 – Inverter supplying load

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

Event 4: Reactor Cavity Vent Fan Trip

IOR ZDI1VP05CA STOP
Wait 5 seconds
DOR ZDI1VP05CA

To trip 1A Reactor Cavity Vent fan (MCC 133X4 Cub C1)

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

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Event 5: Pressurizer level transmitter failure 1LT-459A

IMF RX13A 100 to cause PZR level channel 1LT-459A to fail high.

Respond to requests for NSO support to bypass bistables – Note: Bistables will not be bypassed.

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

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Event 6: 1B CD/CB pump trip

IMF FW22B to trip the 1B CD/CB pump

As EO**,** if asked to investigate the cause of the pump trip, report an overcurrent trip. Report the pump that was started is running with normal parameters.

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

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Event 7: Control rod M12 drops into the core

IMF RD02M12 to cause rod M12 to drop into the core

As SM acknowledge the failure, EAL evaluation for BEP entry, on line risk assessment, and IR requests

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Event 8: Loss of all offsite power

IMF ED15D (preload)

Acknowledge as U2 NSO to enter 2BCA 0.3

Event 9: 1A and 1B DG will fail to automatically start

IMF EG08A (preload)
IMF EG08B (preload)

When SI is actuated:
DMF EG08B (Via trigger)

Event 10: PZR PORV 1RY456 fails open.

IMF TH11B (via trigger)

Op-Test No.: _2017-301___Scenario No.: _N17-2_ Event No.: __1___

Event Description: _____Raise 1B SI Accumulator pressure_____

Time	Position	Applicant's Actions or Behavior
	CUE	Direction from SM to raise 1B SI Accumulator pressure to 625 psig prior to raising

	US	• Direct raising pressure in 1B SI Accumulator to ~625 psig
		• Initiate 1BOL 5.1 when notified by BOP
		• Notify SM of LCO entry
		  • LCO 3.5.1 ECCS Accumulators
		  • CONDITION, REQUIRED ACTION, and COMPLETION TIME
		  • CONDITION B, RA B.1 (Restore to OPERABLE), CT One hour

	BOP	• Perform BOP SI-8 to raise pressure in 1B SI Accumulator
		• Direct EO to open Nitrogen Tube Trainer Manifold Discharge Valve.
		• Direct EO to open 0NT078, High Pressure Hookup Isolation Valve
		• Perform the following at 1PM06J:
		  ○ Verify 1SI943 CLOSED
		  • Open 1SI8880, N2 Supply Isolation Valve
		  • Inform US to initiate 1BOL 5.1
		  • Open 1SI8875B, 1B SI Accumulator Vent Valve, to raise pressure in 1B SI Accumulator to ~ 625 psig.
		  • Close 1SI8875B, 1B SI Accumulator Vent Valve
		  • Inform US to exit 1BOL 5.1
		  ○ Close 1SI8880, N2 Supply Isolation Valve
		○ Direct EO to close Nitrogen Tube Trainer Manifold Discharge Valve.
		○ Direct EO to close 0NT078, High Pressure Hookup Isolation Valve.

		EVALUATOR NOTE: After the actions for filling the 1B SI Accumulator are complete and with lead examiners concurrence, continue with the next event.

Op-Test No.: _2017-301___Scenario No.: _N17-2_ Event No.: __2__

Event Description: ____Raise Reactor Power to 2-3 % using control rods_____

Time	Position	Applicant's Actions or Behavior
	CUE	• Direction from SM to raise reactor power to 2-3% power
	CREW	• Review applicable Precautions, and Limitations and Actions (may be performed prior to taking the shift)
	US	• Direct power ascension per 1BGP 100-3 • Placekeep procedure appropriately • Approve reactivity changes for RO
	RO	• Raise reactor power appropriately to 2% to 3%. ○ Withdraw control rods as necessary • Select MANUAL • Withdraw control rods to desired height ○ Dilute as necessary • Turn OFF RMCS Makeup CS • Select DILUTE or ALT DILUTE on the RMCS Mode Select Switch • Enter the desired dilution amount in the PW Flow Totalizer • Turn ON RMCS Makeup CS ○ Operate PZR Backup heaters as needed
	BOP	• Assist with peer checks and control panel monitoring
EVALUATOR NOTE: After a measurable change in reactor power and with lead examiners concurrence, continue with the next event.		

Op-Test No.: _2017-301___Scenario No.: _N17-2_ Event No.: __3___

Event Description: _____Loss of instrument inverter 112_____

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator BUS 112 INVERTER TROUBLE (1-4-B5) is LIT
	BOP	• Refer to BAR 1-4-B5. • Dispatch an EO to investigate status of Bus 112 Inverter and check local alarms • Verify Instrument Bus 112 energized

	US	○ Refer to 1BOA ELEC-2, LOSS OF INSTRUMENT BUS – BUS 112
		• Notify SM of plant status, Risk Evaluation, IR initiation, and notifications.
		• Determine applicable Tech Specs
		  • LCO 3.8.7 Inverters - Operating
		  • CONDITION, REQUIRED ACTION, and COMPLETION TIME
		  • CONDITION A, RA A.1 (Restore to OPERABLE), CT 7 days

Evaluator's note: The crew may enter 1BOA ELEC-2 due to the failed instrument inverter. Steps of 1BOA ELEC-2 are in italics below.		
	US	• *Implement 1BOA ELEC-2 "LOSS OF INSTRUMENT BUS" and direct operator to perform actions of 1BOA ELEC-2* • *Notify SM of procedure entry and EAL evaluation,*

	RO/BOP	• *Check controlling channels operable*
		  • *PZR Pressure*
		  • *PZR Level*
		  • *Tave*
		  • *Delta T*
		  • *Pimp*
		  • *SG Level*
		  • *Steam Flow*
		  • *Feed Flow*
		• *Direct EO to check bus not damaged*
		• *Check bus energized*
		• *Direct EO to shutdown Instrument Inverter 112 per BOP IP-2*

		EVALUATOR NOTE: After the actions for loss of instrument Inverter 112 are complete and with lead examiners concurrence, continue with the next event.

Op-Test No.: _2017-301___Scenario No.: _N17-2_ Event No.: __4__

Event Description: ____Reactor Cavity Vent Fan Trip _____

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator REACTOR CAVITY VENT FAN TRIP (0-33-C5) is LIT • 1A Reactor Cavity Vent Fan Amber light LIT
	CREW	• Refer to BARs.
	US	• Direct the BOP to manually start 1B Reactor Cavity Vent Fan • Notify SM of failure, request IR

	BOP	• Refer to BAR 0-33-C5
		  • Start Reactor Cavity Vent Fan per BOP VP-7
		• Refer to BOP VP-7
		  • Start 1B Reactor Cavity Vent Fan 1VP05CB

		EVALUATOR NOTE: After the actions for 1A Reactor Cavity Vent Fan Trip are complete and with lead examiners concurrence, continue with the next event.

Op-Test No.: 2017-301 Scenario No.: N17-2 Event No.: 5

Event Description: Pressurizer level transmitter failure 1LT-459A

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator PZR LEVEL HIGH RX TRIP STPT ALERT (1-12-A3) is LIT • Annunciator PZR LEVEL HIGH CONT DEV HTRS ON (1-12-C3) is LIT • 1LI-459A indicates 100% level • Charging flow lowering
	CREW	○ Refer to BARs. • Identify entry conditions for 1BOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL".
	US	• Notify SM of plant status and procedure entry. • Request evaluation of Emergency Plan conditions. • Enter 1BOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment C "PRESSURIZER LEVEL CHANNEL FAILURE" and direct operator to perform actions of 1BOA INST-2

	RO	• Perform actions of 1BOA INST-2, Attachment C
		• Check PZR level NORMAL:
		  • Place 1FK-121, CV pumps flow control valve, OR 1LK-459, PZR master level controller, in manual.
		  • Raise demand on 1FK-121 OR 1LK-459 in conjunction with controlling demand on 1CV182 to raise charging flow.
		  • Operate 1FK-121 OR 1LK-459 in manual to minimize PZR level drop and maintain 8-13 gpm RCP seal injection flow.
		• Select an operable PZR level channel for control
		• Select an operable PZR level channel to the recorder
		• Check PZR level >17%
		• Check Letdown ESTABLISHED
		• Check PZR Heaters NORMAL
		• Check PZR Level Control in Automatic
		  • Place 1FK-121, CV pumps flow control valve, OR 1LK-459, PZR master level controller, as appropriate, in automatic.

		EVALUATOR NOTE: The bistables will not be bypassed during this scenario.

	US	• Request extra NSOs to bypass bistables for the failed channel
		• Determine applicable Tech Specs.
		  • LCO 3.3.1 Reactor Trip System (RTS) Instrumentation
		  • Function 9, Pressurizer Water Level - High
		  • CONDITION, REQUIRED ACTION, and COMPLETION TIME
		  • For LCO 3.3.1, CONDITION A, RA A.1, CT Immediately
		  • For Function 9, CONDITION K, RA K.1 (channel in trip) CT 72 hours OR K.2 (reduce power below P-7) CT 78 hours.
		• Determine TS 3.3.3 and 3.3.4 are NOT applicable – minimum channels operable requirement is met.
		• Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct instrument failure.

		EVALUATOR NOTE: After the actions for PZR level transmitter failure are complete and with lead examiners concurrence, continue with the next event.

Op-Test No.: _2017-301___Scenario No.: _N17-2_ Event No.: __6__

Event Description: _____1B CD/CB pump trip_____

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator CD/CB PUMP TRIP (1-17-A9) is LIT • 1B CD/CB pump amber trip light LIT

	BOP	• Perform actions of Hard Card BHC 1-17-A9
		  • Start aux oil pump for the standby CD/CB pump
		  • Start the standby CD/CB pump
		  • Go to 1BOA SEC-1

	US	• Enter and direct actions of 1BOA SEC-1, SECONDARY PUMP TRIP, Attachment B, CD/CB PUMP TRIP • Notify SM of procedure entry and request EAL evaluation
	BOP	• Check turbine load: NOT > 700 MW • Verify standby CD/CB pump running • Close recirc valve on tripped pump (1CB113B) • Check CD/CB flow restored
Evaluator's note: The scenario may continue with the next event after the crew has closed the recirc valve on the 1B CD/CB pump and with the Lead Evaluator's concurrence.		

	RO/BOP	• Check Plant Status
		  ○ PDMS INOPERABLE alarm (1-10-D8) NOT lit
		  ○ 1BOL 3.h NOT implemented
		  ○ Check PDMS Limit Exceeded NOT lit
		  ○ Control DI near target
		  ○ Rod bank RIL alarm (1-10-B6) NOT lit
		  ○ Turbine RB Light (OWS graphic 5501) is NOT lit
		  ○ C-7 (1-BP 4.6) NOT lit

	CREW	• Restore Plant Conditions
		  • Adjust RCS boron concentration as necessary
		  • Verify controls for running equipment in - AUTO:
		  ○ TDFP
		  ○ HD pump discharge
		  ○ CB pump recircs
		  ○ CD pumps recirc
		  ○ GS condenser bypasses

Op-Test No.: _2017-301___Scenario No.: _N17-2_ Event No.: __6__

Event Description: _____1C CD/CB pump trip (cont'd)_____

Time	Position	Applicant's Actions or Behavior
	CREW	• Complete shutdown of tripped CD/CB pump per BOP CD/CB-2, CONDENSATE/CONDENSATE BOOSTER SYSTEM SHUTDOWN • Adjust SG blowdown flows and calorimetric inputs as necessary • Verify DEHC feedback loop in service • Notify Chemistry to monitor secondary chemistry o Complete applicable section(s) of 1BGP 100-4 (if runback performed) • Check Reactor power change > 15% in one hour. If so: • Notify Chemistry and RP to perform the power change surveillances
		EVALUATOR NOTE: After the actions for the CD/CB pump trip are complete and with lead examiners concurrence, insert the next event.

Op-Test No.: _2017-301___Scenario No.: _N17-2_ Event No.: __7__

Event Description: _____Control rod M12 drops into the core_____

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator ROD AT BOTTOM (1-10-E6) is LIT • Rod M12 DRPI rod bottom light LIT
	CREW	• Identify rod M12 dropped into the core
	US	• Enter and direct actions of 1BOA ROD-3, Dropped or Misaligned Rod. • Notify SM of procedure entry and request EAL evaluation

	RO	• Verify rods in manual
		• Stop boration or dilution in progress
		• Check DRPI not faulted
		  • ROD CONTROL URGENT FAILURE ALARM (1-10-C6) NOT LIT
		  • ROD CONTROL NON URGENT FAILURE ALARM (1-10-D6) NOT LIT
		• Check reactor power
		  • Power is less than 5%
		  • Manually trip the reactor

		EVALUATOR NOTE: The crew may enter 1BCA 0.0 directly when Loss of All AC Power is identified (event 8, page 15)
	US	• Order U-1 Reactor trip • Enter/Implement 1BEP-0 and direct operator actions of 1BEP-0 • Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions

	RO	Perform immediate operator actions of 1BEP-0:
		• Step 1: Verify reactor trip
		  • If DRPI is available:
		  • Rod bottom lights - ALL LIT
		  • Reactor trip & Bypass breakers - OPEN
		  • Neutron flux – DROPPING
		  • If DRPI is not available:
		  • Manually trip the reactor at 1PM05J and 1PM06J
		  • Verify Power range channels <5% or IR SUR negative

	BOP	Perform immediate operator actions of 1BEP-0:
		• Step 2: Verify Turbine Trip
		  • All Turbine throttle valves - CLOSED
		  • All Turbine governor valves - CLOSED
		• Step 3: Verify power to 4KV busses
		  • ESF Buses – BOTH DE-ENERGIZED (141 & 142)

	US	• Enter/Implement 1BCA 0.0 and direct operator actions • Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions

Op-Test No.: 2017-301 Scenario No.: N17-2 Event No.: 8

Event Description: Loss of all offsite power

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator LOSS OF OFFSITE POWER (1-20-A1) • Annunciator DG1A TROUBLE/FAIL TO START (1-21-C8) • Annunciator DG1B TROUBLE/FAIL TO START (1-22-C8) • BOTH 4KV ESF bus alive lights NOT LIT.
	US	• Enter/Implement 1BCA-0.0, "LOSS OF ALL AC POWER", and direct operator actions of 1BCA-0.0 • Direct operator actions of 1BCA-0.0. • Notifies SM of plant status and procedure entry. • Requests evaluation of Emergency Plan conditions • Notify Unit 2 to enter and perform actions of 2BCA 0.3.

	RO	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

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

	BOP	• Verify AF flow at 1PM06J: • AF flow >500 gpm (1B AF train only)

	RO
	
	[CT-22]
		• Verify RCS isolated at 1PM05J:
		  • BOTH PZR PORVs closed – Identify 1RY456 OPEN
		  • **Close 1RY456**
		  • 1CV8149A, B & C closed.
		  • 1CV459 and 1CV460 closed.
		  • 1CV8153A & B closed
		  • RCPs not running

	BOP
	
	[CT-24]
		• Try to restore power to any/both Unit 1 4KV ESF buses at 1PM01J:
		  • DGs – NONE RUNNING.
		  • **Actuate SI**
		  • **Verify 1B DG starts and energizes Bus 142**
		• Check DG support loads AUTOMATICALLY STARTED
		  • Verify Bus 132X and Bus 132Z – ENERGIZED
		  • Verify 1B SX Pump running

	US	• Enter 1BEP-0 and direct operator actions of 1BEP-0 • Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions
Evaluator's note: when the crew has transitioned from 1BCA 0.0 to 1BEP 0 terminate the scenario.		

Facility: Byron Scenario No.: N17-3 Op-Test No.: 2017-301

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: Unit 1 is operating at 75.0% power due to Advanced Nuclear Dispatch, MOL, 919 ppm boron, equilibrium xenon.
The shift manager requests the BOP to perform a partial RV/IV quarterly surveillance per 1BOSR 3.g.3-1 as a PMT for the RSV L1 (1MS5001A) and IV L1 (1MS5003A) pair.
U-1 Boric Acid Transfer pump is running to recirculate the U1 Boric Acid Tank to support Chemistry weekly sample.
Generation Dispatch is expected to request Byron U-1 to raise load by 50 MWe at 1.6 mw/min.

Event No.	Malf. No.	Event Type*	Event Description
1	None	N (BOP, SRO)	**BOP will perform Monthly IV/RV Surveillance;** 1BOSR 3.g.3-1 as a PMT for the RSV L1 and IV L1 pair.
2	MF CV03	C (ATC, SRO)	**Boric acid transfer pump trips**; the RO will align U-0 boric acid transfer pump to support U1 using BOP AB-17.
3	None	N (BOP) R (ATC, SRO)	**Power Team will request Unit 1 raise power.** Crew performs reactivity calculation and begins power ascension 50 MWe at 1.6 MW/min.
4	MF RM02U	TS (SRO)	**Rad Monitor Failure** 1PR11J CNMT atmosphere rad monitor will fail due to a loss of sample flow. Unit Supervisor will determine TS 3.4.15 applies.
5	MF MS04B 100 MF PB2411 ON ZLO1MS018B2 ON	C (BOP, SRO) TS (SRO)	**1B SG PORV will spuriously open in AUTO and PORV low fluid level alarm is received;** the BOP will manually Close valve. The valve will not completely close and Unit Supervisor will determine TS 3.7.4 and 3.6.3 applies.
6	MF CV09 50	I (ATC, SRO)	**1TI-130 fails low;** causing letdown temp control valve to close resulting in actual letdown temperature rising and diverting letdown around the demineralizers. The RO will place 1TK130 in manual per BAR 1-8-C5 to control letdown temperature.
7	MF CH03D	C (BOP, SRO)	**1D CRDM Exhaust Fan trips;** BOP will refer to BAR 0-33-A5 and start an additional CDRM Fan per BOP VP-9.
8	MF FW16 1500	I (BOP, SRO)	**FW HTR Discharge Pressure 1PI-508 fails high**. MS/FW HDR ΔP will rise. The BOP will take manual control of FW pump controller 1SK509A per BHC-1-SG and control in manual.
9	MF TH03A 400	M (ALL)	**1A SG develops a 400 gpm tube rupture**. The crew will trip the reactor, and actuate safety injection. The crew will enter 1BEP-0, Reactor Trip or Safety Injection, and transition to 1BEP-3, Steam Generator Tube Rupture.

10	RF TH09 0 RF TH10 0 ZLO1RY455B1 ON ZLO1RY455B2 OFF ZLO1RY455C1 ON ZLO1RY455C2 OFF	C	**Pressurizer Spray Valves fail to operate during SGTR,** the crew will attempt to establish PZR spray flow to depressurize the RCS, when determined unavailable the crew will utilize at least one PZR PORV to depressurize the RCS and minimize break flow and refill PZR
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

SCENARIO OVERVIEW

Unit 1 is operating at 75.0% power due to Advanced Nuclear Dispatch, MOL, 919 ppm boron, equilibrium xenon. Following completion of turnover, the shift manager requests the BOP to perform a partial RV/IV quarterly surveillance per 1BOSR 3.g.3-1 as a PMT for the RSV L1 (1MS5001A) and IV L1 (1MS5003A) pair. U-1 Boric Acid Transfer pump is running to recirculate the U1 Boric Acid Tank to support Chemistry weekly sample. Generation Dispatch is expected to request Byron U-1 to raise load by 50 MWe at 1.6 mw/min

BOP will perform Monthly IV/RV Surveillance
BOP will perform 1BOSR 3.g.3-1 as a PMT for the RSV L1 and IV L1 pair. (1MS5001A and 1MS5003A)

Boric acid transfer pump trips
The RO will align U-0 boric acid transfer pump to support U1 using BOP AB-17.

Power Team will request Unit 1 raise power
Crew performs reactivity calculation and begins power ascension 50 MWe at 1.6 MW/min.

Rad monitor Failure
1PR11J CNMT atmosphere rad monitor will fail due to a loss of sample flow. Unit Supervisor will determine TS 3.4.15 applies.

1B SG PORV will spuriously open in AUTO and PORV low fluid level alarm is received
The BOP will manually close valve. The valve will not completely close and Unit Supervisor will determine TS 3.7.4 and T.S.3.6.3 applies. The crew will direct isolating the SG PORV using manual isolation valve 1MS019B.

1TI-130 fails low
This causes letdown temp control valve to close resulting in actual letdown temperature rising and diverting letdown around the demineralizers. The RO will place 1TK130 in manual per BAR 1-8-C5 to control letdown temperature

1D CRDM Exhaust Fan trips
BOP will refer to BAR 0-33-A5 and start an additional CDRM Fan per BOP VP-9.

FW HTR Discharge Pressure 1PI-508 fails high. MS/FW HDR ΔP will rise. The BOP will take manual control of FW pump controller 1SK509A per BHC-1-SG and control in manual.

1A SG develops a 400 gpm tube rupture
The crew will trip the reactor, and actuate safety injection. The crew will enter 1BEP-0, Reactor Trip or Safety Injection, and transition to 1BEP-3, Steam Generator Tube Rupture.

Pressurizer Spray Valves fail to operate during SGTR
The crew will attempt to establish PZR spray flow to depressurize the RCS, when determined unavailable the crew will utilize at least one PZR PORV to depressurize the RCS and minimize break flow and refill PZR

Completion criterion is RCS depressurization to match ruptured SG pressure, and SI termination in 1BEP-3. The lead evaluator may end the scenario when pressures have been matched, or after SI has been terminated.

Critical Tasks

1. CT-18 Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs
   (ERG Critical Task number – CT-18) (K/A: EPE 038EA1.32; importance - 4.6/4.7)

2. CT-20 Depressurize RCS to meet SI termination criteria before water release from ruptured SG PORV or safety occurs (as indicated by 1B Steam Generator Levels greater than 100% and by Monitor Parameter THLECELL(202) greater than or equal to 0.99).
   (ERG Critical Task number – CT-20) (K/A: EPE 038EA1.04; importance - 4.3/4.1

SIMULATOR SETUP GUIDE:

- Verify/perform TQ-BY-201-0113, Appendix A, Simulator “Ready for Training” Checklist.
- Establish the conditions of IC 173, 75% power, MOL, steady state, equilibrium xenon.
- Online risk placard is GREEN
- Start U-1 Boric Acid Transfer Pump
- Ensure copy of 1BOSR 3.g.3-1, IV/RV Quarterly Surveillance is available for the crew
- Ensure 1BEP-3 placards are available and inserted in ILT copies of 1BEP-3
- Open SimView file s:\opensim\Monitor\NRC.uvl and collect data
- Open and run caep file N17-3.cae
- Open Monitor file for Parameter THLECELL(202).
- Ensure the following are inserted:

Lights	**Event**	**Delay**	**Initial**	**Ramp**	**Final**	**Current**
ZLO1RY455B1	1	00:00:03			ON	OFF
ZLO1RY455B2	1	00:00:04			OFF	OFF
ZLO1RY455C1	1	00:00:05			ON	OFF
ZLO1RY455C2	1	00:00:06			OFF	OFF
Remote Functions						
TH10 PZR Spray Isol Vlv RY024	1	00:00:02			0	100

Triggers	
Event 3:	ZLO52BRKA(2).GT.0
Command 3:	MRF TH09 0

Turnover information:

- Unit 1 is operating at 75.0% power due to Advanced Nuclear Dispatch, MOL, 919 ppm boron, equilibrium xenon.
- Control bank D is 171 steps
- RCS boron concentration is 919 ppm
- 912 MWe
- No equipment is tagged out
- Online risk is Green
- Following completion of turnover, the shift manager requests the BOP to perform RV/IV quarterly surveillance per 1BOSR 3.g.3-1. This is a partial surveillance for 1MS5001A and 1MS5003A only. An EO has been briefed and is standing by with a field copy of the surveillance.
- U-1 Boric Acid Transfer pump is running to recirculate the U1 Boric Acid Tank to support Chemistry weekly sample.
- Generation Dispatch is expected to request Byron U-1 to raise load by 50 MWe at 1.6 mw/min. Do not ramp until called by Generation Dispatch.
- Reactivity plan and reactivity brief to be performed by crew prior to taking the shift.

Event 1: Perform Monthly IV/RV Surveillance

As EO, report you are standing near U-1 Low Pressure Turbines ready to observe IV/RV 1MS5001A and 1MS5003A. (Sim Drawing MS10)
As valves are closed report local indication that the valves went closed then back open.

Event 2: Boric acid transfer pump trip

IMF CV03 to trip U-1 Boric Acid Transfer Pump

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

As EO, report U-1 Boric Acid Transfer Pump motor is very hot to the touch.

If directed to check the breaker, MCC 133X3 is tripped and does not appear to be damaged. If breaker re-closure is requested, report breaker is closed. DO NOT DELETE MALFUNCTION. If pump restart is attempted, report the breaker is open.

If contacted as Unit 2, report Unit 0 AB pump is NOT supplying Unit 2 demands and is NOT electrically aligned to Unit 2

If dispatched as EO to align Unit-0 AB pump to Unit 1 per BOP AB-17:

- Verify w/MCR AB pump 1 + 0 C/S is in PTL (BOP AB-17, step F.1.a)
- Verify w/MCR makeup C/S is in STOP (BOP AB-17, step F.1.b)
- **IOR ZLO0AB03P ON**
- Wait approximately two minutes then perform the following:
- **DMF CV03**
- Notify MCR AB pump 1 + 0 C/S may be placed in AFTER TRIP (BOP AB-17, step F.1.j)
- Notify MCR Makeup C/S may be placed in AFTER TRIP (BOP AB-17, step F.1.k)

Report Unit 0 AB pump aligned for Unit 1 demands (BOP AB-17 step 4 is complete)

If contacted as Chemistry, report samples have been taken for the Boric Acid Tank.

Event 3: Power Team will request Unit 1 raise power

As Generation Dispatch, contact the MCR by phone (call x3812) and request Unit 1 raise power 50 MWe at 1.6 MW/min due to grid demand.

Acknowledge as Chemistry/Rad Protection requests for RCS samples (if required).

Acknowledge as Generation Dispatch of initiation of ramp

Event 4: Rad Monitor Failure

IMF RM02U to cause a failure of 1PR11J.

If asked if anyone is in CNMT, report no one is in CNMT

As Rad Protection respond to requests to investigate rad monitor and perform RP-BY-700-1006

As SM, Acknowledge LCO entry, request for writing IR, performing risk assessment and making appropriate notifications

Event 5: 1B SG PORV will spuriously open in AUTO and PORV low fluid level alarm is received

IMF MS04B
IMF PB2411 ON
IOR ZLO1MS018B2 ON
to cause 1B SG PORV to spuriously open and low fluid level alarm

If directed to investigate report the valve is closed and some hydraulic fluid is on the floor.

Report there is still a slight amount of steam coming through the SG PORV.

If directed to close 1MS019B, wait 3 minutes and report 1MS019B is closed and steam has stopped.

As SM acknowledge the failure, Tech Spec entry, on line risk assessment, request for maintenance support, and IR requests.

Event 6: 1TI-130 fails low

IMF CV09 50 to fail 1TI130 low

If directed to check local temperature of CV letdown: refer to Sim Drawing CV2 and report value of variable CVTXLTDN

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

Event 7: 1D CRDM Exhaust Fan trips

I**MF CH03D** to cause 1D CRDM exhaust fan trip (MCC 133X6 C4)

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

Event 8: FW HTR Discharge Pressure 1PI-508 fails high

Ensure BOP has returned to inside the horseshoe prior to inserting

IMF FW16 1500 to cause a 1PI-508 to fail high

As SM Acknowledge failure, procedure entry and request for Emergency Plan evaluations.

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

Event 9: 1A SG Tube Rupture - 400 gpm

IMF TH03A to cause a 400 gpm SGTR

If dispatched to locally open 1MS018B, report the valve will not move.

As SM Acknowledge procedure entry and request for Emergency Plan evaluations.

After transition to 1BEP-3, Acknowledge request for STA and begin monitoring BSTs

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Event 10: Pressurizer Spray Valves fail to operate after Trip

MRF TH09 0 (via trigger)
IOR ZLO1RY455B1 ON (via trigger)
IOR ZLO1RY455C1 ON (via trigger)

MRF TH10 0 (via trigger)
IOR ZLO1RY455B2 OFF (via trigger)
IOR ZLO1RY455C2 OFF (via trigger)

Op-Test No.: _2017-301___Scenario No.: _N17-3_ Event No.: __1___

Event Description: ____Perform Monthly Reheat and Intercept Valve Surveillance _____

Time	Position	Applicant's Actions or Behavior
	CUE	• Direction from SM to perform surveillance
	US	• Direct BOP to perform a partial 1BOSR 3.g.3-1, Unit 1 Reheat and Intercept Valve Quarterly Surveillance as a PMT for the RSV L1 and IV L1 pair..
	BOP	• Perform actions of 1BOSR 3.g.3-1 • Direct EO to locally observe IV and RV being tested • Verify RSV and IV open light LIT • Verify RSV and IV closed light NOT LIT • Select VALVE TEST on DEHC Graphic 5501 • Select pushbutton associated with RSV and IV being tested • Select EXECUTE on the popup • Verify with EO valves closed locally • At DEHC graphic verify: • RSV and IV closed lights LIT • RSV and IV open lights NOT LIT • At DEHC graphic verify: • RSV and IV open lights LIT • RSV and IV closed lights NOT LIT • Verify with EO valves opened locally • Depress EXIT on DEHC graphic popup
	RO	• Monitor plant parameters during RSV and IV surveillance.
		EVALUATOR NOTE: After the actions for performing surveillance for one set of valves are complete and with lead examiners concurrence, continue with the next event.

Op-Test No.: 2017-301 Scenario No.: N17-3 Event No.: 2

Event Description: Boric acid transfer pump trips

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator BA XFER PUMP TRIP (1-9-A4) • Amber trip light on Boric Acid Transfer pump 1 + 0 C/S
	RO	• Identify/report trip of Unit 1 Boric Acid Transfer pump • Refer to BAR 1-9-A4 • Dispatch operator to Unit 1 Boric Acid Transfer pump and breaker
	US	• Notify SM of Unit 1 Boric Acid Transfer pump trip. • Direct operators to align the Unit 0 Boric Acid Transfer pump for Unit 1 demand
		EVALUATOR NOTE: BAR 1-9-A4 will direct the alignment of the Common BA Pump using BOP AB-6. BOP AB-6 contains a NOTE prior to the selection of the applicable steps that states: For U-0 Pp alignment instructions, refer to BOP AB-17. The following steps are per BOP AB-17.
	RO	• Determine Unit 1 Boric Acid Transfer pump is unavailable • Align 0AB03P, Boric Acid Transfer pump 0 for Unit 1 demands per BOP AB-17 • Verify 0AB03P NOT supplying Unit 2 boric acid demands • Verify 0AB03P NOT connected to Unit 2 power supply • Place Boric Acid Transfer pump 1 + 0 C/S in PULL OUT at 1PM05J. • MAKE-UP MODE CONT SWITCH to STOP at 1PM05J. • Dispatch operator to align 0AB03P to Unit 1 per BOP AB-17 • Place Boric Acid Transfer pump 1 + 0 C/S in AFTER TRIP at 1PM05J. • Return Unit 1 RMCS to AFTER START at 1PM05J. • Request EST for Boric Acid Transfer Pump alignment
		EVALUATOR NOTE: After the actions for the boric acid pump trip are complete and with lead examiners concurrence, continue with the next event.

Op-Test No.: 2017-301 Scenario No.: N17-3 Event No.: 3

Event Description: Request Unit 1 to raise power

Time	Position	Applicant's Actions or Behavior
	CUE	• Direction from Generation Dispatch to raise power
	US	• Acknowledge request to raise power 50 MWe at 1.6 Mw/min. • Implement actions of 1BGP 100-3. o Perform pre-job brief per HU-AA-1211 "PRE-JOB, HEIGHTENED LEVEL OF AWARENESS, INFREQUENT PLANT ACTIVITY, AND POST JOB BRIEFINGS" for load ramp.
	US	• Direct raising load 50 MWe at 1.6 MW/min. • Initiate load swing instruction sheet, 1BGP 100-3T5
	RO	• Verify rod position and boron concentration. • Determine required PW volume: o Review Rema for power ascension • Determine required PW flow rate. • Initiate dilution as required (BOP CV-5). • Perform the following at 1PM05J: • Set 1FK-111 PW/Total Flow Cont POT to the desired PW flow rate. • Set 1FY-0111 PW Control Predet Counter to desired PW volume. • Place MAKE-UP CONT SWITCH to STOP position. • Set MODE SELECT to DIL/ALT DIL position. • Place MAKE-UP CONT Switch to START. o Verify proper operation of valves and PW makeup pump (1CV111B open, 1CV111A throttled, 1CV110B open (ALT DIL only), PW pump running, PW flow on recorder). o Turn on PZR backup heaters.
	BOP	• Raise turbine load at 1PM02J or OWS drop 210 by performing the following: • Select SETPOINT. • Enter 1.6 MW/min into the RATE window. • Select ENTER. • Enter 950 MW into REF DEMAND window. • Select ENTER. • Select EXIT. • Notify US and RO of pending ramp • Select GO/HOLD • Verify GO/HOLD button illuminates. • Verify HOLD illuminated RED. • Select GO. • Verify GO illuminates RED. • Verify main turbine load begins to rise.

Op-Test No.: 2017-301 Scenario No.: N17-3 Event No.: 3

Event Description: Request Unit 1 to raise power (continued)

Time	Position	Applicant's Actions or Behavior

	RO/
	BOP
		• Monitor reactor power and load ascension:
		  • Monitor NI's, Tave, ΔI, PZR press/level at 1PM05J.
		  • Monitor MW and DEHC system response at 1PM02J or OWS drop 210.
		• During dilution, monitor the following at 1PM05J and HMI:
		  • VCT level.
		  • RCS Tave rising/RCS boron concentration lowering.
		  • PW/Total flow predet counter responding correctly.
		  • Verify dilution auto stops at preset value.
		• Return Reactor Makeup System to automatic

		EVALUATOR NOTE: After measureable change in power and with lead examiners concurrence, continue with the next event.

Op-Test No.: 2017-301 Scenario No.: N17-3 Event No.: 4

Event Description: Rad Monitor Failure

Time	Position	Applicant's Actions or Behavior
	CUE	• Rad Monitor 1PR11J indicates Loss of sample flow on RMS
	BOP	• Refer to BAR RMS-2-1PR11J • Notify US of failure • Check PPC point RP0075

	US	• Determine applicable Tech Specs
		  • LCO 3.4.15 RCS Leakage Detection Instrumentation
		  • CONDITION, REQUIRED ACTION, and COMPLETION TIME
		  • CONDITION B, RA B.1.1 (analyze grab samples …), CT Once per 24 hours OR B.1.2 (Perform SR 3.4.13.1), CT Once per 24 hours AND B.2 (Restore to OPERABLE), CT 30 days.
		• Notify SM of plant status, Tech Spec entry, Risk Evaluation, IR initiation, and notifications.
		• Notify Rad Protection of monitor failure
		○ Direct placing ramp on HOLD

EVALUATOR NOTE: After the US has determined Tech Spec actions for the inoperable rad monitor and with lead examiners concurrence, continue with the next event.

Op-Test No.: 2017-301 Scenario No.: N17-3 Event No.: 5

Event Description: 1B SG PORV spuriously opens in AUTO and PORV low fluid level alarm

Time	Position	Applicant's Actions or Behavior
	CUE	• 1MS018B Position Indication OPEN • Increased steam flow • Annunciator S/G 1B PORV TROUBLE (1-15-B10) is LIT
	CREW	• Identify 1B SG PORV spuriously open
	BOP	• Refer to BAR 1-15-B10 • Notify US of open SG PORV • Identify SER point 2411 is in alarm ○ Attempt to close 1B SG PORV in MANUAL • Close 1B SG PORV with control switch ○ Dispatch EO to investigate 1B SG PORV Accumulator

	US	• Direct closing 1B SG PORV
		• Determine applicable Tech Specs
		  • LCO 3.6.3 Containment Isolation Valves
		  • CONDITION, REQUIRED ACTION, and COMPLETION TIME
		  • CONDITION C, RA C.1 (isolate flow path …), CT 72 hours AND C.2 (Verify flow path isolated), CT Once per 31 days
		  • LCO 3.7.4 Steam Generator (SG) Power Operated Relief Valves (PORVs)
		  • CONDITION, REQUIRED ACTION, and COMPLETION TIME
		  • CONDITION A, RA A.1 (restore to OPERABLE), CT 30 days
		○ Direct placing ramp on hold (if still in progress)
		• Notify SM of failure, Tech Spec entry, request risk evaluation and IR initiation.

		EVALUATOR NOTE: After 1B SG PORV failure has been addressed and with the lead examiners concurrence, continue with the next event.

Op-Test No.: 2017-301 Scenario No.: N17-3 Event No.: 6

Event Description: 1TI-130 fails low

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator LETDOWN TEMP HIGH (1-9-E2) is LIT • 1CV129 diverted to VCT • 1TK130 at minimum demand
	CREW	• Identify failure of 1TI-130
	US	• Direct manual control of 1CC130 using 1TK-130 ○ Direct placing ramp on HOLD (if still in progress)
		NOTE: BAR 1-8-C5 will not alarm due to temp indication failing low. BOP should first refer BAR 1-9-E2 to mitigate the event. 1-9-E2 eventually refers the operator to 1-8-C5, where 1CC130 will be placed in Manual if not done previously.
	BOP	• Refer to BAR 1-9-E2, Letdown Temperature High • Refer to BAR 1-8-C5, Letdown HX Outlet Temperature High • Verify 1CV129 diverted around demin to VCT • Take manual control of 1CC130 and raise demand
	Crew	○ Dispatch EO to locally check letdown temperature
	BOP/ RO	• Monitor panels and assist other operator as required.
	US	• Notify SM of failure, request risk evaluation and IR initiation.
		NOTE: If the Crew is slow to diagnose the failure, they may isolate letdown, and may also put on excess letdown. Steps for each follow in *italics.*
		To isolate letdown
		• *Close 1CV8149A/B/C*
		• *Close 1CV459/460*
		To place excess letdown in service per BOP CV-17
		• *Verify/open 1CV8100 & 1CV8112*
		• *Open 1CC9437A/B*
		• *Verify closed 1CV123*
		• *Open 1RC8037A/B/C or D*
		• *Open 1CV8153A or B*
		• *Open 1CV123 while maintaining outlet temp <165*
		EVALUATOR NOTE: When High Temp alarm clears or at lead examiner's discretion, continue with next event.

Op-Test No.: 2017-301 Scenario No.: N17-3 Event No.: 7

Event Description: 1D CRDM Exhaust Fan trips

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator CRDM EXHAUST FAN TRIP (0-33-A5) is LIT • 1D CRDM amber trip light LIT
	BOP	• Identify failure of 1D CRDM exhaust fan and report to US
	US	• Direct starting standby CRDM exhaust fan • Notify SM of failure, request risk evaluation and IR initiation. ○ Direct placing ramp on HOLD (if still in progress)
	BOP	• Refer to BAR 0-33-A5 • Start standby CRDM Exhaust fan using BOP VP-9
EVALUATOR NOTE: The BOP should be allowed to return to inside the horseshoe prior to continuing with next event.		
EVALUATOR NOTE: When standby CRDM exhaust fan has been started or at lead examiner's discretion, continue with next event.		

Op-Test No.: 2017-301 Scenario No.: N17-3 Event No.: 8

Event Description: FW HTR Discharge Pressure 1PI-508 fails high

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciators SG 1A-D FLOW MISMATCH FW FLOW HIGH (1-15-A4:D4) are LIT • 1B and 1C FW PP flow indication lowering • Indicator 1PI-508 indicates 1500 psig

	BOP	• Perform actions of BHC 1-SG
		  • Verify/Place 1SK509C is in manual
		  • Adjust controller to pre-failed value
		  • Clear integral from FW Reg Vlv controllers as necessary
		  • Go to 1BOA INST-2

	CREW	• Identify lowering speed of 1B and 1C TDFPs • Identify failure of FW discharge header pressure indicator 1PT-508 • Identify entry conditions for 1BOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL".
	US	• Monitor NSO prompt actions using BHC 1-Summary • Notify SM of plant status and procedure entry. • Request evaluation of Emergency Plan conditions. • Enter 1BOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment J "FW PUMP SPEED CONTROL MALFUNCTION" and direct operator to perform actions of 1BOA INST-2. ○ Direct placing ramp on HOLD (if still in progress)
	BOP	• Perform actions of 1BOA INST-2, Attachment J" FW PUMP SPEED CONTROL MALFUNCTION" • Verify / Place 1SK-509A in MANUAL and raise demand • Check feed flow greater than or equal to steam flow • Check FW pump Dp • Compare 1PI-FW015 to 1PI-507 • Check Feed reg valves stable
	RO	• Monitor reactor power. ○ Monitor RCS Tave and reactivity effects caused by secondary feedflow changes ○ Assist BOP with BAR response
	BOP	• Check Feed Flow restored • Feed flow > steam flow • SG levels at or trending to normal
		EVALUATOR NOTE: When the crew has addressed the FW Pp issue or at lead examiner's discretion, continue with next event.

Op-Test No.: 2017-301 Scenario No.: N17-3 Event No.: 9

Event Description: 1A SG Tube Rupture – 400 gpm

Time	Position	Applicant's Actions or Behavior
	CUE	• ALERT/ALARM on 1A Main Steam Line detectors 4AA122 and 4AA123 • 1A SG FW flow lowering • PZR level lowering
		EVALUATOR'S NOTE: The crew may initially enter 1BOA SEC-8, "Steam Generator Tube Leak." The actions are listed *in italics below.*
	CREW	• *Identify entry conditions for 1BOA SEC-8, "Steam Generator Tube Leak"*
	US	• *Direct the actions of 1BOA SEC-8*
	RO	• *Throttle open 1CV121 and 1CV182 attempting to maintain PZR level* • *Lower letdown flow to 75 GPM* • *Report that PZR level can NOT be maintained >17%.*
	US	• *Order crew to trip the reactor, verify the reactor trip, and actuate SI.*
	CREW	• Identify entry conditions for 1BEP-0, "REACTOR TRIP OR SAFETY INJECTION"
	US	• Order U-1 Reactor trip • Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions • Enter/Implement 1BEP-0 and direct operator actions of 1BEP-0

	RO	Perform immediate operator actions of 1BEP-0:
		• Step 1: Verify reactor trip
		  • Rod bottom lights - ALL LIT
		  • Reactor trip & Bypass breakers - OPEN
		  • Neutron flux – DROPPING

	BOP	Perform immediate operator actions of 1BEP-0:
		• Step 2: Verify Turbine Trip
		  • All Turbine throttle valves - CLOSED
		  • All Turbine governor valves - CLOSED
		• Step 3: Verify power to 4KV busses
		  • ESF Buses – BOTH ENERGIZED (141 & 142)

	US	• Direct manual SI actuation
	RO/BOP	• Manually actuate SI

		• Step 4: Check SI Status
		  • SI First OUT annunciator - LIT
		  • SI ACTUATED Permissive Light - LIT
		  • SI Equipment – AUTOMATICALLY ACTUATED
		  o Either SI pumps - RUNNING
		  o Either CV pump to cold leg isolation valve OPEN – 1SI8801A/B
		• Manually actuate SI from 1PM05J and 1PM06J

Op-Test No.: 2017-301 Scenario No.: N17-3 Event No.: 9

Event Description: 1A SG Tube Rupture – 400 gpm (continued)

Time	Position	Applicant's Actions or Behavior
	US	• Step 5: Direct BOP to perform Attachment B of 1BEP-0
		EVALUATOR NOTE: US and RO will continue in 1BEP-0 while BOP is performing Attachment B. Steps for completion of Attachment B start on page 23.
	BOP/ RO	• Verify Total AF flow: • AF pumps – BOTH RUNNING • AF alignment: • 1AF013A-H OPEN • 1AF005A-H THROTTLED • AF flow > 500 gpm • Check S/G tubes intact – 1A SG level rising in an uncontrolled manner / Secondary rads NOT normal • CLOSE 1AF013A and 1AF013E • CLOSE 1AF005A and 1AF005E
	RO	• Check PZR PORVs and SPRAY VALVES at 1PM05J: • 1RY455 & 1RY456 CLOSED • PORV isol valves – 1RY8000A & 1RY8000B BOTH ENERGIZED • PORV relief path – Both PORVs in AUTO, Both isolation valves – OPEN. • Normal PZR Spray Valves CLOSED
	RO	• Check RCS temperatures: • Verify RCS average temperature stable at or trending to 557°F. ○ If required: throttle AF maintaining >500 GPM until SG minimum level is met
	RO	• Check if RCPs should be stopped: • All RCP's – ALL RUNNING. • High head flow 1FI-917 > 100 GPM and RCS Pressure > 1425 PSIG

Op-Test No.: 2017-301 Scenario No.: N17-3 Event No.: 9

Event Description: 1A SG Tube Rupture – 400 gpm (continued)

Time	Position	Applicant's Actions or Behavior
	BOP/ RO	• Check if SG secondary pressure boundaries are intact at 1PM04J: • Check pressure in all SGs: • NO SG dropping in an uncontrolled manner.
	BOP/ RO	• Check S/G tubes are NOT intact at RM-11 console: • 1PR08J SG Blowdown • 1PR27J SJAE/GS – IN ALERT/ALARM • 1AR22/23A Main steam Lines – Trending up or in ALERT/ALARM
	CREW	Transition to 1BEP-3, Steam Generator Tube Rupture
	US	Implement 1BEP-3 "STEAM GENERATOR TUBE RUPTURE" and direct operator actions. • Notifies SM of BEP entry • Requests Emergency Plan evaluation • Request STA to come to the control room
	RO	Check status of RCPs and determine all running ○ If any running, Check trip criteria NOT satisfied • High head SI flow >100 gpm OR SI flow > 200 gpm AND • RCS pressure > 1425 psig
	CREW	Identify ruptured SG ○ Unexpected rise in NR level ○ Main steamline rad monitor ○ 1RT-AR022 Grid 1 4AA122 ○ 1RT-AR023 Grid 1 4AA123 ○ High activity for any SG sample • Reset CNMT isol Phase A • Notify Chem to locally sample • Open SG blowdown sample valves at Chem request • Identify 1A SG ruptured

Op-Test No.: _2017-301___Scenario No.: _N17-3_ Event No.: _9___

Event Description: ____1A SG Tube Rupture – 400 gpm (continued)_____

Time	Position	Applicant's Actions or Behavior

	BOP/
	RO
	
	[CT-18] (critical steps are bold)
		Isolate flow from ruptured SG by verifying
		• SG PORV MS018A in AUTO
		• Check SG PORV MS018A closed
		  • Verify closed when SG pressure < 1115 psig
		• Verify SG blowdown valves closed unless open for sampling
		  • 1SD002A
		  • 1SD002B
		• **Close MSIV and MSIV bypass valves for 1A SG**
		• Check PORVs on intact SGs available for RCS cooldown (1C and 1D SG PORVs)
		• Check ruptured SG level
		  • Narrow Range >10%
		  • **Verify/Close AF isol valves (should have been closed earlier in 1BEP-0)**
		  • **1AF013A**
		  • **1AF013E**
		  • 1AF005A
		  • 1AF005E

	BOP	Check ruptured SG pressure o Ruptured SG pressure greater than 330 psig
	Crew	• Initiate RCS cooldown • Determine required CETC from table (step 6a)
	RO/ BOP	• Check PZR Pressure >1930 # • When < 1930#, block Steamline Isol SI

	BOP	• Dump steam to condenser from intact SGs at maximum rate using steam dumps or SG PORVs
		  o Check steam dumps available
		  • Place MS controller in Manual, reduce demand to 0
		  • Select Steam Pressure Mode
		  • Adjust MS controller to initiate cooldown
		  o When necessary, bypass P-12 interlock using Bypass Interlock Switches A & B
		  o Dump steam at maximum rate using SG PORVs

	RO/ BOP	• Dispatch an operator with keys to standby 1SI101A/B
	Crew	• Check average of 10 highest CETC - < required temperature from step 6a
	Crew	• Continue with step 7; come back to step 6f when cooldown target temperature is achieved.

Op-Test No.: 2017-301 Scenario No.: N17-3 Event No.: 9

Event Description: 1A SG Tube Rupture – 400 gpm (continued)

Time	Position	Applicant's Actions or Behavior
	BOP	• Check intact SG levels > 10% • Control feed flow to maintain NR levels 30 – 50%

	RO	• Check PZR PORVs and isolation valves
		  • PORV isolation valves ENERGIZED
		  • PORVs CLOSED
		  • PORV isolation valves BOTH OPEN

	RO/
	BOP
		• Reset SI
		  • Verify SI actuated permissive light NOT LIT
		  • Verify Auto SI blocked light LIT

	RO/ BOP	• Reset Phase A isolation

	BOP	• Establish IA to containment
		  • Check SACs (Station Air Compressors)- any running
		  • Open 1IA065 and 1IA066

	CREW	• Check if RH pumps should be stopped
		  • Any RH pump running and aligned to RWST
		  • RCS pressure >325#
		  • Stop both RH pumps

	CREW	• Check if RCS Cooldown should be stopped
		  • Ave of 10 highest CETC < required temperature in Step 6
		  • When met, stop cooldown and maintain temperature < required temperature

	CREW	• Check ruptured SG pressure – stable or rising
	CREW	• Check RCS subcooling – acceptable per figure 1BEP 3-2 and Attachment A

	RO/
	BOP
		• Depressurize RCS
		• Normal Spray –available
		  • 1D RCP available
		  • 1RY455B available

Op-Test No.: 2017-301 Scenario No.: N17-3 Event No.: 10

Event Description: Pressurizer Spray Valves fail to operate

Time	Position	Applicant's Actions or Behavior
	RO	• Depressurize RCS using PZR spray valves until: o RCS Pressure < Ruptured SG pressure and PZR level > 12% o PZR level > 69% o RCS subcooling NOT acceptable • Identify PZR spray valves NOT ADEQUATE
	US	• Direct depressurizing RCS using PZR PORVs
	RO **[CT-20]**	• **Open 1 PZR PORV** • **Depressurize RCS using PZR PORVs until:** o **RCS Pressure < Ruptured SG pressure and PZR level > 12%** o **PZR level > 69%** o **RCS subcooling NOT acceptable** • Close PZR PORVs • Check PZR spray valves closed • Check Aux spray valve closed
	CREW	• Check RCS pressure RISING
	CREW	• Check if ECCS flow should be terminated • RCS subcooling – Acceptable • Secondary heat sink o > 500 gpm feed flow to SGs – available o At least 1 intact SG > 10% NR • RCS pressure – rising • PZR level > 12%
	RO/ BOP	• Stop both SI pumps and 1 CV pump
		EVALUATOR NOTE: When the CREW determines SI should be terminated, conclude the scenario.

Op-Test No.: 2017-301 Scenario No.: N17-3 Event No.: 9

Event Description: 1A SG Tube Rupture – 400 gpm (continued)

Time	Position	Applicant's Actions or Behavior
		EVALUATOR NOTE: Beginning of 1BEP-0 Attachment B actions

	BOP	• Perform 1BEP-0 Attachment B
		• Verify ECCS pumps running:
		  • CV pumps BOTH RUNNING
		  • RH pumps BOTH RUNNING
		  • SI pumps BOTH RUNNING
		• Verify ECCS valve alignment – required Group 2 lights LIT
		• Verify ECCS flow
		  • High Head SI flow >100 gpm (1FI-917)
		  • RCS pressure > 1700 psig
		• Verify RCFCs running in accident mode
		  • Group 2 RCFC Accident Mode lights – ALL LIT
		• Verify Phase A isolation
		  • Group 3 Cnmt Isol monitor lights – all LIT
		• Verify CNMT Vent isolation
		  • Group 6 Cnmt Vent Isol monitor lights – ALL LIT
		• Verify CC pumps – BOTH RUNNING
		• Verify SX pumps – BOTH RUNNING
		• Check if Main Steamlines should be isolated – NOT required
		  • All SG pressure > 640 psig (at 1PM04J)
		  • CNMT pressure < 8.2 psig
		• Check if CS is required
		  • CNMT pressure has NOT risen to .20 psig
		• Verify FW isolated at 1PM04J:
		  • FW pumps – TRIPPED.
		  • Isolation monitor lights – LIT.
		  • FW pumps discharge valves - CLOSED (or going closed) 1FW002A-C.
		  • Trip running HD pumps
		• Verify DGs running at 1PM01J:
		  • DGs – BOTH DGs running
		  • 1SX169A & B OPEN.
		  • Dispatch operator locally to check operation
		• Verify Generator Trip at 1PM01J:
		  • OCB 3-4 and 4-5 open.
		  • PMG output breaker open.
		• Verify Control Room ventilation aligned for emergency operations at 0PM02J:
		  • VC Rad Monitors – LESS THAN HIGH ALARM SETPOINT.
		  • Operating VC train equipment – RUNNING.
		  • Supply fan
		  • Return fan
		  • M/U fan
		  • Chilled water pump
		  • Chiller

Op-Test No.: 2017-301 Scenario No.: N17-3 Event No.: 9

Event Description: 1A SG Tube Rupture – 400 gpm (continued)

Time	Position	Applicant's Actions or Behavior
		• Operating VC train dampers – ALIGNED. • M/U fan outlet damper – NOT FULLY CLOSED. • VC train M/U filter light – LIT. • Operating VC train Charcoal Absorber aligned • Bypass damper - CLOSED • Inlet damper - OPEN • Outlet damper – OPEN • Operating VC train M/U filter aligned • Aligned to Turb Bldg • Control Room pressure greater than +0.125 inches water on 0PDI-VC038. • Verify Auxiliary Building ventilation aligned at 0PM02J: • Two inaccessible filter plenums aligned. • Plenum A or B or C: • Fan - RUNNING • Flow Control damper – NOT FULLY CLOSED • Bypass Isolation damper - CLOSED • Plenum A or B or C: • Fan - RUNNING • Flow Control damper - NOT FULLY CLOSED • Bypass Isolation damper – CLOSED • Aux Bldg Exhaust fans running • One exhaust fan running for every supply fan running • Verify FHB ventilation aligned at 0PM02J: • Fan - RUNNING • Inlet Isolation damper - OPEN • Flow Control damper - NOT FULLY CLOSED • Bypass Isolation damper – CLOSED • Maintain UHS basin level >80% • Check outside air temp – NOT less than freezing • Initiate periodic checking of SFP • Direct EO to locally verify SFP level and temperature and report status to STA • Notify US of the following: • Manual actions taken • Failed equipment status • Ownership of continuous actions • Attachment B completed • Shutdown unnecessary plant equipment • Refer to 1BGP 100-4T4 and 1BGP 100-5 as time allows
		EVALUATOR NOTE: end of 1BEP-0 Attachment B actions

Facility: Byron Scenario No.: N17-4 Op-Test No.: 2017-301

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: Unit 1 is at 90% power per Generation Dispatch orders, MOL,877ppm boron, equilibrium xenon, Online risk is green

Turnover: Crew is to perform a partial surveillance 1BOSR 0.5-2.AF.1-2, AF Valves Stroke Test, for 1B AF train as a PMT for 1AF013E. 1BOL 7.5 Condition A (One AF train inoperable) has been initiated. Protected Equipment 1A AF Pump.

Event No.	Malf. No.	Event Type*	Event Description
	RF RP34 OUT RF RP35 OUT RF RP60 OUT RF RP61 OUT	Preload	Slave K623 MS ISOL TRN A Slave K616 MS ISOL TRN A Slave K623 MS ISOL TRN B Slave K616 MS ISOL TRN B
1	None	N (BOP, SRO)	**AF stroke test;** the BOP will perform the stroke test for 1B AF train, 1AF013E.
2	MF CV17 100	C, (ATC, SRO)	**VCT level transmitter 1LI-185 fails high;** causing 1CV112A to divert to the HUT. The RO will perform actions of BAR 1-9-A2 and realign 1CV112A to restore letdown flow to the VCT.
3	IOR ZDI0CW03PA TRIP	C (BOP, SRO)	**0A CW Makeup Pump will spuriously trip;** The BOP will refer to BAR 0-38-A11 and start the standby 0B CW Makeup Pump per BOP CW-9, Circulating Makeup Pump Start-up. The crew may also enter 0BOA SEC-11, Inadequate Circulating Water Makeup.
4	MF PA0005	TS (SRO)	**MSIV pressure alarm;** Alarm 1-1-B5 alarms. Local report will be low accumulator pressure on the 1A MSIV. US will determine TS 3.7.2 applies for the MSIV.
5	MF TH10A 100	C (ATC, SRO)	**PZR spray valve 1RY455B fails open;** PZR spray valve 1RY455B slowly fails open. RO will take manual control per BHC 1-RY-P to close the spray valve.
6	MF FW35B	C (BOP, SRO)	**1B HD Pump spuriously trips;** The BOP will perform actions of BAR 1-17-D2 to start standby HD pump and enter 1BOA SEC-1 to verify plant is stable.
7	MF FW35C	C (BOP) R (ATC, SRO)	**1C HD Pump spuriously trips;** The crew will perform actions of 1BOA SEC-1 and initiate a turbine runback to 780MW at 20 MW/min.

8	MF RP09A MF RP02A MF RP02B MF RD09 8	M (ALL) C (ATC)	**Inadvertent Train A Feedwater Isolation / ATWS**; Feedwater flow to all steam generators is lost requiring a Reactor Trip. The reactor will fail to automatically and manually trip from the main control room. The crew will enter 1BEP-0, Reactor Trip / Safety Injection, and transition to 1BFR S.1, Response to Nuclear Power Generation/ATWS. **ATWS, Rod speed is failed at 8 steps/min;** the RO will place Rod Bank Select Switch to manual per Immediate Action of 1BFR-S.1 step 1 RNO and insert control rods at 48spm.
9	MF TC03 IOR ZDI1HSTG010 NORM	C(BOP)	**Main turbine fails to trip automatically or manually via the Turbine Trip pushbutton.** The BOP will then close the governor valves at the DEHC panel per Immediate Action of 1BFR-S.1 step 2 RNO to isolate main turbine from steam generators.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

SCENARIO OVERVIEW

Unit 1 is at 90% power per Generation Dispatch orders, MOL,877ppm boron, steady state, equilibrium xenon, Online risk is green. Crew is to perform a partial surveillance 1BOSR 0.5-2.AF.1-2, AF Valves Stroke Test, for 1B AF train as a PMT for 1AF013E. 1BOL 7.5 Condition A (One AF train inoperable) has been initiated. Protected Equipment 1A AF Pump..

AF stroke test
The BOP will perform the stroke test on 1B AF train 1AF013E.

VCT level transmitter 1LI-185 fails high
1CV112A will divert to the HUT. The RO will perform actions of BAR 1-9-A2 and realign 1CV112A to restore letdown flow to the VCT.

0A CW Makeup Pump will spuriously trip. The BOP will refer to BAR 0-38-A11 and start the standby 0B CW Makeup Pump per BOP CW-9, Circulating Makeup Pump Start-up. The crew may also enter 0BOA SEC-11, Inadequate Circulating Water Makeup.

MSIV accumulator pressure alarm
Alarm 1-1-B5 alarms. Local report will be low accumulator pressure on the 1A MSIV. US will determine TS 3.7.2 applies for the MSIV

PZR spray valve 1RY455B fails open.
PZR spray valve 1RY455B slowly fails open. RO will take manual control per BHC 1-RY-P to close the spray valve.

1B HD Pump spuriously trips
The BOP will perform actions of BAR 1-17-D2 to start standby HD pump and enter 1BOA SEC-1 to verify plant is stable.

1C HD Pump spuriously trips
The crew will perform actions of 1BOA SEC-1 and initiate a turbine runback to 780MW at 20 MW/min.

Inadvertent Train A Feedwater Isolation / ATWS;
Feedwater flow to all steam generators is lost requiring a Reactor Trip. The reactor will fail to automatically and manually trip from the main control room. The crew will enter 1BEP-0, Reactor Trip / Safety Injection, and transition to 1BFR S.1, Response to Nuclear Power Generation/ATWS.

ATWS, Rod speed is failed at 8 steps/min
The RO will place Rod Bank Select Switch to manual per Immediate Action of 1BFR-S.1 step 1 RNO and insert control rods at 48 steps per minute minimizing the needless continuation of an extreme or a severe challenge to the subcriticality CSF.

Main turbine fails to trip automatically or manually via the Turbine Trip pushbutton
The BOP will then close the governor valves at the DEHC panel per Immediate Action of 1BFR-S.1 step 2 RNO to isolate main turbine from steam generators.

Completion criterion is transition from 1BFR S.1 back to 1BEP 0.

Critical Tasks

1. Insert negative reactivity into the core prior to dispatching operators to locally trip the reactor and/or the turbine
   (ERG Critical Task number – CT-52) (K/A: EPE 029EA1.09; importance - 4.0/3.6)

2. Isolate main turbine from SGs during ATWS prior to re-entering 1BEP-0
   (ERG Critical Task number – CT-50) (K/A: EPE 029EA1.13; importance - 4.1/3.9)

SIMULATOR SETUP GUIDE:

- Verify/perform TQ-BY-201-0113, Appendix A, Simulator “Ready for Training” Checklist.
- Establish the conditions of IC 174, 90% power, MOL, steady state, equilibrium xenon.
- Online risk placard is GREEN
- Place Protected Equipment placard on 1A AF Pump
- Verify VCT level channel 1LT-112 is displayed on VCT level recorder
- Verify 1BOSR 0.5-2.AF.1-2 is available for the crew
- Open SimView file s:\opensim\Monitor\NRC.uvl and collect data
- Open and run caep file N17-4.cae
- Ensure the following are inserted: (on summary page)

Malfunctions	**Event**	**Delay**	**Initial**	**Ramp**	**Final**	**Current**
RP02A REACTOR TRIP BREAKER FAILS TO OPEN RTA	None	00:00:00			True	True
RP02B REACTOR TRIP BREAKER FAILS TO OPEN RTB	None	00:00:00			True	True
TC03 TURBINE AUTO TRIP FAILURE	None	00:00:00			True	True
Switches & Buttons						
ZDI1HSTG010	None	00:00:00			NORM	NORM
Remote Functions						
RP34 K623 MS ISOL TRN A	None	00:00:00			OUT	OUT
RP35 K616 MS ISOL TRN A	None	00:00:00			OUT	OUT
RP60 K623 MS ISOL TRN B	None	00:00:00			OUT	OUT
RP61 K616 MS ISOL TRN B	None	00:00:00			OUT	OUT

Turnover Information:

- Unit 1 is at 90% power per Generation Dispatch orders, MOL, equilibrium xenon
- 877ppm boron
- Control bank D is at 195 steps
- 1106 MWe
- No equipment is tagged out
- Protected Equipment: 1A AF Pump
- Online risk is green
- Crew is to perform a surveillance 1BOSR 0.5-2.AF.1-2, AF Valves Stroke Test, for 1B AF train as a PMT for 1AF013E. 1BOL 7.5 Condition A (One AF train inoperable) has been initiated. Protected Equipment 1A AF Pump.

Event 1: AF stroke test

Event 2: VCT level transmitter 1LI-185 fails high

IMF CV17 100 to fail VCT level transmitter 1LT-185 high

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

Event 3: 0A CW Makeup Pump will spuriously trip

IOR ZDI0PBCW03PA TRIP to cause a trip of 0A CW makeup pump

As EO, acknowledge order to investigate cause of pump trip. Report you are at the RSH doing rounds, and that the overcurrent target flag is up.
Respond as necessary for local steps to start the 0B CW Makeup pump per BOP CW-9. Report local steps of BOP CW-9 steps 1-8 are complete.

As SM Acknowledge procedure entry and request for Emergency Plan evaluations.
As SM Acknowledge request for writing IR, performing risk assessment and making appropriate notifications.

Event 4: MSIV accumulator pressure alarm

IMF PA0005 ON to cause 1A MSIV low accumulator pressure alarm

When dispatched to investigate 1A MSIV pressure alarm report 1A MSIV active accumulator pressure is 4600 psig, standby accumulator pressure is 4925 psig.

If directed to adjust 1A MSIV pressure using BOP MS-5 or 1BOSR MS-W1:
DMF PA0005
And report 1A MSIV pressure has been adjusted to 4950 psig.

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

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Event 5: PZR spray valve 1RY455B fails open

IMF TH10A 100 to cause PZR spray valve 1RY455B to fail open.

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

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Event 6: 1B HD Pump spuriously trips

IMF FW35B to cause a trip of 1B HD pump

As SM, acknowledge the 1B HD pump trip, 1BOA SEC-1 entry, request for E Plan evaluation, and requests for on line risk assessment, maintenance support, and IR initiation.

If dispatched as EO, report 1B Heater Drain pump has ground overcurrent flag at breaker cubicle (Bus 156 Cub 3)

Event 7: 1C HD Pump spuriously trips

IMF FW35C to cause a trip of 1C HD pump

Note: If crew determines a reactor trip is required, insert next event

As SM, acknowledge the 1C HD pump trip, 1BOA SEC-1 entry, request for E Plan evaluation, and requests for on line risk assessment, maintenance support, and IR initiation.

If dispatched as EO, report 1C Heater Drain pump breaker ground overcurrent relay has a target on it.

As Generation Dispatch acknowledge report of load reduction.

Event 8: Inadvertent Train A Feedwater Isolation / ATWS / ATWS, Rod speed is failed at 8 steps/min

IMF RP09A to cause an inadvertent FW isolation
and
IMF RD09 8 to fail rod speed to 8 spm

IMF RP02A and RP02B (in preload) to cause a failure of reactor to trip

As SM Acknowledge procedure entry and request for Emergency Plan evaluations.
After transition to 1BFR-S.1, Acknowledge request for STA and begin monitoring BSTs.

As EO, acknowledge request for local trip of Reactor Trip Breakers. After crew has gone past step 4 of 1BFR S.1, report you are at U-1 reactor trip switchgear.
When requested to trip U-1 reactor:
DMF RP02A
DMF RP02B
MRF RP01 OPEN
MRF RP02 OPEN
And report reactor trip and bypass breakers are open

Event 9: Main turbine fails to trip automatically or manually via the Turbine Trip pushbutton

I**MF TC03** (in preload) to cause a failure of turbine to auto trip
IOR ZDI1HSTG010 NORM (in preload) to fail main turbine trip pushbutton

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Op-Test No.: _2017-301___Scenario No.: _N17-4_ Event No.: _1__

Event Description: _____AF stroke test_____

Time	Position	Applicant's Actions or Behavior
	CUE	• From turnover, perform a partial 1BOSR 0.5-2.AF.1-2 for 1AF013E as a PMT
	US	• Direct BOP to perform a partial 1BOSR 0.5-2.AF.1-2 for 1AF013E
EVALUATOR NOTE: Scenario may be continued after completion of stroke test of 1 valve.		
	BOP	• Refer to 1BOSR 0.5-2.AF.1-2 • Record "As Found" condition of 1AF013E as OPEN • Exercise 1AF013E CLOSED • Exercise 1AF013E OPEN ○ Return 1AF013E, to its "As Found" condition
	RO	• Assist BOP with procedure as a peer check for valve stroke • Monitor primary and secondary panels
EVALUATOR NOTE: When valve stroke test is complete, insert the next event.		

Op-Test No.: _2017-301___Scenario No.: _N17-4_ Event No.: _2__

Event Description: ____VCT level transmitter 1LI-185 fails high_____

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator VCT LEVEL HIGH-HIGH LOW (1-9-A2) is LIT • VCT Level 1LI-185 indicates 100% on recorder • 1CV112A DIVERT to HUT
	CREW	• Refer to BAR 1-9-A2 • Determine 1LT-185 is failed HIGH ○ Determine Auto switchover at <5% is unavailable
	RO	• Place 1CV112A to VCT position • Monitor VCT level
	US	• Notify SM of failure, request IR
	BOP	• Monitor primary and secondary panels • Assist with BAR response
		EVALUATOR NOTE: After the actions for the VCT level failure are complete and with lead examiners concurrence, insert the next event.

Op-Test No.: _2017-301___Scenario No.: _N17-4_ Event No.: _3__

Event Description: _____0A CW Makeup Pump will spuriously trip_____

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator CW MAKEUP PUMP TRIP (0-38-A11) is LIT • Amber trip light LIT for 0A CW Makeup Pump
	US	• Direct operator to respond to alarm
	BOP	• Refer to BAR 0-38-A11 • Dispatch an operator to investigate tripped pump • Monitor CW flume level ○ Adjust 0CW220, CW Intake Bay Level Control Valve • Start the standby CW Makeup pump using BOP CW-9
	RO	• Monitor primary and secondary parameters while BOP is involved in the pump trip
		EVALUATOR'S NOTE: The crew may refer to or enter 0BOA SEC-11 for inadequate makeup flow. Actions of 0BOA SEC-11 follow in italics.
	US	• *Enter 0BOA SEC-11, In Adequate CW Makeup, and direct operator to perfrom actions* • *Notify SM of procedure entry and request EAL evaluation*

	BOP	• *Perform actions of 0BOA SEC-11*
		• *Check at least 2 pumps running – Only one running*
		• *Using BOP CW-9:*
		  • *Direct EO to perform local actions of procedure or direct the EO's actions*
		  • *F.1 blowdown oil cooler cooling line*
		  • *F.2 Verify open sliding gate suction valve*
		  • *F.3 Verify open recirc valve*
		  • *F.4 Verify closed discharge valve*
		  • *F.8 Throttle open 0CW217B*
		  • *Start 0B CW Makeup pump*
		  • *Direct EO to lineup oil cooling water*
		  • *Throttle open 0CW220*
		  • *Verify 0B CW MU discharge valve 0CW216B opens*
		  • *Verify 0B CW MU recirc valve closes*
		  • *Verify open 0B CW MU Pump discharge isolation valve 0CW217B*
		  • *Throttle open 0CW278B, recirc valve locally*
		  • *Verify pump current of 300 to 343 amps*
		  • *Adjust 0CW220*
		  • *Direct EO to Locally check motor and bearing temperatures*
		○ *Check outside air temperature > 40°F*
		○ *Dispatch operator to investigate cause of trip*
		○ *Verify adequate Makeup capability*

		EVALUATOR NOTE: After the actions to control CW makeup pump trip are complete and with lead examiners concurrence, insert the next event.

Op-Test No.: _2017-301___Scenario No.: _N17-4_ Event No.: _4__

Event Description: _____MSIV accumulator pressure alarm_____

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator MSIV 1A HYD/PNEU PRESS HIGH/LOW (1-1-B5) is LIT
	BOP	• Respond to BAR • Dispatch an operator to investigate low pressure alarm • Direct an operator to restore 1A MSIV pressure using BOP MS-5

	US	• Acknowledge report of low MSIV accumulator pressure
		• Determine applicable Tech Spec
		  • LCO 3.7.2 Main Steam Isolation Valves (MSIVs)
		  • CONDITION, REQUIRED ACTION, and COMPLETION TIME
		  • CONDITION A, RA A.1 (restore to OPERABLE), CT 7 days
		• Notify SM of plant status, tech spec entry, request IR and maintenance notification and risk evaluation
		• Direct restoration of MSIV pressure

		EVALUATOR NOTE: After MSIV accumulator pressure has been addressed and with lead examiners concurrence, continue with the next event.

Op-Test No.: _2017-301___Scenario No.: _N17-4_ Event No.: _5__

Event Description: _____PZR spray valve 1RY455B fails open_____

Time	Position	Applicant's Actions or Behavior
	CUE	• PZR pressure is lowering • 1RY455B OPEN light is LIT ○ Annunciator PZR PRESS CONT DEV LOW HTRS ON (1-12-C1) is LIT
	RO	• Identify 1RY455B is OPEN • Perform action of Hard Card BHC 1-RY-P • Place 1PK-455B in manual and reduce demand to 0 • Adjust PZR pressure to prefailed value • Monitor PZR pressure
		EVALUATOR NOTE: Tech Spec 3.4.1 only applicable if pressure lowers to <DNB limits of 2209 psig)
	US	• Monitor NSO prompt actions using BHC 1-Summary • Evaluate Tech Spec 3.4.1 (if pressure reduced to <DNB limits) for applicability • LCO 3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits • CONDITION, REQUIRED ACTION, and COMPLETION TIME • CONDITION A, RA A.1 (restore parameter to within limit), CT 2 hours • Notify SM of plant status, request IR and maintenance notification and risk evaluation
	BOP	• Assist with BAR response • Monitor panels with failure in progress
		EVALUATOR NOTE: After response to PZR spray valve failure is complete and with lead examiners concurrence, continue with the next event.

Op-Test No.: _2017-301___Scenario No.: _N17-4_ Event No.: _6__

Event Description: _____1B HD Pump spuriously trips_____

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator HD PUMP TRIP (1-17-D2). • HD Tank level rising. • HD Pump discharge valves opening. • 1B HD pump amber trip light LIT

	BOP	• Recognizes 1B HD pump tripped.
		• Refer to BAR 1-17-D2.
		• Reports failure to US.
		• Recognizes one Heater Drain Pump running.
		• Perform actions of BAR 1-17-D2
		  • Start Standby HD pump
		  • Inform US to enter 1BOA SEC-1
		• Direct EO to investigate cause of HD pump trip
		• Complete shutdown of tripped pump per BOP HD-2

	US	• Acknowledge 1B HD pump trip. • Acknowledge start of standby HD pump per BAR • Contact SM of procedure entry, EAL evaluation, perform risk assessment, initiate IR, and contact maintenance to investigate/correct failure • Implement 1BOA SEC-1, "SECONDARY PUMP TRIP" Attachment C "HD PUMP TRIP" and direct operator actions of 1BOA SEC-1 • Notify Chemistry to monitor secondary chemistry.

	BOP	• VERIFY/START standby HD pump
		• Verify HD pumps running - TWO running
		• Check HD tank level stable and <72%
		• Restore plant conditions
		  • HD tank overflow closed in AUTO
		  • Running HD pumps parameters acceptable

	RO	• Check PDMS OPERABLE • Check PDMS LIMIT EXCEEDED alarm NOT LIT • Control Delta I near target
		EVALUATOR NOTE: After standby HD pump has been started and with lead examiners concurrence, continue with the next event.

Op-Test No.: _2017-301___Scenario No.: _N17-4_ Event No.: _7__

Event Description: _____1C HD Pump spuriously trips _____

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator HD PUMP TRIP (1-17-D2). • HD Tank level rising. • HD Pump discharge valves opening. • 1C HD pump amber trip light LIT
	BOP	• Recognizes 1C HD pump tripped. • Refer to BAR 1-17-D2. • Reports failure to US. • Recognizes one Heater Drain Pump running. • Recognizes standby HD pump is unavailable
	CREW	• Identify entry conditions for 1BOA SEC-1, "SECONDARY PUMP TRIP".
	US	• Acknowledge 1C HD pump trip. • Contact SM of procedure entry, EAL evaluation, perform risk assessment, initiate IR, and contact maintenance to investigate/correct failure. • Implement 1BOA SEC-1, "SECONDARY PUMP TRIP" Attachment C "HD PUMP TRIP" and direct operator actions of 1BOA SEC-1

	BOP	• Recognizes standby HD pump NOT AVAILABLE.
		• Check HD pump status at 1PM03J.
		  • ONLY 1A HD pump running.
		  • Initiate HD runback on OWS graphic 5512 at 1PM02J or OWS drop 210.
		  • Verify turbine load lowering.
		• Check HD Tank level at 1PM03J:
		  • Level > 72% and rising.
		  • Maintain HD tank level.
		  o Verify 1HD046A &B in AUTO.
		  o Open 1CB113A-D as needed.
		  o Manually open 1HD117, HD tank overflow valve.
		  o Lower turbine load as necessary to maintain HD tank level <72%.
		• Check 1HD117, HD tank overflow valve in auto and closed at 1PM03J.
		  o Lower turbine load as necessary to close 1HD117.
		• Check 1A HD pump parameters at 1PM03J.
		  • 1A HD pump amps < 168 amps.
		  • 1A HD pump flow < 2950 KLB/HR.
		  o Lower turbine load as necessary to restore 1C HD pump parameters.
		• Deactivate turbine runback:
		  • Depress STOP HD RUNBACK softkey at OWS graphic 5512 at 1PM02J or OWS drop 210.

Op-Test No.: _2017-301___Scenario No.: _N17-4_ Event No.: _7__

Event Description: _____1C HD Pump spuriously trips(continued)_____

Time	Position	Applicant's Actions or Behavior

	US/RO	• Check PDMS operable.
		  • Annunciator PDMS INOPERABLE not lit (1-10-E8).
		  • 1BOL 3.h not implemented.
		  • Annunciator PDMS LIMIT EXCEEDED not lit (1-10-D7).

	RO	• Control ΔI near target.
		  • Operate control rods in manual as necessary to restore ΔI to desired value at 1PM05J.
		• Monitor RCS parameters.
		  ○ If RCS pressure lowers < 2209 psig, notify US to enter TS 3.4.1, RCS DNB Limits.
		  ○ If control rods < low – 2 rod insertion limit, notify US to enter TS 3.1.6, Control Bank Insertion Limits.

	RO	• Initiate RCS boration at 1PM05J: • Determine required boric acid volume. ○ Determine from Rema. • Determine desired boric acid flow rate. • Set 1FK-110 BA Flow Control to desired boration rate. • Set 1FY-0110 BA Blender Predet Counter to desired volume. • Place MAKE-UP MODE CONT SWITCH to STOP position. • Place MODE SELECT SWITCH to BORATE position. • Place MAKE-UP MODE CONT SWITCH to START. • Verify proper operation of valves and BA transfer pump (1CV110B open, Boric Acid Transfer Pump running, 1CV110A throttles open, proper BA flow indicated on recorder). ○ Turn on PZR backup heaters.
	BOP	• Verify running CB pump recirc valves in auto. • 1CB113A-D on running pumps. • Dispatch operators to perform BOP HD-2 for 1B HD pump. • Shutdown CD/CB pump (if started during procedure performance).

	US	• Notify chemistry to monitor secondary plant chemistry.
		• Notify SM to perform risk assessment.
		• Check reactor power change > 15% in one hour.
		  ○ Notify chemistry to perform TS 3.4.16 sampling.
		  ○ Notify rad protection to perform TS sampling.
		• Contact Generation Dispatch to inform of of load reduction and estimated duration of power derate.

		EVALUATOR NOTE: After boration is in progress in response to HD pump trip and with lead examiners concurrence, continue with the next event.

Op-Test No.: _2017-301___Scenario No.: _N17-4_ Event No.: _8__

Event Description: _____Inadvertent Train A Feedwater Isolation / ATWS _____

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator FWIV NOT FULL OPEN (1-1-A4/1-15-E7) is LIT • FW Monitor lights all LIT • FW flow reduced to 0 on 1FI-510/521/531/541
	CREW	• Identify conditions for loss of all FW requiring a reactor trip
	US	• Order U-1 Reactor trip • Enter/Implement 1BEP-0, Reactor Trip / Safety Injection, and direct immediate operator actions of 1BEP-0

	RO	• Initiate a manual reactor trip from 1PM05J
		• Initiate a manual reactor trip from 1PM06J
		• Perform immediate actions of 1BEP 0
		• Step 1: Verify reactor trip
		  • Rod bottom lights - NOT LIT
		  • Reactor trip & Bypass breakers - CLOSED
		  • Neutron flux – NOT DROPPING
		  • Check PR channels - >5%
		• Inform US failure of reactor to trip

	US	• Transition to 1BFR S.1, ATWS • Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions
		EVALUATOR NOTE: The scenario will continue to the next event.

Op-Test No.: 2017-301 Scenario No.: N17-4 Event No.: 8 / 9

Event Description: ATWS, Rod speed is failed at 8 steps/min
Main turbine fails to trip automatically or manually via the Turbine Trip pushbutton

Time	Position	Applicant's Actions or Behavior
	CUE	• Rod Speed indicating 8 steps / min after main turbine trip • Main turbine Gov valves and throttle valves open after depressing turbine trip pushbutton
	RO **[CT-52]**	• **Verify/ensure Control Rods inserting in Manual or Auto** at least 48 steps per minute • Insert Control Rods in Manual
	BOP **[CT-50]**	• Manually trip the Turbine using trip pushbutton on 1PM02J or OWS Panel 5512 • **Select Turbine Manual** • **Select Rapid** • **Select and hold GV Lower**
	BOP	• Verify / Start Aux Feedwater pumps

	RO / BOP
	[CT-52]
		• Check at least 1 CV pump running
		• **Initiate emergency boration by**
		  • Open 1CV8104
		  • Start boric acid transfer pump
		  • Check emergency boration and charging flows >30 gpm
		• Check PZR pressure <2335 psig
		• Verify Group 6 CNMT Vent monitor lights LIT

	CREW	• Check if Reactor Trip has occurred • Dispatch EO to locally open Rx Trip Breakers • Check Turbine Trip occurred

	CREW	• Check if Reactor is subcritical
		  • PR channels <5%
		  • IR channels – negative SUR

		EVALUATOR NOTE: Depending on timeframe, the crew may go to either step 8 or step 16 at this point. Steps 8-15 are in *italics.*
	CREW	• *Check SG NR levels ≥ 1 SG >10%* • *Control feed flow to maintain SG NR level 10% - 50%* • *Check 1SD002A-H closed* • *Check 1CV111A & B closed* • *Verify BTRS MODE SELECTOR SWITCH is OFF* • *Dispatch operator to verify dilution paths are isolated* • *Check for RCS temperature NOT dropping uncontrollably* • *Check for any SG pressure NOT dropping uncontrollably*

Op-Test No.: _2017-301___Scenario No.: _N17-4_ Event No.: _8 / 9 (continued)

Event Description: ____ATWS, Rod speed is failed at 8 steps/min_____
____Main turbine fails to trip automatically or manually via the Turbine Trip pushbutton

Time	Position	Applicant's Actions or Behavior
		EVALUATOR NOTE: If RCS is cooling down or SG are depressurizing, the crew will perform steps 11-13
	CREW	• *Step 11: Check/close MSIVs and bypass valves closed* • *Step 12: Check SG pressure NOT dropping uncontrollably or depressurized* • *Step 13: Isolate faulted SG*

	CREW	• *Step 14: Check CETC < 1200°F*
		• *Step 15: Verify reactor subcritical*
		  • *PR channels < 5%*
		  • *IR channels – negative SUR*

	Crew	• Return to procedure and step in effect
	US	• Announces transition to 1BEP-0, Reactor Trip or Safety Injection
		EVALUATOR NOTE: EVALUATOR NOTE: The scenario can be terminated after the transition to 1BEP-0 is announced or at lead examiner's discretion