Simulation Facility: Braidwood		Scenario No.: **NRC 1**	Operating Test No.: **18-1 NRC**
Examiners:		Applicant:	SRO
			ATC
			BOP

Initial Conditions: IC-18

Turnover: Unit 1 is at 75% power, steady state, equilibrium Xenon, BOL. On-line risk is green. Following completion of turnover, the Shift Manager requests the BOP swap GC pumps per BwOP GC-5, SWITCHING THE STANDBY AND OPERATING GC PUMPS, due to elevated vibrations on 1A GC pump. EOs have been briefed and are standing by at the stator water cooling skid. The 1A FW pump is OOS for a motor bearing replacement. 1FT-543 is OOS for troubleshooting by FIN.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IMF FW43 IMF FW49C IMF FW01 IOR ZLO1FW002A1 OFF IOR ZDI1FW002A CLS IRF FW027 0 IMF TC03 IOR ZDI1HSTG010 NORM IMF MS01A 100 IMF MS01B 100 IMF MS01C 100 IMF MS01D 100 Trigger 1 (RP:SI(1) .EQ. TRUE) IMF HV18B IMF RX03H 0		1A AF pump fails to start 1C CD/CB pump auto-start failure 1A MFP OOS Main turbine auto trip failure Main turbine manual trip pushbutton failure 1A-1D MSIVs failed open SI actuation trigger 0B MCR Return Fan trip on SI Place 1FT-543 OOS for troubleshooting
1	None	N-BOP N-SRO	Swap stator water cooling (GC) pumps
2	IRF ED019 OPEN	T-SRO	Loss of Instrument Bus 114
3	IMF SLIM12ManPB PRESSED IMF SLIM12OutIncPB PRESSED IMF SLIM12pwrFail_mft TRUE	I-ATC I-SRO	Master Pressurizer Level Controller (1LK-0459) output fails high
4	IMF PB2198 ON IMF FW44	T-SRO	1B AF pump local alarm (Air Box Trip)
5	IMF FW22D IMF FW49C (preload)	C-BOP C-SRO	1D CD/CB pump trip with 1C CD/CB pump auto-start failure
6	IMF FW02A TRIP	R-ATC N-BOP R-SRO	1B FW pump trip with turbine runback
7	IMF CV03	C-ATC C-SRO	Boric Acid Transfer Pump Trips during runback.

8	IMF RP09A IMF FW19B 3.5	M-All	Inadvertent FWI / 1B SG feedline break / loss of heat sink
9	Preload	C-BOP C-SRO	Turbine auto & manual trip failure
10	Preload	C-BOP C-SRO	0B MCR Return Fan trip on SI
11	Preload	C-All	1A AF pump fails to start

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

SCENARIO OVERVIEW

Unit 1 is at 75% power, steady state, equilibrium Xenon, BOL. On-line risk is green. Following completion of turnover, the Shift Manager requests the BOP swap GC pumps per BwOP GC-5, SWITCHING THE STANDBY AND OPERATING GC PUMPS, due to elevated vibrations on 1A GC pump. EOs have been briefed and are standing by at the stator water cooling skid. The 1A FW pump is OOS for a motor bearing replacement. 1FT-543 is OOS for troubleshooting by FIN.

After completing shift turnover and relief, the crew will perform BwOP GC-5 to swap the operating GC pumps. The BOP will start the 1B GC pump and shutdown the 1A GC pump with the ATC giving peer checks as applicable. An EO will report a good start/shutdown of the GC pumps.

When BwOP GC-5 is complete, Instrument Bus 114 will deenergize and show signs of damage with no fire. The crew will check controlling channels and respond per 1BwOA ELEC-2. Time permitting, the crew may perform actions for the deenergized PRNI channel per 1BwOA INST-1. Bistables will not be bypassed due to requiring additional NSO support (2 hour delay). The SRO will enter Tech Spec 3.8.9 Condition B for the instrument bus failure.

After the crew has completed actions for the Instrument Bus 114 failure, the Master Pressurizer Level Controller (1LK-0459) output will fail high prior to losing power. The crew will take manual control of the 1CV121 controller and manually control charging flow to restore PZR level. The SRO will establish a critical parameter for pressurizer level being in manual control.

When the crew has completed taking the actions for the Master Pressurizer Level Controller failure, a trouble alarm will come in for the 1B AF Pump. The crew will dispatch an EO to the 1B AF pump. The EO will report that the 1B AF Pump Air Box Tripped annunciator is in alarm on the local control panel. The airbox trip lever will not reset. The SRO will enter Tech Spec 3.7.5 Condition A for the 1B AF pump.

After the SRO has evaluated Tech Specs for the 1B AF pump, the 1D CD/CB pump will trip with the standby 1C CD/CB pump failing to auto-start. The crew will start the 1C CD/CB pump per 1BwPR 1-17-A9 and dispatch an EO to the breaker and pump to investigate. The crew will enter 1BwOA SEC-1 (Attachment C) for the CD/CB pump trip.

After the crew has started the 1C CD/CB pump and stabilized the plant, the hydraulic transient will cause a trip of the 1B FW pump. The crew will respond per 1BwPR 1-16-A1,B1,C1 and initiate a turbine runback and enter 1BwOA SEC-1 (Attachment A). The ATC will borate to restore rod position above the rod insertion limit.

During the runback, the boric acid transfer pump will trip. The crew will respond per BwAR 1-9-A4 and align alternate per BwOP AB-23**.**

After sufficient reactivity control is observed and the Unit 0 boric acid transfer pump is aligned to Unit 1, an inadvertent feedwater isolation and 1B SG feedline break inside Cnmt will occur. The crew will trip the reactor, verify reactor trip and enter 1BwEP-0 to address the reactor trip. During the immediate actions, the main turbine will fail to trip and the BOP will have to manually runback the

turbine. The B train ESF loads will have to be manually started due to the loss of Instrument Bus 114. When SI actuates, the 0B VC Return Fan will trip requiring the crew to swap to the 0A VC train. The 1A AF pump will fail to start and the crew will enter 1BwFR-H.1 due to a loss of heat sink. Wide range SG levels will be less than 43% (adverse Cnmt) and the crew will initiate bleed and feed. Scenario completion criteria is the establishment of bleed and feed.

Critical Tasks:

1. Manually trip the main turbine before a severe challenge (ORANGE path) develops to either subcriticality or integrity critical safety function or before transition to 1BwCA-2.1, whichever happens first. (Westinghouse – CT-13) (K/A Number – EPE007 EA1.07, Importance – 4.3/4.3)
2. Establish RCS bleed and feed before either PZR PORV opens automatically as a result of a loss of heat sink. (Westinghouse – CT-44) (K/A Number - EPEE05 EA1.1, Importance – 4.1/4.0)

SIMULATOR SETUP GUIDE

- Verify/perform TQ-BR-201-0113, BRAIDWOOD TRAINING DEPARTMENT SIMULATOR EXAMINATION SECURITY ACTIONS CHECKLIST.
- Reset to IC-18, 75% power, steady state, equilibrium Xenon, BOL OR use the IC written below.
- Open SmartScenario file **18-1 NRC 1.ssf** from the thumb drive and place the ssf in run.
- Release the **SETUP** command box.
- Complete items on Simulator Ready for Training Checklist.
- Ensure the simulator is in RUN (allow simulator to run during board walk down and turnover).
- Verify 0A & 0C VA plenums in-service, 0B VA plenum in standby.
- Verify/remove any Equipment Status Tags and Danger Tags not applicable to the scenario.
- Position switches and place 1A MFP OOS – place INFO cards on:
  - 1A MFP C/S in PTL.
  - 1A MFP lube oil pump C/S in PTL.
  - 1FW012A in CLOSE.
  - 1FW002A (closed).
- Flag Indications for 1FT-543 Failure on 1PM04J.
- Verify page 1 PRELOAD items are inserted.
- Verify SER printer is clear of data.
- If desired, write an IC after all the set-up actions are completed (snap to 0). This IC may be used for running the scenario on additional simulator groups.
- Provide students with turnover sheets and copy of BwOP GC-5.
- Provide turnover of unit status to oncoming crew.

Event 1: Swap stator cooling (GC) pumps

As EO, report a good start of the 1B GC pump and a good shutdown of the 1A GC pump.

As EO, when asked to reset the H2 Stator Clg Panel Trouble alarm, release ssf command box Event 1.

Ensure **RF TP15 ACK** is inserted to reset the trouble alarm.

NOTE: H2 Stator Clg Panel Trouble alarm is from high DP due to 2 pump operation. When asked, report GC stator water coil DP is 26 psid, no throttling of 1GC5523 required.

As SM, acknowledge the GC pump swap completion.

Event 2: Loss of Instrument Bus 114

Release ssf command box Event 2.

Ensure **RF ED019 OPEN** is inserted to deenergize Instrument Bus 114.

When dispatched as an NSO to Instrument Bus 114, wait one minute and report Instrument Bus 114 has a faint acrid smell coming from bus panel & there are burn marks on panel door but no active fire exists.

When dispatched as an EO to instrument inverter 114, wait two minutes and report inverter 114 output breaker is tripped open. Inverter 114 output voltage is 120 volts current is 0 amps.

If dispatched as an EO to fail open 1AF005E-H, release ssf command box Event 2 AF valves.

Ensure **MF FW45E 100** is inserted to fail OPEN 1AF005E.
Ensure **MF FW45F 100** is inserted to fail OPEN 1AF005F.
Ensure **MF FW45G 100** is inserted to fail OPEN 1AF005G.
Ensure **MF FW45H 100** is inserted to fail OPEN 1AF005H.

Then report to the crew that 1AF005E-H are failed open.

If dispatched as an EO to shut down instrument inverter 114 per BwOP IP-2, acknowledge the request.

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

As SM, if requested for support for bypassing bistables in AEER, report that AEER bistables are not to be bypassed until NSO support can be obtained (in approx. 2 hours) and that the abnormal operating procedure should be continued.

Event 3: Master Pressurizer Level Controller (1LK-0459) output fails high

Release ssf command box Event 3.

Ensure **MF SLIM12ManPB PRESSED, MF SLIM12OutIncPB PRESSED and IMF SLIM12pwrFail_mft TRUE** are inserted to fail 1LK-0459 output high, then lose power.

As SM, acknowledge the Master Pressurizer Level Controller failure & manual control of charging.

As SM, acknowledge the IR request, on-line risk assessment and making appropriate notifications.

Event 4: 1B AF pump local alarm (Air Box Trip)

Release ssf command box Event 4.

Ensure **MF PB2198 ON and MF FW44** are inserted to cause the 1B AF pump local alarm/trip.

If dispatched as an EO to investigate the 1B AF pump local alarm, wait two minutes, then **delete MF PB2198** and report that the 1B AF Pump Air Box Tripped alarm is in and the air box is failed closed.

If requested to push the reset button at 1AF01J, report no change in 1B AF pump status.

Request permission to reset the air box. When given permission to reset the air box, wait two minutes and then report that the airbox cannot be reset.

Acknowledge as System Engineering and Maintenance to assist in reopening the air box.

As SM, acknowledge the failure, requests for on-line risk assessment, Maintenance/Engineering support and IR request.

Event 5: 1D CD/CB pump trip with 1C CD/CB pump auto-start failure

Release ssf command box Event 5.

Ensure **MF FW22D** is inserted to trip the 1D CD/CB pump.

As SM, acknowledge the pump trip and auto-start failure, 1BwOA SEC-1 entry, request for EAL evaluation, and request for on-line risk assessment, maintenance support and IR initiation.

If dispatched as EO, wait 2 minutes, then report 1D CD/CB pump has a ground overcurrent flag at breaker cubicle. If asked, the 1C CD/CB pump has no issues locally.

If dispatched as EO, acknowledge request to shutdown 1D CD/CB per BwOP CD/CB-2.

Event 6: 1B FW pump trip with turbine runback

Release ssf command box Event 6.

Ensure **MF FW02A TRIP** is inserted to trip the 1B FW pump.

If dispatched to the 1B MFP, report no issues can be found at the 1B FW pump.

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

Note: Event 7 will need to be released after the boration has started for the runback, coordinate with Examiner to ensure the failure is inserted when ready.

Event 7: BA transfer pump trips during runback

Release ssf command box Event 7.

Ensure **MF CV03** is inserted to trip the BA transfer pump.

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

As EO, report the breaker for the Unit 1 BA transfer pump is tripped free and will not reset. The motor is hot to the touch, no fire is present.

As FS / EO, acknowledge request to align unit 0 BA transfer pump per BwOP AB-23.

As FS, request makeup control sw to off.

As FS, request BA pump control switch to PTL.

Release ssf command box Event 7 BA Pump to swap to the unit 0 BA pump (all inserted on hold, call before releasing as a first check for the valve manipulation):

Ensure **RF CV39 PMP 0** is inserted to swap the disconnect to the unit 0 BA pump.
Ensure **RF CV59 100** is inserted to open 1AB8465.
Ensure **RF CV35remf 100** is inserted to open 0AB8469.
Ensure **RF CV60 100** is inserted to open 1AB8468.

Release ssf command box Event 7 BA Pump DMF.

Ensure **DMF CV03** occurs.

If asked, as chemistry report boron concentration of last RCS sample was 611 PPM. B-10 fraction is .199.

Event 8: Inadvertent FWI / 1B SG feedline break / loss of heat sink

Release ssf command box Event 7.

Ensure **MF RP09A and MF FW19B 3.5** are inserted to cause an inadvertent FWI and 1B SG feedline break.

As SM, acknowledge the procedure transitions, EAL evaluation and STA request.

When requested to monitor DG operation, release ssf command box DG Check.

Ensure **RF EG06 RESET** is inserted to reset 1A DG alarms.
Ensure **RF EG12 RESET** is inserted to reset 1B DG alarms.

When requested to open 0/1SX007 to obtain **8000 GPM**, release ssf command box SX007 Throttling – 8000 gpm – 0/1SX007.

Ensure **RF SW01 60** is inserted to open 0SX007 to 60%.
Ensure **RF SW02 60** is inserted to open 1SX007 to 60%.

After the STA is requested, as STA report CSF status – Red path on heat sink (until feed flow established). Yellow on heat sink once adequate feed flow established, Yellow on inventory when vessel head voids due to bleed and feed.

If dispatched as an EO to locally trip the main turbine, acknowledge the request. Wait two minutes and notify the crew that the local push button had no effect on the Main Turbine.

If dispatched as an EO, report 1B AF pump has an air box trip until and 1A AF pump has a ground overcurrent flag and motor damage.

Event 9: Turbine auto & manual trip failure

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

Event 10: 0B MCR Return Fan trip on SI (preload)

Ensure **MF HV18B** is inserted on the SI to trip the 0B VC Return Fan.

As SM, acknowledge the procedure transitions, EAL evaluation and STA request.

Event 11: 1A AF pump fails to start (preload)

As SM, acknowledge the procedure transitions, EAL evaluation and STA request.

If dispatched as EO, report 1A AF pump has a ground overcurrent flag, motor damage is present, no fire exists.

Scenario No: **18-1 NRC 1** Event No. 1		
Event Description:		Swap stator cooling (GC) pumps
Time	Position	Applicant's Actions or Behavior
	CUE	• From turnover, swap stator water cooling pumps per BwOP GC-5, SWITCHING THE STANDBY AND OPERATING GC PUMPS.
	SRO	• Direct BOP to perform BwOP GC-5. ○ Peer check actions of BOP.
	BOP	• Refer to BwOP GC-5. • Start 1B GC pump at 1PM02J. • Allow both pumps to run in parallel for ≥ 5 minutes (per step D.1 / step F.2 NOTE). **EXAMINER'S NOTE:** When the examinee indicates that a 5 minute parallel run is required, examiner may time compress the parallel run time and give the cue that **"5 minutes has elapsed."** ○ Notify EO to perform leak check at skid and acknowledge local alarm. • Stop 1A GC pump at 1PM02J. • Request EO to throttle 1GC5523 to maintain ~26 psid across stator water coils (EO reports 26 psid exists, no throttling required). • Inform SRO that BwOP GC-5 is complete.
	SRO	• Acknowledge report that GC pump swap is complete. ○ Notify SM that BwOP GC-5 is complete.
	ATC	• Monitor remainder of MCBs. ○ Peer check actions of BOP.
		EXAMINER'S NOTE: After the actions for BwOP GC-5 are complete and with Lead Examiner's concurrence, enter next event.

Scenario No: **18-1 NRC 1** Event No. 2		
Event Description: Loss of Instrument Bus 114		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-4-A3, PROCESS I&C CAB PWR SUP FAILURE • Annunciator 1-4-B3, SOLID STATE PROT CAB GENERAL WARNING • Annunciator 1-4-C2, SEQUENCING CAB PWR FAILURE • Numerous block 4, 10 & 13 annunciators lit. • PRNI N-44 deenergized.
	ATC/ BOP	• Determine Instrument Bus 114 deenergized. ○ Refer to BwARs, as time permits.
	CREW	• Identify entry conditions for 1BwOA ELEC-2, LOSS OF INSTRUMENT BUS. • Dispatch EOs to investigate status of inverter and instrument bus.
	SRO	• Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Enter/Implement 1BwOA ELEC-2 and direct operator actions of 1BwOA ELEC-2 to establish the following conditions:

	ATC	• Check control channels operable at 1PM05J:
		  • PZR pressure
		  • PZR level
		  • T_{AVE}
		  • Delta T

	BOP	• Check control channels operable at 1PM05J/1PM04J:
		  • P_{IMP}
		  • SG level
		  • Steam flow
		  • Feed flow

	BOP	• Dispatch NSO/EOs to check Instrument Bus 114 and inverter 114:
		  • Instrument Bus 114 is damaged.
		  • Instrument inverter 114 is NOT damaged.

	CREW	• Determine Instrument Bus 114 cannot be energized.
	SRO	• Refer to 1BwOA ELEC-2, Table D, LOSS OF INSTRUMENT BUS 114 EFFECTS. • Brief crew on loss of Instrument Bus 114 effects. • Direct actions of 1BwOA INST-1, NUCLEAR INSTRUMENTATION MALFUNCTION. • Dispatch operators to fail air to 1AF005E-H. • Enter Tech Spec 3.8.9, Condition B. ○ *If the crew dispatches an EO to shutdown Instrument inverter 114, enter Tech Spec 3.8.7, Condition A. (TS 3.0.6 would no longer be applicable with the inverter in a shutdown lineup, i.e. more than just the instrument bus would be making the inverter inoperable)*
		EXAMINER'S NOTE: (1) After the crew recognizes Instrument Bus 114 cannot be reenergized and the Tech Spec determination has been made and with

Scenario No: **18-1 NRC 1** Event No. 2		
Event Description: Loss of Instrument Bus 114		
Time	Position	Applicant's Actions or Behavior
		Lead Examiner's concurrence, enter next event. **(2) If desired by the Lead Examiner, the crew can perform steps below (in italics) of 1BwOA INST-1, NI MALFUNCTION. When the crew requests assistance for bypassing bistables, cue will be that no extra NSOs are currently available (2 hour delay).**
	ATC/ BOP	○ *Check Rod Control status.* ○ *Check annunciator 1-10-B5 – LIT.* ○ *Place N44 Rod Stop Bypass switch in BYPASS at 1PM07J.* ○ *Check Tave – Tref deviation stable and within 1°F.* ○ *Check SG levels normal and stable.* ○ *Defeat N44 functions at 1PM07J:* ○ *Place upper section detector current comparator defeat switch in PR N44 position.* ○ *Place lower section detector current comparator defeat switch in PR N44 position.* ○ *Place power mismatch bypass switch in PR N44 position.* ○ *Place rod stop bypass switch in PR N44 position (previously performed).* ○ *Place comparator channel defeat to N44 position.* ○ *Check annunciator 1-10-C3 – LIT.* ○ *Reset PR N44 rate trip at 1PM07J (N/A - no power available).* ○ *Place computer points in TEST: N0047, N0048, U1143.* ○ *Delete computer point from scan: N0052A.* ○ *Place N44 input to DEH in test.* ○ *Remove PR N44 from service in Ovation.* ○ *Locally bypass bistables.*

Scenario No: **18-1 NRC 1** Event No. 3		
Event Description:		Master Pressurizer Level Controller (1LK-0459) output fails high
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-9-D3, CHG LINE FLOW HIGH LOW • 1LK-0459 controller loss of power. • 1FK-0121 controller output failed high. • Charging flow, 1FI-121A, rising.

	ATC	• Perform the following at 1PM05J:
		  • Determine charging flow rising.
		  • Identify 1FK-0121 controller output is high.
		  • Identify 1LK-0459 controller loss of power.
		  • Report failure(s) to US.

	ATC	• Reference BwAR 1-9-D3 and perform the following at 1PM05J:
		  • Determine that charging flow is high.
		  • Place 1FK-0121 controller, in manual.
		  • Lower demand on 1FK-0121.
		  • Monitor charging flow and pressurizer level and restore PZR level to normal band.

	BOP	• Monitor remainder of MCBs. ○ Refer to BwARs, as time permits.
	SRO	• Notify SM of 1LK-0459 failure/manual control of charging flow. • Establish a critical parameter for PZR level. • Notify SM to evaluate for Emergency Plan conditions. • Notify SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct the controller failure.
		EXAMINER'S NOTE: After the actions for Master Pressurizer Level Controller failure are complete and with Lead Examiner's concurrence, enter next event.

Scenario No: **18-1 NRC 1** Event No. 4		
Event Description: 1B AF pump local alarm (Air Box Trip)		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-3-C6, AF PUMP DIESEL TROUBLE

	BOP	• Reference BwAR 1-3-C6 and perform the following:
		  • Dispatch EO to investigate local alarm.
		  • Notify SRO/team of alarm.
		  • Request EO to push reset button on 1AF01J.
		  • Request EO to verify air box intake damper not tripped closed.
		○ Place the 1B AF pump control switch to PULL OUT.

	SRO	• Notify Engineering/Maintenance to assist in resetting the tripped air box on 1B AF pump. • Declare the 1B AF pump inoperable and enter Tech Spec 3.7.5 Condition A. • Notify Shift Manager of plant status, Tech Spec entry, request for risk assessment and IR request.
		EXAMINER'S NOTE: After the Tech Spec has been determined for the 1B AF pump and with Lead Examiner's concurrence, insert next event.

Scenario No: **18-1 NRC 1** Event No. 5		
Event Description: 1D CD/CB pump trip with 1C CD/CB pump auto-start failure		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-17-A9, CD/CB PUMP TRIP • 1D CD/CB pump trip light – LIT. • FW flow to each SG lowers. • SG levels begin trending down.
	BOP	• Notify SRO of the 1D CD/CB pump trip. • Per 1BwPR 1-17-A9, CD/CB PUMP TRIP PROMPT RESPONSE, start 1C CD/CB pump auxiliary oil pump and then start the 1C CD/CB pump. • Inform SRO to enter 1BwOA SEC-1, SECONDARY PUMP TRIP.
	CREW	• Dispatch EO to 1D CD/CB pump and breaker.
	SRO	• Determine 1D CD/CB pump has tripped. • Direct the BOP to start the 1C CD/CB pump. • Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Enter 1BwOA SEC-1, Attachment C, CD/CB PUMP TRIP MODE 1 and 2, and direct the following operator actions:

	BOP	• Check turbine load – GREATER THAN 700 MW.
		• Check CD/CB flow restored:
		  • Standby CD/CB pump – RUNNING.
		  • At least three CD/CB pumps – RUNNING.
		  • Check FW flow $\geq$ steam flow.
		• Check FW pumps not cavitating:
		  • Close recirc valve, 1CB113D.
		  • FW pump discharge flows – OSCILLATING – NO.

	BOP/ATC	• Check CD/CB flow restored:
		  • Check alarms – NOT LIT:
		  • CB PUMP DSCH FLOW HIGH alarm (1-17-B11).
		  • FW PUMP NPSH LOW alarm (1-16-E1).
		• Check Plant Status:
		  • PDMS INOPERABLE (1-10-E8) – NOT LIT & 1BwOS PDMS-1a – NOT IMPLEMENTED.
		  • Check PDMS LIMIT EXCEEDED (1-10-D7) – NOT LIT.
		  • Control ΔI near target.
		  • ROD BANK LOW INSERTION LIMIT alarm (1-10-B6) – NOT LIT.
		  • Deactivate turbine runback by pulling out on runback pushbutton or depress the "Stop CD/FW Runback" softkey (N/A – not used).
		  • LOSS OF TURB LOAD INTLK C-7 (1-BP-4.6) – NOT LIT.
		• Restore Plant Conditions:
		  • Adjust RCS boron concentration as necessary.
		  • Verify controls for running equipment in – AUTO:
		  • Turbine driven FW pumps/recirc valves (OWS graphic 6060).
		  • HD pump discharge valves.
		  • CB pump recirc valves. (1CB113C)
		  • CD pumps recirc.
		  • GS condenser bypass valves.

Scenario No: **18-1 NRC 1** Event No. 5		
Event Description: 1D CD/CB pump trip with 1C CD/CB pump auto-start failure		
Time	Position	Applicant's Actions or Behavior
		• Shutdown tripped CD/CB pump per BwOP CD/CB-2, CONDENSATE/CONDENSATE BOOSTER SYSTEM SHUTDOWN. • Adjust SG blowdown flows and calorimetric inputs as necessary. • Verify DEHC in AUTO, if desired. • Verify DEHC feedback loop IN SERVICE – Impulse. • Notify Chemistry Department to monitor secondary chemistry due to secondary plant transient.
	SRO	• Notify SM to perform risk assessment, initiate IR, make required notifications and contact maintenance to investigate/correct the pump failure.
		EXAMINER'S NOTE: After the actions for 1D CD/CB pump trip are complete and with Lead Examiner's concurrence, enter next event.

Scenario No: **18-1 NRC 1** Event No. 6		
Event Description: 1B FW pump trip with turbine runback		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-16-B1, FW PUMP 1B TRIP • Annunciator 1-16-D2, FW PUMP DSCH FLOW HIGH

	BOP	• Recognize 1B FW pump tripped.
		• Refer to 1BwPR 1-16-A1,B1,C1, FW PUMP TRIP (DUAL PUMP OPERATION) PROMPT RESPONSE, and perform the following actions:
		  • Verify/close 1B FW pump recirc valve, 1FW012B.
		  • Check turbine load > 700 MW.
		  • With 1A FW pump OOS - Initiate CD/FW runback via runback pushbutton or OWS graphic 5512.
		  • Start standby CD/CB pump (only 3 CD/CB pumps available).
		  • Inform SRO to GO TO 1BwOA SEC-1.

	CREW	• Identify entry conditions for 1BwOA SEC-1, SECONDARY PUMP TRIP.
	SRO	• Acknowledge 1B FW pump trip. • Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Enter 1BwOA SEC-1, Attachment A, FW PUMP TRIP ABOVE 15% POWER, and direct operator actions to establish the following conditions:

	BOP	• Verify/close 1FW012B, Recirc Valve.
		• Check turbine load > 700 MW.
		  • ONLY 1C FW pump running.
		• Verify auto start of 1A FW pump (NO – OOS).
		• Restore feed flow - 1A FW pump not available for fast start.
		• Reduce turbine load - initiate CD/FW runback (previously performed).
		  • Check turbine load dropping.
		  • Verify rods in AUTO.
		  • Initiate boration as necessary.
		  • Start standby CD/CB pump (only 3 CD/CB pumps available).
		• Raise FW pump suction pressure.
		  • Check FW PUMP NPSH LOW (1-16-E1) – LIT (NOT lit).
		• Check feed flow restored:
		  • Feed flow ≥ steam flow.
		  • SG levels stable at or trending to normal.
		  • Deactivate turbine runback.
		  • Check FW PUMP DSCH FLOW HIGH alarm (1-16-D2) – NOT LIT.

Scenario No: **18-1 NRC 1** Event No. 6		
Event Description: 1B FW pump trip with turbine runback		
Time	Position	Applicant's Actions or Behavior
	ATC	**BwOP CV-6 Attachment A, borate in automatic, via hard card.** Perform the following at 1PM05J: • Determine required boric acid volume. o Refer to operator aid for required boric acid addition. • Determine desired boric acid flow rate. o Turn on PZR backup heaters (as desired). • Set BA totalizer to desired value. • Set BA controller setpoint to desired BA flowrate. • 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 If desired, adjust 1LK-112, VCT level controller, setpoint to control VCT level. • When desired boration achieved, place RMCS M/U CONT switch to STOP. • Verify 1CV110B closed, 1CV110A closed and Boric Acid Transfer Pump stopped. - OR - **BwOP CV-6 Attachment A, batch boration, via hard card.** Perform the following at 1PM05J: o Turn on PZR backup heaters (as required). o If desired to reset Boric Acid Totalizer to 0, reset the BA blender predetermined setpoint. • Open 1CV110B. • Open 1CV110A. • Start the BA Transfer pump. o If desired, adjust 1LK-112, VCT level controller, setpoint to control VCT level. • When desired amount of BA has been added, stop the BA Transfer Pump. • Close 1CV110A. • Close 1CV110B. o Adjust 1LK-112, VCT level controller, setpoint to desired value. • Place 1CV110A/B to AUTO. • Record boration in Unit log. • Perform BwOP CV-7 to return RMCS to automatic.
	SRO/ ATC	• Check PDMS operable: • PDMS INOPERABLE (1-10-E8) – NOT LIT. • 1BwOS PDMS-1A – NOT IMPLEMENTED. • PDMS LIMIT EXCEEDED (1-10-D7) – NOT LIT.
	ATC	• Control ΔI near target. • Monitor RCS parameters: o If RCS pressure lowers < 2209 psig, notify SRO to evaluate Tech Spec 3.4.1, RCS DNB Limits (N/A if Rx power drop caused low PZR pressure).

Scenario No: **18-1 NRC 1** Event No. 6		
Event Description: 1B FW pump trip with turbine runback		
Time	Position	Applicant's Actions or Behavior

		• If ROD BANK LOW INSERTION LIMIT (1-10-B6) – LIT:
		  • Borate as necessary.
		  • Refer to Tech Spec 3.1.6.
		• Check LOSS OF TURB LOAD INTLK C-7 – NOT LIT (NO).
		  • When all steam dumps are closed, momentarily place Steam Dump Mode selector in RESET.

	SRO	• Notify Chemistry to monitor secondary plant chemistry.
		• Notify SM to perform risk assessment, initiate IR, make required notifications and contact maintenance to investigate/correct the pump failure.
		• Check reactor power change > 15% in one hour.
		  • Notify Chemistry to perform Tech Spec 3.4.16 sampling.
		  • Notify Rad Protection to perform RETS 12.4.1.A sampling.
		• Enter Tech Spec 3.1.6 Condition A when control rods below LO-2 rod insertion limit.

		EXAMINER'S NOTE: After an acceptable load ramp has occurred and with Lead Examiner's concurrence, insert next event (during post runback boration).

Scenario No: **18-1 NRC 1** Event No. 7		
Event Description:		Boric Acid Transfer Pump Trips during runback.
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-9-A4, BA XFER PUMP TRIP • Trip indication at 1PM05J control switch for the BA transfer pump

	ATC	• Recognize the BA transfer pump has tripped.
		• Refer to BwAR 1-9-A4, BA XFER PUMP TRIP:
		  • Dispatch an EO to check the breaker and the pump.
		  • Dispatch FS to align unit 0 BA XFER Pump to unit 1 per BwOP AB-23.
		  • Place makeup control switch to Stop.
		  • Place the U1 BA transfer pump in PTL.
		  • *Field supervisor aligns Unit 0 BA XFER pump locally.*
		  • Place BA XFER pump to AFTER TRIP.
		  • Return RMCS to auto per BwOP CV-7 (included below in italics as an optional continuation).
		  • Inform SRO to review TRM and initiate IR.

	SRO	• Notify SM of BA xfer pump trip, request IR. • Refer to TRM (none applicable) • Direct RO to perform BwOP AB-23.
		EXAMINER'S NOTE: After the unit 0 BA XFER pump is aligned to unit 1 and with Lead Examiner's concurrence, insert next event.

	ATC	• *Perform BwOP CV-7*
		  • *Determine BA flow rate.*
		  • *Place 1CV110A/B & 1CV111A/B in AUTO.*
		  • *Verify BA XFER control switch not in PTL.*
		  • *Verify PW pump control switch not in PTL.*
		  • *Place makeup control switch to STOP.*
		  • *Place Mode select switch to AUTO.*
		  • *Place makeup control switch to START.*

Scenario No: **18-1 NRC 1**		Event No. 8, 9, 10, & 11
Event Description:		Inadvertent FWI / Turbine auto & manual trip failure / 1B SG feedline break inside Cnmt / loss of heat / 0B MCR Return Fan trip / 1A AF pump fails to start
Time	Position	Applicant's Actions or Behavior
	CUE	• Feed flows dropping to zero. • SG levels dropping. • FW Isolation monitor lights – LIT.
	CREW	• Recognize indications of an inadvertent FWI. • Manually initiate a reactor trip.
	ATC	• Initiate a manual reactor trip.
	SRO	• Notify SM of plant status and procedure entry. • Request evaluation of Emergency Plan conditions. • Enter/Implement 1BwEP-0 and direct operator actions of 1BwEP-0.

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

	BOP
	
	[CT-13]
		Perform immediate operator actions of 1BwEP-0:
		• Verify Turbine Trip:
		  • All Turbine throttle valves – OPEN.
		  • All Turbine governor valves – OPEN.
		Manually trip the main turbine before a severe challenge (ORANGE path) develops to either subcriticality or integrity critical safety function or before transition to 1BwCA-2.1, whichever happens first. (Westinghouse – CT-13) (K/A Number – EPE007 EA1.07, Importance – 4.3/4.3)
		  • Attempt to manually trip the turbine.
		  • **Manually runback the turbine at max rate (select turbine MANUAL, select rapid, select and hold GV lower arrow).**

	BOP	Perform immediate operator actions of 1BwEP-0: • Verify power to 4KV busses. • ESF Buses – BOTH ENERGIZED (141 & 142).

	CREW	Recognize and respond to conditions requiring a Safety Injection in accordance with 1BwEP-0 "REACTOR TRIP OR SAFETY INJECTION" step 4:
		• Check SI Status:
		  • SI First OUT annunciator – LIT.
		  • SI ACTUATED Permissive Light – LIT.
		  • SI Equipment – AUTOMATICALLY ACTUATED.
		  • Either SI pumps – RUNNING.
		  • Either CV pump to cold leg isolation valve OPEN – 1SI8801A/B.
		• Manually actuate SI from 1PM05J and 1PM06J.

	SRO	• Direct BOP to perform Attachment B of 1BwEP-0.
		EXAMINER'S NOTE: SRO and ATC will continue in 1BwEP-0 while BOP is performing Attachment B.

Scenario No: **18-1 NRC 1** Event No. 8, 9, 10, & 11		
Event Description:	Inadvertent FWI / Turbine auto & manual trip failure / 1B SG feedline break inside Cnmt / loss of heat / 0B MCR Return Fan trip / 1A AF pump fails to start	
Time	Position	Applicant's Actions or Behavior

	BOP	**1BwEP-0 Attachment B:**
		• Verify FW isolated at 1PM04J:
		  • FW pumps – TRIPPED.
		  • FW isolation monitor lights – LIT.
		  • FW pumps discharge valves – CLOSED (or going closed) 1FW002A-C.
		• Verify DGs running at 1PM01J:
		  • DGs – BOTH RUNNING.
		  • 1SX169A/B OPEN.
		  • Dispatch operator locally monitor DGs operation.
		• Verify Generator Trip at 1PM01J:
		  • OCB 1-8 and 7-8 open.
		  • PMG output breaker open.
		• Verify SX Pumps Running:
		  • Check Unit 0 CC HX aligned to Unit 1.
		  • 1CC9473A&B OPEN.
		  • Unit 1 SX pumps – BOTH RUNNING.
		  • Dispatch an operator to energize and open 0/1SX007 to 8000 GPM flow to the Unit 0/1 CC HX, then open the disconnects.
		• Verify Control Room ventilation aligned for emergency operations at 0PM02J:
		  • VC Rad Monitors – LESS THAN HIGH ALARM SETPOINT.
		  • Operating VC train equipment – RUNNING – NO.
		  • 0B Return fan (TRIPPED)
		  • Attempt to start 0B Return fan (will NOT start).
		  • Reset Control Room Vent Isolation.
		  • Stop 0B train VC equipment.
		  • Start the following 0A train VC train equipment:
		  • 0A Supply fan
		  • 0A Return fan
		  • 0A M/U fan
		  • 0A Chilled water pump
		  • 0A Chiller
		  • Operating VC train equipment – RUNNING.
		  • 0A Supply fan
		  • 0A Return fan
		  • 0A M/U fan
		  • 0A Chilled water pump
		  • 0A Chiller
		  • Operating VC train dampers – ALIGNED.
		  • M/U fan outlet damper – 0VC24Y NOT FULLY CLOSED.
		  • 0A VC train M/U filter light – LIT.
		  • 0VC25Y – OPEN.
		  • 0VC312Y – CLOSED.
		  • Operating VC train Charcoal Absorber aligned for train 0A.
		  • 0VC43Y – CLOSED.
		  • 0VC21Y – OPEN.
		  • 0VC22Y – OPEN.

Scenario No: **18-1 NRC 1**		Event No. 8, 9, 10, & 11
Event Description:		Inadvertent FWI / Turbine auto & manual trip failure / 1B SG feedline break inside Cnmt / loss of heat / 0B MCR Return Fan trip / 1A AF pump fails to start
Time	Position	Applicant's Actions or Behavior
		• 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: • 0VA03CA – RUNNING. • 0VA022Y – OPEN. • 0VA020Y – CLOSED. • Plenum C: • 0VA03CF – RUNNING. • 0VA072Y – OPEN. • 0VA438Y – CLOSED. • Verify FHB ventilation aligned at 0PM02J: • 0VA04CA – RUNNING. • 0VA060Y – OPEN. • 0VA057Y – OPEN. • 0VA051Y – CLOSED. • Shutdown Unnecessary Plant Equipment. • Trip all running HD pumps. • Initiate periodic monitoring of Spent Fuel Cooling. • Notify SRO Attachment B complete, 0B VC Return Fan trip and manual start of 0A VC train.
	ATC/ BOP	• Verify ECCS pumps running: • Both CV pumps – 1A CV pump only, manually start 1B CV pump. • Both RH pumps – 1A RH pump only, manually start 1B RH pump. • Both SI pumps – 1A SI pump only, manually start 1B SI pump.
	ATC/ BOP	• Perform the following at 1PM06J: • Verify RCFCs running in Accident Mode: • Group 2 RCFC Accident Mode lights – ALL LIT – NO (train A only). • Stop 1B/1D high speed RCFCs. • Close 1SX112B/114B. • Open 1SX147B. • Verify/open 1SX016B/1SX027B. • Start 1B/1D low speed RCFCs. • Verify Phase A isolation: • Group 3 Cnmt Isol monitor lights – ALL LIT – NO. • Manually actuate Phase A. • Manually close any open Phase A valve. • Verify Cnmt Vent isolation: • Group 6 Cnmt Vent Isol monitor lights – ALL LIT.
	ATC/ BOP	• Verify AF system: • AF pumps – BOTH RUNNING – NO, both pumps tripped. • Attempt to manually start both AF pumps (neither pump starts). • AF isolation valves – 1AF13A-H OPEN. • AF flow control valves – 1AF005A-H OPEN (no pumps running).

Scenario No: **18-1 NRC 1** Event No. 8, 9, 10, & 11		
Event Description:	Inadvertent FWI / Turbine auto & manual trip failure / 1B SG feedline break inside Cnmt / loss of heat / 0B MCR Return Fan trip / 1A AF pump fails to start	
Time	Position	Applicant's Actions or Behavior

		• Verify CC pumps – BOTH RUNNING – NO (train A only).
		  • Start 1B CC pump.
		• Verify SX pumps – BOTH RUNNING – NO (train A only).
		  • Start 1B SX pump.
		• Check if Main Steamline Isolation is required (MSIVs failed open, will NOT close).
		• Check if CS is required:
		  ○ CNMT pressure has remained < 20 psig.
		  ○ CNMT pressure is > 20 psig (Perform 1BwEP-0 att. C).
		  • Check CS valve alignment:
		  ▪ 1CS001A/B – OPEN
		  ▪ 1CS007A/B – OPEN (opens 1CS007B)
		  ▪ 1CS019A/B – OPEN
		  ▪ 1CS010A/B – OPEN
		  • Check CS pump running (if not, locally start per 1BwOA ELEC-5).

	ATC/ BOP	• Verify total AF flow:
		  • AF flow greater than 500 GPM – NO.
		  ○ Attempt to start both AF pumps (will not start).
		  ○ GO TO 1BwFR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK.

	CREW	Identify entry conditions for 1BwFR-H.1 "RESPONSE TO LOSS OF SECONDARY HEAT SINK."
		1BwFR-H.1 "RESPONSE TO LOSS OF SECONDARY HEAT SINK"
	SRO	• Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Request STA evaluation of status trees. • Enter/implement 1BwFR-H.1 and direct operator actions of 1BwFR-H.1.

	ATC	• Check if secondary heat sink is required:
		  • RCS pressure > non-faulted SG pressure.
		  • RCS temperature > 350°F.

	ATC	• Check if bleed and feed is required:
		  • WIDE RANGE level in any 3 SGs – LESS THAN 43% (adverse Cnmt).
		  • Stop all RCPs.

	ATC	• Establish RCS feed path: • Actuate SI.

	BOP	• Verify RCS feed path:
		  • CENT CHG pumps – BOTH RUNNING.
		  • Group 2 cold leg injection monitor lights required for operating ECCS pumps – LIT.

Scenario No:	**18-1 NRC 1**	Event No.	8, 9, 10, & 11	
Event Description:	Inadvertent FWI / Turbine auto & manual trip failure / 1B SG feedline break inside Cnmt / loss of heat / 0B MCR Return Fan trip / 1A AF pump fails to start			

Time	Position	Applicant's Actions or Behavior

	ATC
	
	[CT-44]
		• Establish RCS bleed path:
		  • PZR PORV isolation valves – 1RY8000A & 1RY8000B energized & open.
		Establish RCS bleed and feed before either PZR PORV opens automatically as a result of a loss of heat sink. (Westinghouse – CT-44) (K/A Number - EPEE05 EA1.1, Importance – 4.1/4.0)
		  • **Open BOTH PZR PORVs:**
		  • **1RY455A.**
		  • **1RY456.**

	ATC	• Verify adequate RCS bleed path:
		  • PZR PORVs – BOTH OPEN.
		  • PORV isolation valves – BOTH OPEN.

	BOP	• Verify ESF equipment actuations. • Check if ESF actuation verification steps of 1BwEP-0 have been performed. Perform as time permits.

	CREW	• Maintain RCS heat removal:
		  • Maintain ECCS flow.
		  • Maintain PZR PORVs – BOTH OPEN.

		EXAMINER'S NOTE: At this point in the scenario, all Critical Tasks are complete and the scenario stop criteria has been reached, with Lead Examiner's concurrence, STOP the scenario.

SHIFT MANAGER TURNOVER

DAY/DATE: : 18-1 NRC 1 ONCOMING SHIFT _____

UNIT 1 STATUS	UNIT 0 & 1 MAJOR Clearance Order's
MODE . . . . . .1 Rx Pwr. . . . . .75 Generator MWe. . . . .921 Max Load / Power. . . 1269 MWe Min Load/Power . . . . 600 MWe Max Ramp Rate. . . . .5 mw/min Desired Delta I . . . . .Target On Line Risk . . . . . .Green Boron @ . . . . . .611 Control Bank. 168	None
SIGNIFICANT LCO, AAR, RETS	**UNIT 0 & 1 MAJOR ACTIVITIES**
None	The 1A FW pump is OOS for a motor bearing replacement.
U1 IN PROGRESS / PENDING	**ADMIN and PRIORITIES**
Equilibrium Xenon Preconditioned to 100% power, ARO. All control systems in automatic. Following completion of turnover, the Shift Manager requests the BOP swap GC pumps per BwOP GC-5, SWITCHING THE STANDBY AND OPERATING GC PUMPS, due to elevated vibrations on 1A GC pump. EOs have been briefed and are standing by at the stator water cooling skid. 1FT-543 is OOS for troubleshooting by FIN.	**SAFETY**: **FOCUS AREA**: **Event Free Clocks**: ***Station***: ***Ops*** **Last configuration control event:** **DOSE INFO**: Dose goal for today: **Station Priorities**
SCHEDULED ACTIVITY CONFLICT	

SHIFT MANAGER TURNOVER

UNIT 2 STATUS		UNIT 2 MAJOR Clearance Order's	
MODE	1	None	
Rx Pwr.	100%		
Generator Mwe.	1190		
Max Load / Power . . .	100%		
Min Load/Power	1264 MWe		
Max Ramp Rate.	5mw/min		
Desired Delta I	Target		
Online Risk.	Green		
Boron @	856		
Control Bank.	220		

SIGNIFICANT LCO, AAR, RETS	UNIT 2 MAJOR ACTIVITIES
Nothing	Nothing

UNIT 2 IN PROGRESS	**UNIT 2 PENDING**
Nothing	Nothing

SCHEDULED ACTIVITY CONFLICT

SHIFT MANAGER TURNOVER

NSO's		
	Unit 1	
	U1 Admin	
Layne	Unit 2	
Cavanaugh	U2 Admin	
	X	
	X	
Roesler	Field Sup.	
Mullins	WEC	
	X	
	X	
	X	
	X	
	X	
	X	
	X	
	X	
NLO's		**Circle Appropriate Assignment**
	FIN	X X
Lanka	U-1	SSD FB
Sebby	U-2	SSD FB
Jarman	ROVER	SSD FB
Jenco	MUDS	SSD FB
Ruiz	RW	SSD FB
Ashby	X	SSD FB
Thompson	X	SSD FB
Skrzypiec	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
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	X	SSD FB
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	X	SSD FB
	X	SSD FB
McGaw	RP Tech	
Dobbs	RP Tech	
Gallois, Butch	Chem Tech	

SHIFT MANAGER TURNOVER

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UNIT 1 SUPERVISOR

DAY/DATE **18-1 NRC 1** ONCOMING SHIFT _____

UNIT 1 STATUS	UNIT 1 MAJOR OOS's
MODE .....1 **% Pwr** .....75 **MWE** .....921 **Max Load**.....1269 MWe **Max VARS** .....BwGP Chart **Min Load** .....600 MWe **Max Ramp Rate** .....5 mw/min **Delta I** .....Target **Boron**.....611 **Control Bank D** .....168 **On Line Risk** .....Green	None
UNIT 1 LCOAR / TRM / DEQUIP ENTRIES	UNIT 1 MAJOR SURVEILLANCES and PMs
1FT-543 is OOS for troubleshooting by FIN.	None
UNIT 1 AND COMMON IN PROGRESS (INCLUDE PAINTING)	UNIT1 AND COMMON PENDING
Equilibrium Xenon Preconditioned to 100% power, ARO. All control systems in automatic. The 1A FW pump is OOS for a motor bearing replacement.	Perform BwOP GC-5, SWITCHING THE STANDBY AND OPERATING GC PUMPS, due to elevated vibrations on 1A GC pump.

UNIT 1 SUPERVISOR

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UNIT 1 NSO TURNOVER
DATE 18-1 NRC 1 ONCOMING SHIFT

Unit Status

Mode	1	**Max load/Power**	1269 MWe
Power	75	**Max ramp rate**	5 mw/min
MW Elect.	921	**Safety Systems Status**	Green
Min load/Power	600 MWe	**Control Rod Position**	168
Delta I	Target	**Boron Concentration**	611 ppm

In Progress	Pending
Equilibrium Xenon Preconditioned to 100% power, ARO. All control systems in automatic. The 1A FW pump is OOS for a motor bearing replacement. 1FT-543 is OOS for troubleshooting by FIN.	Perform BwOP GC-5, SWITCHING THE STANDBY AND OPERATING GC PUMPS, due to elevated vibrations on 1A GC pump.

Long Term

Administrative

Temporary Procedures	
Temporary Alteration	
New Equipment Status Tags	
Unit Logbook	
Unit Routine	
Aux. Electric Room Access	
Daily Orders	

LCOARs	**RETS-AAR**	**DEQUIP**
None		

Turnover Items	
1) NSO Shiftly/Daily Surveillance	
2) SSPS Channels/Bistables	
3) Sys – Safeguards	
4) Sys – Primary	
5) Sys – Balance of the Plant	
6) Alarms – SER/Annunciator	
7) Alarms – Process/RM-11	
8) Alarms – FP/others	
9) Chemistry	
10) Radiation Precautions	
11) Nuclear Instrumentation	
12) MCB Instrumentation	
13) MCB Controllers	
14) Electrical Distribution – AC	
15) Electrical Distribution – DC	
16) BwOP (proc. & step in effect)	
Comments:	

Review		US	WEC/STA	SM
Time:	Shift	Off Going		
Oncoming personnel has had a change in health status. If yes, inform Supervisor and contact OHS (nurse) ☐ Yes ☐ No				
Date	Shift	Oncoming		

Simulation Facility: Braidwood

Scenario No.: **NRC 2**

Operating Test No.: **18-1 NRC**

Examiners: _____ SRO

_____ ATC

_____ BOP

Applicant: _____

Initial Conditions: IC-21

Note: during the first (and only) session of this scenario conducted on 6/11/19, a simulator issue resulted in an unplanned reactor trip. This D-2 has been adjusted to reflect as-run conditions.

Turnover: Unit 1 is at 100% power, steady state, equilibrium Xenon, BOL. Online risk is green. Following completion of turnover, Radiation Protection is standing by for a shutdown of the 1PR11J for a filter change. 1FT-543 is OOS for troubleshooting by FIN.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IMF SI01B IRF RP30 OUT IMF SI12A IOR ZDI1CV8112 OPEN IRF ED500 1220 IMF RX03H 0		1B SI pump fails to start Phase A slave relay fails to actuate (1CV8100, 1IA065, 1PS228A/B, 1PR001A, 1CV8152) 1A SI pump auto-start failure 1CV8112 failed open Set AND computer to current AND MWe Place 1FT-543 OOS for troubleshooting.
1	None	N-BOP N, T-SRO	1PR11J filter change
2	IRF ED500 1120	R-ATC N-BOP R-SRO	Advanced Nuclear Dispatch (AND) order to lower load by 100 MWe at 4 MW/minute
3	IMF RX28J 0	T-SRO	1FT-444 RCS Loop flow Transmitter Failure.
4	IMF CV42B SHAFT SHEAR	C-ATC T, C-SRO	1B CV pump shaft shear
5	IMF RX03G 0 15min	I-BOP I-SRO	1FT-542 Fails Low over 15 minutes. (Note: event not run due to unplanned reactor trip)
6	IMF RP11A DMF RP11A	C-BOP C-SRO	Inadvertent Phase B (train A only) (Note: event not run due to unplanned reactor trip)
7	IMF CV27D 30 IMF TH06D 1500	M-All	1D RCP seal failure causing an RCS LOCA
8	Preload	C-ATC C-SRO	1A SI pump fails to auto-start on SI with 1B SI pump tripped
9	Preload	C-ATC C-SRO	1CV8100 fails to auto-close on Phase A with 1CV8112 failed open

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

SCENARIO OVERVIEW

Unit 1 is at 100% power, steady state, equilibrium Xenon, BOL. Online risk is green. Following completion of turnover, Radiation Protection is standing by for a shutdown of 1PR11J for a filter change.

After completing shift turnover and relief, the crew will shutdown the 1PR11J at Rad Protection's request. The BOP will shutdown 1PR11J. The SRO will enter Tech Spec 3.4.15 Condition B while the 1PR11J is shutdown and exit the Tech Spec LCO when 1PR11J is restarted. The BOP will restart 1PR11J after the filter change is complete.

Once 1PR11J is restarted, an Advanced Nuclear Dispatch (AND) order will be given to lower load by 100 MWe. The AND ramp computer will indicate a ramp to 1120 MWe is requested and the crew will call to confirm the ramp. Once the ramp is confirmed, the ramp down to 1120 MWe will be commenced at 4 MW/min per the operator aid. The ATC will borate the RCS and the BOP will perform the ramp.

Once sufficient reactivity control has taken place, the 1FT-414 will fail low. The crew will respond per BwAR 1-13-D3. The SRO will enter 1BwOA INST-2 attachment L and inform the shift manager. The SRO will enter Tech Spec 3.3.1 Conditions A & K.

Following the 1FT-414 failure, the 1B CV pump shaft will shear. The ATC will respond to the failure and will isolate letdown per 1BwPR 1-9-LD. The SRO will enter 1BwOA PRI-15, LOSS OF NORMAL CHARGING. Charging will be restored by starting the 1A CV pump, letdown will be restored per 1BwOA ESP-2. The SRO will enter Tech Spec 3.5.2 Condition A and TRM 3.1.d Condition A.

Once the crew has restored charging and letdown and the SRO has evaluated Tech Specs, 1FT-542 will slowly fail low. The BOP will respond to lowering SG level in the 1D SG and take the controller for 1FW-540 to manual and restore level per BwAR 1-15-D3. The SRO will enter 1BwOA INST-2 attachment H to respond to the event and establish a critical parameter for 1D SG level.

Once 1D SG level is normalized and BwOA INST-2 actions are complete, an Inadvertent Phase B (train A only) will actuate. The crew will respond per BwAR 1-5-A7 and verify seal injection flow is between 8-13 gpm to each RCP, reset Phase B and open the Phase B isolation valves to restore CC to the RCPs.

After the crew has recovered from the Inadvertent Phase B, the 1D RCP seal package will fail and cause an RCS LOCA. The crew will trip the reactor, verify reactor trip, initiate SI and enter 1BwEP-0 to address the reactor trip and small break LOCA. The SI will be complicated by the 1A SI pump failing to auto-start on the SI with the 1B SI pump having a ground overcurrent trip. Additionally, 1CV8100 will fail to auto-close on the Phase A with 1CV8112 failed open. The crew will start the 1A SI pump and manually close 1CV8100. The crew will transition to 1BwEP-1, LOSS OF REACTOR OR SECONDARY COOLANT. The crew will continue in 1BwEP-1 and transition to 1BwEP ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION. Scenario completion criteria is when the RCS cooldown step is completed in 1BwEP ES-1.2.

Critical Tasks:

1. Restore CC flow to the RCPs following the inadvertent phase B prior to 10 minutes elapsing (requiring a reactor trip, NRC designated CT). (K/A Number – 103, A4.04, Importance – 3.5/3.5) (Note: this critical task was not applicable due to event 6 not being performed due to reactor trip)
2. Manually start 1A SI pump prior to transitioning out of 1BwEP-0. (Westinghouse – CT-7) (K/A Number – 013 A4.01, Importance – 4.5/4.8)
3. Manually close 1CV8100 before transitioning out of 1BwEP-0. (Westinghouse – CT-11) (K/A Number – EPE009 EA1.08, Importance – 4.0/4.1)
4. Trip RCPs, when RCP trip criteria are met (RCS pressure <1425 psig and high head SI flow >100 gpm or SI pump discharge flow >200 gpm), prior to exiting out of 1BwEP-1. (Westinghouse – CT-16) (K/A Number – EPE009 EK3.23, Importance – 4.2/4.3)

SIMULATOR SETUP GUIDE

- Verify/perform TQ-BR-201-0113, BRAIDWOOD TRAINING DEPARTMENT SIMULATOR EXAMINATION SECURITY ACTIONS CHECKLIST.
- Reset to IC-21, 100% power, steady state, equilibrium Xenon, BOL OR use the IC written below.
- Open SmartScenario file **18-1 NRC 2.ssf** from the thumb drive and place the ssf in run.
- Release the **SETUP** command box.
- Ensure the simulator is in RUN (allow simulator to run during board walk down and turnover).
- Verify 0A & 0C VA plenums in-service, 0B VA plenum in standby.
- Complete items on Simulator Ready for Training Checklist.
- Verify/remove any Equipment Status Tags and Danger Tags not applicable to the scenario.
- Start the 1B CV Pump.
- Secure the 1A CV Pump.
- Verify/enter the following items:

• **IMF SI01B**	1B SI pump fails to start
• **IRF RP30 OUT**	Phase A slave relay fails to actuate (1CV8100, 1IA065, 1PS228A/B, 1PR001A, 1CV8152)
• **IMF SI12A**	1A SI pump auto-start failure
• **IOR ZDI1CV8112 OPEN**	1CV8112 failed open
• **IRF ED500 1220**	Set AND computer to current AND MWe
• **IMF RX03H 0**	Fails 1FT-543 to 0

- Verify SER printer is clear of data.
- If desired, write an IC after all of the set-up actions are completed. This IC may be used for running the scenario on additional simulator groups.
- Provide students with turnover sheets and copy of BwOP AR/PR-19.
- Provide turnover of unit status to oncoming crew.

Event 1: 1PR11J filter change

As Rad Protection, contact the MCR by phone (X2209) shortly after completion of shift turnover and request shutdown of 1PR11J to obtain sample (change of particulate and iodine filter cartridges). The RP procedure governing the filter change is RP-BR-911. Tell the MCR they will be contacted when ready to start up the 1PR11J.

Two minutes after 1PR11J is shutdown, contact the MCR by phone and request startup of 1PR11J. If asked, report the bypass/normal switch on 1PS36J CASP panel is in bypass. Following start of 1PR11J, provide feedback that 1PR11J is operating properly.

As SM, acknowledge the Tech Spec 3.4.15 Condition B entry and exit for 1PR11J.

Event 2: Advanced Nuclear Dispatch (AND) order to lower load by 100 MWe

Release ssf command box Event 3.

Ensure **RF ED500 1120** is inserted for the desired AND ordered ramp down of 100 MWe.

Acknowledge as Constellation that the ramp is desired at 4 MWe/min.

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

As SM, Gen Dispatch and NDO, acknowledge the ramp down to 1120 MWe.

Event 3: 1FT-444 RCS Loop Flow Transmitter Failure.

Release ssf command box **Event 4**.

Ensure **IMF RX28J 0** is inserted to fail the 1D RCS loop flow transmitter low.

As SM, acknowledge the failure and request for on-line risk assessment, maintenance support, IR initiation, and TS entry.

As SM, Inform the crew extra NSOs are not currently available for bistable manipulations, a callout is being performed.

Event 4: 1B CV pump shaft shear

Release ssf command box Event 5.

Ensure **MF CV42B SHAFT SHEAR** is inserted to cause a 1B CV pump shaft shear.

If dispatched as an EO to 1B CV pump and/or breaker, wait three minutes and report 1B CV pump shaft is sheared.

If dispatched as an EO to check for a good start on the 1A CV pump, report that the 1A CV pump had a good start.

As SM, acknowledge the failure, Tech Spec entry, on-line risk assessment, EAL evaluation, request

for maintenance support and IR request.

Event 5: 1FT-542 Fails Low over 15 minutes.

Release ssf command box Event 6.

Ensure **IMF RX03G 0 15min (on hold)** is inserted to fail 1FT-542 low over 15 minutes.

Release **IMF RX03G 0 15min** from SmartSummary.

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

As SM, acknowledge leaving FRV and master feed pump speed control in manual.

Event 6: Inadvertent Phase B (train A only)

Release ssf command box Event 2.

Ensure **MF RP11A** is inserted, then **DMF RP11A**, to cause a Phase B isolation on train A.

Call as IMD FLS and state a worker contacted a panel in the AEER during a walkdown and a relay actuation was heard.

If asked to reset 1CC053 as EO, **IRF CC53**, to reset 1CC053.

As SM, acknowledge the failure, LCOAR entry (if applicable), on-line risk assessment, EAL evaluation, request for maintenance support and IR request.

Event 7: 1D RCP seal failure causing an RCS LOCA

Release ssf command box Event 6.

Ensure **MF CV27D 30 & MF TH06D 1500** are inserted to cause a 1D RCP seal failure & RCS LOCA.

As SM, acknowledge the procedure transitions, EAL evaluation and STA request.

When requested to monitor DG operation, release ssf command box DG Check.

Ensure **RF EG06 RESET** is inserted to reset 1A DG alarms.
Ensure **RF EG12 RESET** is inserted to reset 1B DG alarms.

When requested to open 0/1SX007 to obtain **8000 GPM**, release ssf command box SX007 Throttling – 8000 gpm – 0/1SX007.

Ensure **RF SW01 60** is inserted to open 0SX007 to 60%.
Ensure **RF SW02 60** is inserted to open 1SX007 to 60%.

Acknowledge as TSC for determining the recommended minimum indicated PZR water level.

Event 8: 1A SI pump fails to auto-start on SI with 1B SI pump tripped (preload)

As SM, acknowledge procedure transitions, EAL evaluation and STA request.

If dispatched as EO, report 1B SI pump has a ground overcurrent flag dropped at its breaker, no issues are noted at the 1B SI pump.

Event 9: 1CV8100 fails to auto-close on Phase A with 1CV8112 failed open (preload)

As SM, acknowledge procedure transitions, EAL evaluation and STA request.

NOTE: 1CV8112 is located inside Cnmt.

Scenario No: **18-1 NRC 2** Event No. 1		
Event Description: 1PR11J filter change		
Time	Position	Applicant's Actions or Behavior
	CUE	• Request from RP to shutdown 1PR11J for filter change.

	BOP	• Notify SRO of 1PR11J filter change request.
		• Refer to BwOP AR/PR-19 "ROUTINE SKID MOUNTED PROCESS RADIATION MONITOR OPERATIONS."
		• Notify SRO to evaluate applicable LCO/RETS entry.
		• To shutdown 1PR11J:
		  • Select Grid 2 (5 or 6) on RMS.
		  • Select 1PR11J.
		  • Select the flow button to secure 1PR11J sample pump.
		  • Verify flow is NOT indicated on 1PR11J.
		• Notify SRO of 1PR11J status.

	SRO	• Enter Tech Spec 3.4.15 Condition B for 1PR11J. ○ Inform SM of Tech Spec 3.4.15 entry.
	CUE	• Request from RP to startup 1PR11J following filter change.

	BOP	• Refer to BwOP AR/PR-19.
		• Notify SRO of request to start 1PR11J.
		• To start 1PR11J:
		  • Select Grid 2 (5 or 6) on RMS.
		  • Select 1PR11J.
		  • Select the flow button to start 1PR11J sample pump.
		  • Verify flow indicated on 1PR11J.
		• Notify SRO of completion of 1PR11J filter change (status of the monitor and to evaluate operability of 1PR11J).

	SRO	• Exit Tech Spec 3.4.15 Condition B for 1PR11J. ○ Inform SM of Tech Spec 3.4.15 exit.
		EXAMINER'S NOTE: After 1PR11J is restarted and the SRO Tech Spec determination is complete and with Lead Examiner's concurrence, enter next event.

Scenario No: **18-1 NRC 2** Event No. 2		
Event Description:		Advanced Nuclear Dispatch (AND) order to lower load by 100 MWe at 4 MW/minute
Time	Position	Applicant's Actions or Behavior
	CUE	• AND computer alarms requesting a ramp down to 1120 MWe.
	SRO	• Review AND computer and determine that a ramp down to 1120 MWe is requested. • Call Constellation and verify that a ramp is requested. • Initiate 1BwGP 100-4T6 "LOAD CHANGE INSTRUCTION SHEET FOR POWER REDUCTION." • Perform pre-job brief per OP-BR-108-101-1002, Attachment 4 "EMERGENT RAMP REACTIVITY SUMMARY BRIEF."
	SRO	• Direct lowering load to 1120 MWe at 4 MW/min. • Notify Chemistry of power reduction and to monitor affected parameters.
	CREW	• Review Prerequisites, Precautions, and Limitations and Actions of 1BwGP 100-4 (may be performed after ramp is initiated).
	ATC	**BwOP CV-6 Attachment A, borate in automatic, via hard card.** Perform the following at 1PM05J: • Determine required boric acid volume. • Refer to operator aid for required boric acid addition. • Determine desired boric acid flow rate. ○ Turn on PZR backup heaters (as desired). • Set BA totalizer to desired value. • Set BA controller setpoint to desired BA flowrate. • 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). ○ If desired, adjust 1LK-112, VCT level controller, setpoint to control VCT level. • When desired boration achieved, place RMCS M/U CONT switch to STOP. • Verify 1CV110B closed, 1CV110A closed & Boric Acid Transfer Pump stopped. - OR - **BwOP CV-6 Attachment A, batch boration, via hard card.** Perform the following at 1PM05J: ○ Turn on PZR backup heaters (as required). ○ If desired to reset Boric Acid Totalizer to 0, reset the BA blender predetermined setpoint. • Open 1CV110B. • Open 1CV110A. • Start the BA Transfer pump. ○ If desired, adjust 1LK-112, VCT level controller, setpoint to control VCT level. • When desired amount of BA has been added, stop the BA Transfer Pump. • Close 1CV110A. • Close 1CV110B. ○ Adjust 1LK-112, VCT level controller, setpoint to desired value. • Place 1CV110A/B to AUTO. • Record boration in Unit log. • Perform BwOP CV-7 to return RMCS to automatic.

Scenario No: **18-1 NRC 2** Event No. 2		
Event Description:		Advanced Nuclear Dispatch (AND) order to lower load by 100 MWe at 4 MW/minute
Time	Position	Applicant's Actions or Behavior

	BOP	• Lower turbine load at 1PM02J or OWS drop 210 by performing the following:
		  • Select SETPOINT.
		  • Enter desired MWs into REF DEMAND window.
		  • Select LEFT ENTER.
		  • Verify correct value in REFERENCE DEMAND window.
		  • Enter desired MW/min into the RATE window.
		  • Select RIGHT ENTER.
		  • Select EXIT.
		  • Inform crew of pending ramp with an UPDATE.
		  • Select GO/HOLD.
		  • Verify GO/HOLD button illuminates orange.
		  • Verify HOLD indicator illuminates RED.
		  • Select GO.
		  • Verify GO indicator illuminates RED while the main turbine ramps.
		  • Verify main turbine load begins to drop.
		  • Monitor MWe and DEHC system response at 1PM02J or OWS drop 210.

	ATC/
	BOP
		• Monitor reactor power and load lowering.
		• Monitor NIs, Tave, ΔI, PZR pressure/level at 1PM05J or PPC.
		• Monitor MW and DEHC system response at 1PM02J or OWS drop 210.
		• During boration, monitor/perform the following at 1PM05J, Ovation and/or PPC:
		  • VCT level.
		  • RCS Tave.
		  ○ Verify boration auto stops at preset value.
		  ○ Return RMCS to automatic.
		  ○ Perform periodic control rod steps to maintain Tave and Delta I within limits.

		EXAMINER'S NOTE: After reactor power is lowered to an adequate level and with Lead Examiner's concurrence, enter next event.

Scenario No: **18-1 NRC 2** Event No. 3		
Event Description: 1FT-444 RCS Loop Flow Transmitter Failure		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-13-D3, RCP 1D BRKR OPEN OR FLOW LOW ALERT. • 1PM05J indication for 1FT-444 failing to 0.
	SRO	• Acknowledge annunciator 1-13-D3. • Notify SM of the 1FT-444 failure.

	ATC	• Reference BwAR 1-13-D3 and perform the following:
		  • Verify feedwater control system response.
		  • Recommend entry to 1BwOA INST-2.
		  • Determine 1FT-444 Failed low.

	SRO	• Acknowledge 1FT-444 failure. • Request extra NSOs to bypass / trip bistables. • Notify SM, entering TS 3.3.1 Conditions A & K. • Notify SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct failure.
		EXAMINER'S NOTE: After the tech spec determination is complete and with Lead Examiner's concurrence, insert next event.

Scenario No: **18-1 NRC 2** Event No. 4		
Event Description: 1B CV pump shaft shear		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-7-B2, RCP SEAL WATER INJ FLOW LOW • Annunciator 1-9-A1, REGEN HX LTDWN TEMP HIGH • Annunciator 1-9-D3, CHG LINE FLOW HIGH/LOW • PZR level lowering. • Low amps on the 1B CV pump.
	ATC	• Identify 1B CV pump has low amps & no flow at 1PM05J. • Report failure to SRO. • Isolate letdown per hard card 1BwPR 1-9-LD or 1BwOA PRI-15 Operator Action Summary page by closing 1CV8149A/B/C and 1CV459/460. • Adjust charging flow to minimum using 1CV121 and 1CV182 as required.
	CREW	○ Refer to BwARs, as time permits. • Identify entry conditions for 1BwOA PRI-15 "LOSS OF NORMAL CHARGING." • Dispatch operator to investigate cause of 1B CV pump low amps.
	SRO	• Notify Shift Manager of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Enter 1BwOA PRI-15 and direct operator actions of 1BwOA PRI-15 to establish the following conditions: ○ Enter Tech Spec 3.4.1 Condition A if PZR pressure < 2209 psig.
		EXAMINER'S NOTE: Crew may stop the 1B CV pump due to abnormal indications.
	ATC	Perform the following at 1PM05J: • Check RCP seal cooling. • Check CV pump status: ○ If one CV pump is running (CV pump may or may not be secured before entering 1BwOA PRI-15). • Check CV pump parameters any fluctuating – NO. • CV pump discharge pressure on 1PI-120A is less than RCS pressure: • Place 1CV121 controller to manual. • Place 1B CV pump C/S in PULL OUT. • Start 1A CV pump. • Place 1CV121 controller in auto (if desired). • If 1CV121 is in auto, place 1LK-459 in auto if desired (see next page **step 8**). - OR -
	ATC	○ If NEITHER CV pump is running. • Place 1B CV pump C/S in PULL OUT. • Isolate normal letdown: • CLOSE 1CV8149A, B & C, letdown orifice isolation valves. • CLOSE 1CV459 & 1CV460, letdown isolation valves. • Check VCT status: • Check 1CV112B & 1CV112C, VCT suction valves, OPEN. • Maintain VCT level greater than 20%. • Check annunciator 1-9-C2, VCT TEMP HIGH – NOT LIT. ○ Acknowledge RMS alarm caused by isolating flow to 1PR06J.

Scenario No: **18-1 NRC 2** Event No. 4		
Event Description: 1B CV pump shaft shear		
Time	Position	Applicant's Actions or Behavior

Note: Scripted crew actions for this event not performed after this point due to plant trip.	ATC	Perform the following at 1PM05J:
		• Check for gas binding of previously running CV pump by verifying the following trends NOT fluctuating prior to pump trip (may use PPC trends):
		  • RCP #1 seal leakoff flows.
		  • CV pump flow.
		  • CV pump discharge pressure.
		  • CV pump amps.
		• Restore charging flow:
		  • Check 1CV8111 & 1CV8114, 1A CV pump miniflow isolation valves – OPEN.
		  • Check RCS pressure approximately 2235 psig.
		  • Start 1A CV pump.
		(Note: unplanned reactor trip occurred due to transient following CV pump start)

		Examiner Note: the next event takes ~5 minutes of run time to notice. Coordinate with the booth operator to release event 5 while letdown is being restored per 1BwOA ESP-2.

	ATC	• Check CV system alignment (step 8):
		  • Verify 1CV8147, charging to RC 1A loop isolation valve – OPEN.
		  • Verify 1CV8324A, charging to regen HX 1A isolation valve – OPEN.
		  • Verify/open 1CV8105 and 1CV8106, charging line CNMT isolation valves.
		  • Check charging flow established (charging flow may be at minimum for RCP seal injection due to letdown isolation).
		  • Determine normal letdown isolated (restore letdown per 1BwOA ESP-2).

	CREW	• Identify entry conditions for 1BwOA ESP-2 "REESTABLISHING CV LETDOWN DURING ABNORMAL CONDITIONS."
	SRO	• Notify Shift Manager of plant status and procedure entry. • Implement 1BwOA ESP-2 and direct operator actions of 1BwOA ESP-2 to establish the following conditions:

	BOP	Restore normal letdown using 1BwOA ESP-2 by performing the following at 1PM05J:
		• Check letdown isolated:
		  • Verify 1CV8149A, B, & C, letdown orifice isolation valves – CLOSED.
		  • Verify 1CV459 & 1CV460, letdown line isolation valves – CLOSED.
		• Check letdown flow path:
		  • Verify 1CV8401A, letdown HX 1A isolation valve – OPEN.
		  • Verify 1CV8324A, charging to regen HX 1A isolation valve – OPEN.
		  • Verify 1CV8389A, letdown to regen HX 1A isolation valve – OPEN.
		  • Verify 1CV8152 & 1CV8160, letdown line CNMT isolation valves – OPEN.
		  • Verify BTRS mode select switch OFF light – LIT.
		• Align letdown controllers:
		  • Place 1PK-131, letdown line pressure controller, in MANUAL and raise demand to 40%.
		  • Place 1CC130A, letdown HX outlet temperature controller, in MANUAL and raise demand to 60%.

Scenario No: **18-1 NRC 2** Event No. 4		
Event Description: 1B CV pump shaft shear		
Time	Position	Applicant's Actions or Behavior

	BOP	• Verify charging flow established:
		  • Check 1CV8105 and 1CV8106, charging line CNMT isolation valves - OPEN.
		  • Throttle 1CV182, charging header backpressure control valve, to establish 8-13 gpm RCP seal injection flow.
		  • Throttle 1CV121 to establish ≥ 100 gpm charging flow on 1FI-121A.
		• Establish letdown flow:
		  • OPEN 1CV459 & 1CV460, letdown line isolation valves.
		  • OPEN 1CV8149A/B/C, letdown orifice isolation valves, as necessary to establish 120 gpm letdown flow.
		  • Lower demand on 1PK-131, letdown line pressure controller, to raise letdown pressure to approximately 360 psig on 1PI-131.
		  • Operate 1FK-121 in manual to restore PZR level to normal operating band and maintain 8-13 gpm RCP seal injection flow.
		  • Lower demand on 1CC130A, to control letdown temperature between 90 to 115°F on 1TI-130.
		  • Place 1PK-131, letdown line pressure controller, in AUTO.
		  • Place 1CC130A, letdown HX outlet temperature controller, in AUTO.
		  • At the RMS, verify 1PR06J rad monitor status is GREEN.

	ATC	• Place 1CV121 controller in auto (if desired). • If 1CV121 controller is placed in auto, place 1LK-0459 in auto (if desired). • Monitor RMCS during automatic VCT makeup: • Proper flow on PW/Total Flow (1FT-0111) and Boric Acid Flow (1FT-0110) on recorder 1FR-0110.
	SRO	• Notify SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct pump failure. • Enter Tech Spec 3.5.2 Condition A. *(Note: TS 3.5.5 entry would NOT be appropriate, 3.0.6 should be invoked due to charging pump inoperability)* • Enter TRM 3.1.d Condition A.
		EXAMINER'S NOTE: After the 1B CV pump shaft shear actions are complete and with Lead Examiner's concurrence, enter next event. **The next event is on a 15 minute ramp and may take ~5 minutes to cue the crew.**

Note: following the occurrence of the unplanned reactor trip during event 4, the crew was allowed several minutes to carry out the immediate actions of 1BwEP-0, make a transition to 1BwEP ES-0.1, and implement a portion of 1BwEP ES-0.1 for verifying post-trip plant conditions. Subsequently, Events 7-9 were inserted and the scenario continued on as scripted.

Scenario No: **18-1 NRC 2** Event No. 5 (Note: event not run due to unplanned reactor trip)		
Event Description: 1FT-542 Fails to 0 over 15 minutes		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-15-D3, S/G 1D FLOW MISMATCH STM FLOW LOW. • Annunciator 1-15-D9, S/G 1D LEVEL DEVIATION HI/LOW. • 1PM04J indication for 1FT-542 slowly failing to 0.
	SRO	• Acknowledge annunciator 1-15-D3. • Notify SM of the 1FT-542 failure.

	BOP	• Reference BwAR 1-15-D3 and perform the following:
		  • Place 1D FRV in MANUAL.
		  • Restore S/G Level to NORMAL.
		  • Place FW Pump Turbine speed control in Manual.
		  • Close 1FW012A/B/C as needed.
		  • Recommend entry to 1BwOA INST-2.
		  • Determine 1FT-542 Failed low.

	SRO	• Acknowledge 1FT-542 failure.
		• Enter 1BwOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL UNIT 1, Attachment H:
		  • Check affected SG levels.
		  ○ Place affected SG FW reg valve and bypass valve in manual.
		  ○ Place FW pump speed controller in manual.
		  • Restore SG level to a stable condition.
		  • Check reactor power less than 100%.
		  • Select an operable SF channel (NONE operable).
		  • DOES NOT restore auto SG level control.
		• Notify SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct failure.

		EXAMINER'S NOTE: Once SG levels are controlled in manual and with Lead Examiner's concurrence, insert next event.

Scenario No: **18-1 NRC 2** Event No. 6 (Note: event not run due to unplanned reactor trip)		
Event Description: Inadvertent Phase B (train A only)		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-5-A7, CNMT PHASE B ISOLATION • Annunciator 1-7-A4, RCP 1A THERM BARR CC WTR FLOW LOW • Annunciator 1-7-B4, RCP 1B THERM BARR CC WTR FLOW LOW • Annunciator 1-7-C4, RCP 1C THERM BARR CC WTR FLOW LOW • Annunciator 1-7-D4, RCP 1D THERM BARR CC WTR FLOW LOW • Annunciator 1-7-E4, RCP THERM BARR CC WTR FLOW HIGH LOW • Annunciator 1-7-A5, RCP 1A BRNG CC WTR FLOW LOW • Annunciator 1-7-B5, RCP 1B BRNG CC WTR FLOW LOW • Annunciator 1-7-C5, RCP 1C BRNG CC WTR FLOW LOW • Annunciator 1-7-D5, RCP 1D BRNG CC WTR FLOW LOW
	CREW	• Determine a Phase B was not manually actuated and conditions for auto Phase B actuation are not met.

	BOP
	
	[CT]
		Reference BwAR 1-5-A7 and perform the following at 1PM05/6J:
		• Check status of the following valves:
		  • 1CC9414, CC from RC pumps isol vlv, (OPEN).
		  • 1CC9416, CC from RC pumps isol vlv, (CLOSED).
		  • 1CC685, CC from RC pump thermal barriers isol vlv, (OPEN).
		  • 1CC9438, CC from RCP thermal barriers isol vlv, (CLOSED).
		  • 1CC9413A, CC to RC pumps isol vlv, (CLOSED).
		  • 1CC9413B, CC to RC pumps isol vlv, (OPEN).
		• Verify seal injection flow of 8-13 gpm per RCP.
		• Request SRO to refer to 1BwOA RCP-2, LOSS OF SEAL COOLING.
		• **Determine Containment pressure < 20 psig and stable.**
		  • **Depress Phase B Isolation RESET pushbuttons.**
		  • **Reopen Phase B isolation valves (1CC9416, 1CC9438 & 1CC9413A).**

		EXAMINER'S NOTE: The RCPs may be operated up to 10 minutes without CC flow to the motor bearings.
	SRO	• Direct BOP to follow BwAR actions for Cnmt Phase B Isolation. • Refer to 1BwOA RCP-2, LOSS OF SEAL COOLING. • Direct ATC to monitor RCP motor, bearing and seal leakoff temperatures.
	ATC	• Adjust RCP seal injection flows to 8-13 gpm, if required. • Monitor RCP motor, bearing and seal leakoff temperatures.
		EXAMINER'S NOTE: After restoring the Phase B isolation valves to their required (open) position and with Lead Examiner's concurrence, enter next event.

Scenario No: **18-1 NRC 2** Event No. 7, 8 & 9		
Event Description:	1D RCP seal failure causing an RCS LOCA, 1A SI pump auto-start failure and 1CV8100 fails to auto-close	
Time	Position	Applicant's Actions or Behavior
	CUE	• PZR pressure lowering. • PZR level lowering. • Annunciator 1-7-B3, RCP SEAL LEAKOFF FLOW HIGH • Annunciator 1-12-C1, PZR PRESS CONT DEV LOW HTRS ON • Annunciator 1-9-D3, CHG FLOW HIGH LOW • Annunciator 1-12-B4, PZR LEVEL CONT DEV LOW • Containment pressure rising.
	ATC	• Identify/report PZR level/pressure trend and recommend reactor trip & SI. ○ Refer to BwARs, as time permits.
	SRO	• Direct ATC to trip reactor, verify the reactor trip and then SI.
	CREW	• Initiate a manual reactor trip and SI and transition to 1BwEP-0, RX TRIP OR SAFETY INJECTION.
	SRO	• Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Enter/Implement 1BwEP-0 and direct operator actions of 1BwEP-0.

	ATC	Perform immediate operator actions of 1BwEP-0:
		• Verify reactor trip:
		  • Rod bottom lights - LIT.
		  • Reactor trip & Bypass breakers – OPEN.
		  • Neutron flux – DROPPING.

	BOP	Perform immediate operator actions of 1BwEP-0:
		• Verify Turbine Trip:
		  • All Turbine throttle valves – CLOSED.
		  • All Turbine governor valves – CLOSED.

	BOP	Perform immediate operator actions of 1BwEP-0: • Verify power to 4KV busses: • ESF Buses – BOTH ENERGIZED (141 & 142).

	ATC	• Check SI Status:
		  • SI First OUT annunciator – LIT.
		  • SI ACTUATED Permissive Light – LIT.
		  • SI Equipment – AUTOMATICALLY ACTUATED.
		  • Either SI pump – RUNNING – (NO).
		  • Either CV pump to cold leg isolation valve OPEN – 1SI8801A/B.
		• Manually actuate SI from 1PM05J and 1PM06J.

	SRO	• Direct BOP to perform Attachment B of 1BwEP-0.
		EXAMINER'S NOTE: SRO and ATC will continue in 1BwEP-0 while BOP is performing Attachment B.

Scenario No: **18-1 NRC 2** Event No. 7, 8 & 9		
Event Description:	1D RCP seal failure causing an RCS LOCA, 1A SI pump auto-start failure and 1CV8100 fails to auto-close	
Time	Position	Applicant's Actions or Behavior

	BOP	**1BwEP-0 Attachment B:**
		• Verify FW isolated at 1PM04J:
		  • FW pumps – TRIPPED.
		  • FW isolation monitor lights – LIT.
		  • FW pumps discharge valves – CLOSED (or going closed) 1FW002A-C.
		• Verify DGs running at 1PM01J:
		  • DGs – BOTH RUNNING.
		  • 1SX169A/B OPEN.
		  • Dispatch operator locally monitor DGs operation.
		• Verify Generator Trip at 1PM01J:
		  • OCB 1-8 and 7-8 open.
		  • PMG output breaker open.
		• Verify SX Pumps Running:
		  • Check Unit 0 CC HX aligned to Unit 1.
		  • 1CC9473A&B OPEN.
		  • Unit 1 SX pumps – BOTH RUNNING.
		  • Dispatch an operator to energize and open 0/1SX007 to 8000 GPM flow to the Unit 0/1 CC HX, then open the disconnects.

	BOP	• Verify Control Room ventilation aligned for emergency operations at 0PM02J:
		  • VC Rad Monitors – LESS THAN HIGH ALARM SETPOINT.
		  • Operating VC train equipment – RUNNING.
		  • 0B Supply fan
		  • 0B Return fan
		  • 0B M/U fan
		  • 0B Chilled water pump
		  • 0B Chiller
		  • Operating VC train dampers – ALIGNED.
		  • M/U fan outlet damper – 0VC08Y NOT FULLY CLOSED.
		  • 0B VC train M/U filter light – LIT.
		  • 0VC09Y – OPEN.
		  • 0VC313Y – CLOSED.
		  • Operating VC train Charcoal Absorber aligned for train B.
		  • 0VC44Y – CLOSED.
		  • 0VC05Y – OPEN.
		  • 0VC06Y – OPEN.
		  • 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:
		  • 0VA03CB – RUNNING.
		  • 0VA023Y – OPEN.
		  • 0VA436Y – CLOSED.
		  • Plenum C:
		  • 0VA03CF – RUNNING.
		  • 0VA072Y – OPEN.
		  • 0VA438Y – CLOSED.

Scenario No: **18-1 NRC 2** Event No. 7, 8 & 9		
Event Description:	1D RCP seal failure causing an RCS LOCA, 1A SI pump auto-start failure and 1CV8100 fails to auto-close	
Time	Position	Applicant's Actions or Behavior

		• Verify FHB ventilation aligned at 0PM02J:
		  • 0VA04CB – RUNNING.
		  • 0VA055Y – OPEN.
		  • 0VA062Y – OPEN.
		  • 0VA435Y – CLOSED.
		• Shutdown Unnecessary Plant Equipment.
		  • Trip all running HD pumps.
		• Initiate periodic monitoring of Spent Fuel Cooling.
		• Notify SRO Attachment B complete.

	ATC/
	BOP
	
	[CT-7]
		• Verify ECCS pumps running:
		  • Both CV pumps – RUNNING.
		  • Both RH pumps – RUNNING.
		  • SI pumps – NONE RUNNING.
		Manually start 1A SI pump prior to transition out of 1BwEP-0. (Westinghouse – CT-7) (K/A Number – 013 A4.01, Importance – 4.5/4.8)
		  • **Start 1A SI pump.**
		  • Attempt start of 1B SI pump (will NOT start).

	ATC
	
	[CT-11]
		• Perform the following at 1PM06J:
		  • Verify RCFCs running in Accident Mode.
		  • Group 2 RCFC Accident Mode lights – LIT.
		  • Verify Phase A isolation.
		  • Group 3 Cnmt Isol monitor lights – LIT – NO.
		  • Manually actuate Phase A.
		Manually close 1CV8100 before transition out of 1BwEP-0. (Westinghouse – CT-11) (K/A Number – EPE009 EA1.08, Importance – 4.0/4.1)
		  • **Close 1CV8100.**
		  • 1CV8112 will NOT close (located inside Cnmt).
		  • Close 1IA065, 1PS228A/B, 1PR001A and 1CV8152.
		
		• Verify Cnmt Vent isolation.
		  • Group 6 Cnmt Vent Isol monitor lights – LIT.
		• Verify AF system:
		  • AF pumps – BOTH RUNNING.
		  • AF isolation valves – 1AF13A-H OPEN.
		  • AF flow control valves – 1AF005A-H THROTTLED.
		• Verify CC pumps – BOTH RUNNING.
		• Verify SX pumps – BOTH RUNNING.
		• Check if Main Steamline Isolation is required:
		  ○ All S/G pressures > 640 psig (at 1PM04J).
		  ○ CNMT pressure < 8.2 psig.
		• When CNMT pressure is > 8.2 psig, then verify MSIVs & MSIV bypass valves – CLOSED.
		• Check if CS is required:
		  • CNMT pressure has not risen > 20 psig.

Scenario No: **18-1 NRC 2** Event No. 7, 8 & 9		
Event Description:	1D RCP seal failure causing an RCS LOCA, 1A SI pump auto-start failure and 1CV8100 fails to auto-close	
Time	Position	Applicant's Actions or Behavior

	ATC	• Verify total AF flow:
		  • AF flow greater than 500 gpm.
		  • Check SG NR levels not rising in an uncontrolled manner.

	ATC	• Verify ECCS valve alignment at 1PM06J:
		  • Group 2 Cold Leg Injection monitor lights required for injection – LIT.
		• Verify ECCS flow:
		  • High head SI flow > 100 gpm (1FI-917).
		  • RCS pressure < 1700 psig.
		  • 1A SI pump discharge flow > 200 gpm.

	ATC	• Check PZR PORVs and spray valves at 1PM05J:
		  • PORVs – CLOSED.
		  • PORV isol valves – BOTH energized.
		  • PORV relief paths – PORVs in AUTO, PORV isolation valves OPEN.
		  • Normal PZR spray valves – CLOSED.

	ATC/BOP	• Check RCS temperature at 1PM05J:
		  • If RCPs running, RCS Tave stable at or trending to 557°F.
		  • If RCPs not running, RCS cold leg temperatures stable at or trending to 557°F.
		  • Throttle AF flow if RCS temperature is low.

	ATC
	
	[CT-16]
		• Check status of RCPs at 1PM05J (OAS Step, may occur sooner):
		  • All RCPs – RUNNING (if tripped, GO TO next step).
		  • Check RCP trip criteria:
		  ○ RCS pressure > 1425 psig – continue in 1BwEP-0.
		  ○ **RCS pressure < 1425 psig:**
		  • **Verify high head injection flow (1FI-917) > 100 gpm.**
		  • **Trip all RCPs.**

	CREW	• Check if SG secondary pressure boundaries are intact at 1PM04J:
		  • Check pressure in all SGs:
		  • No SG pressure dropping in an uncontrolled manner.
		  • No SG completely depressurized.

	BOP	• Check if SG tubes are intact:
		  • Check the following have remained < alert alarm setpoint at RMS:
		  • 1PR08J, SG Blowdown.
		  • 1PR27J, SJAE/GS Exhaust.
		  • 1AR22/23A-D, 1A-D Main Steam Lines.

	BOP	• Check if RCS is intact:
		  • CNMT area rad monitors > alert alarm setpoint.
		  • CNMT pressure > 3.4 psig (1PI-CS934-937).
		  • CNMT floor drain sump level is > 46 inches (1LI-PC002/003).

	CREW	Transition to 1BwEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT."

Scenario No: **18-1 NRC 2** Event No. 7, 8 & 9		
Event Description:	1D RCP seal failure causing an RCS LOCA, 1A SI pump auto-start failure and 1CV8100 fails to auto-close	
Time	Position	Applicant's Actions or Behavior
		1BwEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT"
	SRO	• Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Request STA evaluation of status trees. • Enter/Implement 1BwEP-1 and direct operator actions of 1BwEP–1.

	ATC/BOP
	
	[CT-16]
		• Check status of RCPs at 1PM05J:
		  • All RCPs – RUNNING (if tripped, GO TO next step).
		  • **Check RCP trip criteria:**
		  ○ **RCS pressure > 1425 psig – continue in 1BwEP-1 (next step).**
		  ○ **RCS pressure < 1425 psig:**
		  ○ **Verify high head injection flow (1FI-917) > 100 gpm.**
		  ○ **Verify SI pump discharge flow >200 gpm.**
		  • **Trip all RCPs.**

	ATC/BOP	• Check if SG secondary pressure boundaries are intact at 1PM04J:
		  • Check pressure in all SGs:
		  • No SG pressure dropping in an uncontrolled manner.
		  • No SG completely depressurized.

	ATC/BOP	• Check intact SG levels at 1PM04J:
		  • SG NR levels > 10% (31% adverse Cnmt).
		  • Control feed flow to maintain NR levels between 10% (31% adverse Cnmt) and 50%.

	ATC/BOP	• Check secondary radiation normal:
		  • Reset CNMT Isolation Phase A if necessary.
		  • Sample all SGs for activity:
		  • Open SG Blowdown Sample Isol valves:
		  • 1SD005A (SG 1A).
		  • 1SD005C (SG 1B).
		  • 1SD005D (SG 1C).
		  • 1SD005B (SG 1D).
		  • Request Chemistry sample all SGs for activity.
		  • Check for secondary radiation trends – Normal for plant conditions:
		  • SJAE/Gland Steam Exhaust Gas radiation, 1PR27J.
		  • SG Blowdown Liquid radiation, 1PR08J.
		  • 1A MS line, 1AR22/1AR23.
		  • 1B MS line, 1AR22/1AR23.
		  • 1C MS line, 1AR22/1AR23.
		  • 1D MS line, 1AR22/1AR23.
		  • Secondary activity samples normal (when available).

	ATC/BOP	• Check PZR PORVs and ISOLATION VALVES at 1PM05J:
		  • PORV isol valves – BOTH energized.
		  • PORVS – BOTH CLOSED.
		  • PORV isol valves – BOTH OPEN.

Scenario No: **18-1 NRC 2** Event No. 7, 8 & 9		
Event Description:	1D RCP seal failure causing an RCS LOCA, 1A SI pump auto-start failure and 1CV8100 fails to auto-close	
Time	Position	Applicant's Actions or Behavior

	ATC/BOP	• Check if ECCS flow should be reduced:
		  • RCS subcooling acceptable (NO).
		  • Determine that ECCS flow is required.

	ATC/BOP	• Check is CS should be stopped: • CS pumps - ANY RUNNING – NO.

	ATC/BOP	• Check if RH pumps should be stopped:
		  • Reset SI if necessary:
		  • Depress both SI reset pushbuttons.
		  • Verify SI ACTUATED permissive light – NOT LIT.
		  • Verify AUTO SI BLOCKED permissive light – LIT.
		  • Check RCS pressure:
		  • Pressure – Greater than 325 psig.
		  • Pressure – Stable or rising.
		  • RH pumps – Any running with suction aligned to RWST.
		  • Stop RH pumps and place in standby.

	ATC/BOP	• Check RCS and SG pressures for faulted SG indications:
		  • Check pressure in all SGs – STABLE or RISING.
		  • Check RCS pressure – STABLE or DROPPING.

	ATC/BOP	• Check if DGs should be stopped:
		  • 4 KV busses – energized by offsite power:
		  • Bus 141.
		  • Bus 142.
		  • Bus 143.
		  • Bus 144.
		  • Stop any unloaded DG and place in standby per BwOP DG-12, DIESEL GENERATOR SHUTDOWN.

	SRO/BOP	• Initiate evaluation of plant status.
		  • Check cold leg recirc capability – BOTH trains available.
		  • Check Aux Bldg rad monitors – NORMAL for plant conditions.
		  • Obtain samples.
		  • Evaluate plant equipment for long term recovery (stop 0A VC chiller).
		  • Start additional plant equipment as directed by SRO.
		  • Check if SR detectors should be energized.

	SRO	• Check if RCS cooldown and depressurization is required.
		  • RCS pressure > 325 psig.
		  • GO TO 1BwEP ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION.

Scenario No: **18-1 NRC 2** Event No. 7, 8 & 9		
Event Description:	1D RCP seal failure causing an RCS LOCA, 1A SI pump auto-start failure and 1CV8100 fails to auto-close	
Time	Position	Applicant's Actions or Behavior
		1BwEP ES-1.2 "POST LOCA COOLDOWN AND DEPRESSURIZATION"
	SRO	• Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Request STA evaluation of status trees. • Enter/Implement 1BwEP ES-1.2 and direct operator actions of 1BwEP ES-1.2.

	BOP/ ATC	• Reset SI if necessary.
		  • Depress both SI reset pushbuttons.
		  • Verify SI ACTUATED permissive light – NOT LIT.
		  • Verify AUTO SI BLOCKED permissive light – LIT.

	BOP	• Reset Cnmt isolation.
		  • Phase A if necessary.
		  • Phase B if necessary.

	BOP	• Establish instrument air to Cnmt.
		  • Check SACs – ANY RUNNING.
		  • OPEN 1IA065 and 1IA066.

	BOP	• Verify all AC busses energized by offsite power.
		  • Busses 141-144.
		  • Busses 156-159.

	ATC
	
	SRO
		• Deenergize PZR heaters.
		  • Place B/U heater contactors in OFF.
		  • Place variable heater C/S in AFTER TRIP.
		  • Consult TSC for recommended minimum indicated water level.

	BOP/ ATC	• Check if RH pumps should be stopped.
		  • RH pumps – any running with suction aligned to RWST.
		  • Check RCS pressure:
		  • Pressure – Greater than 325 psig.
		  • Pressure – Stable or rising (if NO, GO TO next step).
		  • Stop RH pumps and place in standby.

	BOP	• Check intact SG levels.
		  • NR levels > 10% (31% adverse Cnmt).
		  • Control feed flow to maintain NR levels between 10% (31% adverse Cnmt) and 50%.

	CREW	• Initiate RCS cooldown to 200°F.
		  • Maintain cooldown rate in RCS cold legs < 100°F in any 1 hour period.
		  • Check PZR pressure below P-11.
		  • Block steamline SI.
		  • Dump steam using steam dumps/SG PORVs (if needed to supplement current RCS cooldown).

Scenario No: **18-1 NRC 2** Event No. 7, 8 & 9		
Event Description:	1D RCP seal failure causing an RCS LOCA, 1A SI pump auto-start failure and 1CV8100 fails to auto-close	
Time	Position	Applicant's Actions or Behavior
		EXAMINER'S NOTE: At this point in the scenario, all Critical Tasks are complete and the scenario stop criteria has been reached, with Lead Examiner's concurrence, STOP the scenario.

SHIFT MANAGER TURNOVER

DAY/DATE: : 18-1 NRC 2 ONCOMING SHIFT _____

UNIT 1 STATUS	UNIT 0 & 1 MAJOR Clearance Order's
MODE . . . . . .1 Rx Pwr. . . . . .100% Amps Generator MWe. . . . .1254 Max Load / Power. . . 1269 MWe Min Load/Power . . . . 600 MWe Max Ramp Rate. . . . .5 mw/min Desired Delta I . . . . .Target On Line Risk . . . . . .Green Boron @ . . . . . .778 Control Bank. 220	None
SIGNIFICANT LCO, AAR, RETS	**UNIT 0 & 1 MAJOR ACTIVITIES**
None	None
U1 IN PROGRESS / PENDING	**ADMIN and PRIORITIES**
Equilibrium Xenon Preconditioned to 100% power, ARO. All control systems in automatic. Following completion of turnover, Radiation Protection is standing by for a shutdown of the 1PR11J for a filter change. 1FT-543 is OOS for troubleshooting by FIN.	**SAFETY**: **FOCUS AREA**: **Event Free Clocks**: ***Station***: ***Ops*** **Last configuration control event:** **DOSE INFO**: Dose goal for today: **Station Priorities**
SCHEDULED ACTIVITY CONFLICT	

SHIFT MANAGER TURNOVER

UNIT 2 STATUS		UNIT 2 MAJOR Clearance Order's	
MODE	1	None	
Rx Pwr.	100%		
Generator Mwe.	1190		
Max Load / Power . . .	100%		
Min Load/Power	1264 MWe		
Max Ramp Rate.	5mw/min		
Desired Delta I	Target		
Online Risk.	Green		
Boron @	856		
Control Bank.	220		

SIGNIFICANT LCO, AAR, RETS	UNIT 2 MAJOR ACTIVITIES
Nothing	Nothing

UNIT 2 IN PROGRESS	**UNIT 2 PENDING**
Nothing	Nothing

SCHEDULED ACTIVITY CONFLICT

SHIFT MANAGER TURNOVER

NSO's		
	Unit 1	
	U1 Admin	
Layne	Unit 2	
Cavanaugh	U2 Admin	
	X	
	X	
Roesler	Field Sup.	
Mullins	WEC	
	X	
	X	
	X	
	X	
	X	
	X	
	X	
	X	
NLO's		**Circle Appropriate Assignment**
	FIN	X X
Lanka	U-1	SSD FB
Sebby	U-2	SSD FB
Jarman	ROVER	SSD FB
Jenco	MUDS	SSD FB
Ruiz	RW	SSD FB
Ashby	X	SSD FB
Thompson	X	SSD FB
Skrzypiec	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
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	X	SSD FB
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	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
McGaw	RP Tech	
Dobbs	RP Tech	
Gallois, Butch	Chem Tech	

SHIFT MANAGER TURNOVER

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UNIT 1 SUPERVISOR

DAY/DATE **18-1 NRC 2** ONCOMING SHIFT _____

UNIT 1 STATUS	UNIT 1 MAJOR OOS's
MODE .....1 **% Pwr** .....100% amps **MWE** .....1254 **Max Load**.....1269 MWe **Max VARS** .....BwGP Chart **Min Load** .....600 MWe **Max Ramp Rate** .....5 mw/min **Delta I** .....Target **Boron**.....778 **Control Bank D** .....220 **On Line Risk** .....Green	None
UNIT 1 LCOAR / TRM / DEQUIP ENTRIES	UNIT 1 MAJOR SURVEILLANCES and PMs
	None
UNIT 1 AND COMMON IN PROGRESS (INCLUDE PAINTING)	UNIT1 AND COMMON PENDING
Equilibrium Xenon Preconditioned to 100% power, ARO. All control systems in automatic. 1FT-543 is OOS for troubleshooting by FIN.	Following completion of turnover, Radiation Protection is standing by for a shutdown of the 1PR11J for a filter change.

UNIT 1 SUPERVISOR

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UNIT 1 NSO TURNOVER
DATE 18-1 NRC 2 ONCOMING SHIFT

Unit Status

Mode	1	**Max load/Power**	1269 MWe
Power	100% amps	**Max ramp rate**	5 mw/min
MW Elect.	1256	**Safety Systems Status**	Green
Min load/Power	600 MWe	**Control Rod Position**	220
Delta I	Target	**Boron Concentration**	778 ppm

In Progress	Pending
Equilibrium Xenon Preconditioned to 100% power, ARO. All control systems in automatic. 1FT-543 is OOS for troubleshooting by FIN.	Following completion of turnover, Radiation Protection is standing by for a shutdown of the 1PR11J for a filter change.

Long Term

Administrative

Temporary Procedures	
Temporary Alteration	
New Equipment Status Tags	
Unit Logbook	
Unit Routine	
Aux. Electric Room Access	
Daily Orders	

LCOARs	**RETS-AAR**	**DEQUIP**
None		

Turnover Items	
1) NSO Shiftly/Daily Surveillance	
2) SSPS Channels/Bistables	
3) Sys – Safeguards	
4) Sys – Primary	
5) Sys – Balance of the Plant	
6) Alarms – SER/Annunciator	
7) Alarms – Process/RM-11	
8) Alarms – FP/others	
9) Chemistry	
10) Radiation Precautions	
11) Nuclear Instrumentation	
12) MCB Instrumentation	
13) MCB Controllers	
14) Electrical Distribution – AC	
15) Electrical Distribution – DC	
16) BwOP (proc. & step in effect)	

Comments:				
Review		**US**	**WEC/STA**	**SM**
Time:	**Shift**	**Off Going**		
Oncoming personnel has had a change in health status. If yes, inform Supervisor and contact OHS (nurse) ☐ Yes ☐ No				
Date		**Shift**	**Oncoming**	

Simulation Facility	Braidwood	Scenario No.: **NRC 3**	Operating Test No.: **18-1 NRC**
Examiners:	_____	Applicant:	_____ SRO
	_____		_____ ATC
	_____		_____ BOP

Initial Conditions: IC-49

Turnover: Unit 1 is at ~10^{-8} amps in the IR, steady state, xenon-free, BOL. On-line risk is green. Step 26 of 1BwGP 100-2, PLANT STARTUP, is ready to be performed to realign feedwater to the steam generators, 1FW009A-D are closed. Following completion of step 26, continue the startup per the 1BwGP 100-2T1 flowchart.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IMF SW01B IMF RP01 IOR ZDIRT2 NORMAL IMF MS01A 96 IMF MS01B 90 IMF MS01C 93 IMF MS01D 88		1B SX pump trip Auto reactor trip failure 1PM05J reactor trip switch failure 1A-1D MSIVs failed open
1	None	N-BOP N-SRO	Realign feedwater to the Steam Generators
2	None	R-ATC R-SRO	Withdraw control rods to 2%-3% power
3	IMF RX15inc RAISE	I-ATC I-SRO	Master Pressurizer Pressure Controller (1PK-0455A) setpoint fails high
4	IMF NI06B -11 IMF PN2174 ON IOR ZLO1NYN36DS202 ON	T-SRO	IRNI channel N-36 fails low (loss of detector voltage)
5	IOR ZDI1CV8401A CLS	C-ATC C-SRO	1CV8401A (1A letdown HX inlet valve) fails closed
6	IOR ZDI1WO01PA TRIP DOR ZDI1WO01PA	C-BOP C-SRO	1A Containment Chilled Water pump trip
7	IMF SW01A IMF SW01B (preload)	T-SRO	1A SX pump trip with 1B SX pump failure to manually start
8	IMF MS07C 4	M-All	Uncontrolled depressurization of all Steam Generators
9	Preload	C-ATC C-SRO	Auto reactor trip failure with 1PM05J reactor trip switch failure

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

SCENARIO OVERVIEW

Unit 1 is at ~10^{-8} amps in the IR, steady state, xenon-free, BOL. On-line risk is green. Step 26 of 1BwGP 100-2, PLANT STARTUP, is ready to be performed to realign feedwater to the steam generators, 1FW009A-D are closed. Following completion of step 26, continue the startup per the 1BwGP 100-2T1 flowchart.

After completing shift turnover and relief, the crew will perform step 26 of 1BwGP 100-2 to realign feedwater to the Steam Generators. The BOP will perform the procedure and realign feedwater with peer checks from the ATC as appropriate.

Once feedwater is realigned, the SRO will direct the ATC to raise reactor power to 2-3%. The crew will follow the plant startup flowchart, 1BwGP 100-2T1, and perform step 27 to withdraw control rods until 2-3% reactor power is reached. The ATC will maintain reactor power at 2-3% by adjusting RCS Boron concentration or rod position as required.

After the crew has stabilized reactor power at 2-3%, the Master PZR Pressure Controller (1PK-0455A) setpoint fails high. The SRO will direct the ATC to respond per BwAR 1-12-C1. The ATC will place the controller, 1PK-455A, in manual and maintain PZR pressure in the desired band.

Once the crew has stabilized PZR pressure, IRNI channel N-36 will fail low due to a loss of detector voltage. The crew will enter 1BwOA INST-1, NI MALFUNCTION, and address the failed IRNI channel. The SRO will enter Tech Spec 3.3.1 Conditions A and F.

After the IRNI failure Tech Spec determination is made, 1CV8401A, 1A letdown HX inlet valve, will fail closed isolating letdown flow. The ATC will respond to the malfunction and will complete the letdown isolation per 1BwPR 1-9-LD. The crew will restore letdown flow through the 1B letdown HX using BwOP CV-17 & CV-22.

After letdown is restored, the 1A Containment Chilled Water pump will trip. The 1A Containment Chilled Water pump trip causes a trip of the 1A Containment Chiller. The crew will start the standby 1B Containment Chilled Water pump and Chiller per BwOP VP-1. Containment pressure and temperature will slowly rise with the loss of Containment cooling. The US should refer to Tech Spec 3.6.4 and 3.6.5.

After the crew has started the 1B Containment Chilled Water Pump, the 1A SX pump will trip. The SRO will direct the BOP to respond to the SX pump trip per 1BwPR 1-2-A1. The BOP will attempt to start the 1B SX pump, but the 1B SX pump will not start. The BOP will continue the prompt response actions and request Unit 2 to crosstie SX between the units. The crew will dispatch an EO to investigate the 1A and 1B SX pump trips. The SRO will enter Tech Spec 3.7.8 Condition A for both SX pumps and LCO 3.0.3.

After the SRO determines a unit shutdown is required by LCO 3.0.3, the 1C SG will become faulted, main steam line isolation will fail and the automatic reactor trip will fail. The 1C steamline break will generate a reactor trip signal, but the automatic reactor trip will not function. The crew will manually trip the reactor from 1PM06J (1PM05J Rx trip switch will not work), verify reactor trip, initiate SI, attempt to close the MSIVs and enter 1BwEP-0. The crew will continue through 1BwEP-0 and transition to 1BwEP-2 with 4 faulted SGs. Once the crew determines that all MSIVs are failed open, the crew will transition to 1BwCA-2.1. The crew will throttle AF flow to each SG to 45 gpm. Scenario completion criteria is when both RH pumps are placed in standby in 1BwCA-2.1.

Critical Tasks:

1. Manually trip the reactor from the control room before transitioning out of 1BwEP-0. (Westinghouse – CT-1) (K/A Number – EPE007 EA2.02, Importance – 4.3/4.6)
2. Manually control AF flowrate to not less than 45 gpm per SG to minimize the RCS cooldown rate before a severe (Orange path) challenge develops to the integrity CSF. (Westinghouse – CT-33) (K/A Number – EPE E12 EA2.2, Importance – 3.4/3.9)

SIMULATOR SETUP GUIDE

- Verify/perform TQ-BR-201-0113, BRAIDWOOD TRAINING DEPARTMENT SIMULATOR EXAMINATION SECURITY ACTIONS CHECKLIST.
- Reset to IC-49 (PW = 181nrc3), 10^{-8} amps in the IR, xenon free, BOL OR use the IC written below.
- Open SmartScenario file **18-1 NRC 3.ssf** from the thumb drive and place the ssf in run.
- Release the **SETUP** command box.
- Ensure the simulator is in RUN (allow simulator to run during board walk down and turnover).
- Verify 0A & 0C VA plenums in-service, 0B VA plenum in standby.
- Complete items on Simulator Ready for Training Checklist.
- Verify/remove any Equipment Status Tags and Danger Tags not applicable to the scenario.
- Ensure the 1A SX pump is running with the 1B SX pump in standby.
- Verify/enter the following items:

IMF SW01B	1B SX pump trip
IMF RP01	Auto reactor trip failure
IOR ZDIRT2 NORMAL	1PM05J reactor trip switch failure
IMF MS01A 96	1A-1D MSIVs failed open
IMF MS01B 90	
IMF MS01C 93	
IMF MS01D 88	

- Verify SER printer is clear of data.
- If desired, write an IC after all of the set-up actions are completed. This IC may be used for running the scenario on additional simulator groups.
- Provide students with turnover sheets.
- Provide turnover of unit status to oncoming crew.
- Verify Unit 2 SAC is running and all SA/IA annunciators are clear.

Event 1: Realign feedwater to the Steam Generators

As the EO, when asked, report 1FW041A-D are open.

Event 2: Withdraw control rods to 2%-3% power

As SM, if asked to suspend the 3 step rod withdrawal limit, ask for and use the SRO recommendation.

As SM, acknowledge the start and completion of the power change.

If asked, the Mode Change Checklist is complete for Mode 2 to Mode 1.

Event 3: Master Pressurizer Pressure Controller (1PK-0455A) setpoint fails high

Release ssf command box Event 3.

Ensure **MF RX15inc RAISE** is inserted to fail the Master Pressurizer Pressure Controller setpoint high.

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

Event 4: IRNI channel N-36 fails low (loss of detector voltage)

Release ssf command box Event 4.

Ensure **MF NI06B -11, MF PN2174 ON and OR ZLO1NYN36DS202 ON** are inserted to fail IRNI channel N-36 low.

As SM, acknowledge the procedure entry, EAL evaluation, request for maintenance support & IR request.

Event 5: 1CV8401A (1A letdown HX inlet valve) fails closed

Release ssf command box Event 5.

Ensure **OR ZDI1CV8401A CLS** is inserted to fail 1CV8401A closed.

If asked as the SM, flushing the 1B letdown HX is NOT required.

If dispatched as an EO to investigate 1CV8401A, report that 1CV8401A appears normal. If asked, 1CV8467B is already open.

As EO/WEC/FS, if asked, 1B letdown HX is already filled and vented.

When dispatched as an EO to swap Letdown HXs, per BwOP CV-22, release ssf command box Event 5 HX Valve Operations.

- Ensure **RF CC37 0** is inserted on HOLD in SmartSummary – close 1A Letdown HX CC inlet valve (1CC9452A).
- Ensure **RF CC39 100** is inserted on HOLD in SmartSummary – open 1B Letdown HX CC inlet valve (1CC9452C).

As SM, acknowledge the failure, request for maintenance support and IR request.

Event 6: 1A Containment Chilled Water Pump trip

Release ssf command box Event 6.

Ensure **OR ZDI1WO01PA TRIP, then DOR ZDI1WO01PA** are inserted to trip the 1A Containment Chilled Water pump.

If dispatched as EO to investigate 1A Chilled Water pump breaker, wait 2 minutes and report the breaker tripped free. The 1A Cnmt Chiller breaker is open with NO flags.

If dispatched as EO to investigate 1A Chilled Water pump, wait 3 minutes and report the pump motor smells acrid and there is a haze above the motor (no fire). Cause of 1A Containment Chiller trip is EVAP LOW WATER FLOW.

If asked as EO, report 1TIS-WO018 reads 44ºF.

As SM, acknowledge the trip of 1A Containment Chilled Water pump and Chiller, on-line risk assessment, maintenance support and IR initiation.

If asked as SM, direct the crew to start the 1B Cnmt Chiller remotely from the MCR rather than locally (reason is to limit time frame to restore Containment cooling).

As EO, provide local operator actions for starting the 1B Containment Chilled Water Pump and Chiller (BwOP VP-1):

- (step F.2) As EO, Oil Heater Breaker is on. If contacted as WEC supervisor, the WEC is tracking 1B Chiller Oil Heater energization time.
- (step F.5) Pump suction pressure is 22 psig. WO Expansion Tank level is 55%.
- (step F.7) 1WO005B is throttled. 1FIS-WO027 indicates 3000 gpm.
- (step F.8) Chiller Oil level is 50% in the sightglass.
- (step F.9) Lamp test was satisfactory for all light bulbs.
- (step F.10) Chiller oil temperature is 145°F and Low Oil Temp alarm NOT lit locally.

- (step F.11) Electrical Demand Selector is in the 60% demand position, Capacity Control switch is in AUTO and Program timer ONE division mark on the wheel of the zero mark.
- (step F.12) LCD on the purge control unit displays “ADAPTIVE” mode.
- (step F.13) RESET pushbutton has been depressed for 2 seconds, no trip lights are lit.
- (step F.15) IF asked to start the Chiller locally, report that the Local/Remote transfer switch is physically stuck in the REMOTE position (the intent is for the MCR to start the chiller per step F.16).
- (step F.16) Report that as EO that you are standing by the 1B Containment Chiller, ready for a remote start (START/STOP Switch is in STOP; Local/Remote switch is in REMOTE).
- (step F.17) The Program Timer Light at the Local Control Panel is lit.
- Report that you (EO) will complete the remaining local steps (F.18 – F.30).

Event 7: 1A SX pump trip with 1B SX pump failure to manually start

Release ssf command box Event 7.

Ensure **MF SW01A** is inserted to cause the 1A SX pump to trip.

When requested as U-2 to perform 2BwPR 2-2-A1 actions, release ssf command box 2SX005.

Ensure **RF SW07 100** in inserted to open 2SX005.

Then report that BOTH U-2 SX pumps are running, 2SX005 is open and request U-1 to open 1SX005 (already open).

If dispatched as an EO to investigate 1A SX pump breaker, wait 2 minutes and report Phase A overcurrent flag on 1A SX pump breaker cubicle (Bus 141, cubicle 2). If dispatched to check 1B SX pump, report 1B SX pump breaker has NO targets up.

If dispatched as an EO to investigate 1A and 1B SX pumps, wait 3 minutes and report no damage or abnormal conditions at either pump. Both pumps are NOT rotating, if asked.

If contacted as Rad Waste Operator, report no abnormal Aux Building sump indications.

If asked as U-2 NSO, 2SX033 and 2SX034 are open.

If contacted as U-2 NSO, report 2A/2B SX pump amps are 160 amps each, each pump's SX discharge pressure is 95 psig and U-2 CC HX outlet temperature, 2TI-674, is 84°F.

If contacted as EO to check the 1A Containment Chiller, report the chiller tripped on high condenser pressure. If asked, 1A Cnmt Chiller is ready for a restart.

As SM, acknowledge the trip of 1A and 1B SX pumps, Tech Spec 3.7.8 Condition A and Tech Spec 3.0.3 entry, requests for on-line risk assessment, maintenance support and IR initiation.

Event 8: Uncontrolled depressurization of all Steam Generators

Release ssf command box Event 8.

Ensure **MF MS07B 4** is inserted to cause a large steam break inside Cnmt.

As SM, acknowledge the failure, procedure transitions, EAL evaluation and STA request.

When requested to monitor DG operation, release ssf command box DG Check.

Ensure **RF EG06 RESET** is inserted to reset 1A DG alarms.
Ensure **RF EG12 RESET** is inserted to reset 1B DG alarms.

When requested to open 0/1SX007 to obtain **4000 GPM**, release ssf command box SX007 Throttling – 4000 gpm – 0/1SX007.

Ensure **RF SW01 22** is inserted to open 0SX007 to 22%.
Ensure **RF SW02 22** is inserted to open 1SX007 to 22%.

After the STA is requested, as STA report CSF status: RED Path on heat sink when AF throttled to 45 gpm per SG, ORANGE path on integrity if RCS cold leg temperature < 240°F.

Event 9: Auto reactor trip failure with 1PM05J reactor trip switch failure (preload)

As SM, acknowledge the failure, procedure transitions, EAL evaluation and STA request.

Scenario No: **18-1 NRC 3** Event No. 1		
Event Description: Realign feedwater to the Steam Generators		
Time	Position	Applicant's Actions or Behavior
	CUE	• From turnover, perform step 26 of 1BwGP 100-2.
	SRO	• Direct BOP to realign feedwater to the SGs.
	BOP	• Verify/close FW Reg Bypass valves, 1FW510A-540A. • Verify/close FW Reg valves, 1FW510-540. • Check SG pressure ~ equal to FW inlet pressure, P0403/23/43/63. • Dispatch EO to verify/open SG Low Flow FW Isol Upstream Isol valves, 1FW041A-D. • OPEN Low Flow FW Isol valves, 1FW039A-D, at 1PM04J. • Control SG levels using the FW Reg Bypass valves in manual or auto. • Notify SRO that FW is realigned.
	ATC	• Provide peer checks. • Monitor reactor power.
	SRO	• Acknowledge report of FW realignment.
		EXAMINER'S NOTE: After feedwater is aligned to the SGs, insert the next event.

Scenario No: **18-1 NRC 3** Event No. 2		
Event Description: Withdraw control rods to 2%-3% power		
Time	Position	Applicant's Actions or Behavior
	CUE	• From turnover, perform step 27 of 1BwGP 100-2.
	SRO	• Direct ATC to withdraw rods to raise reactor power to 2%-3%. ○ The crew may dilute in addition to using control rods.
	ATC	• Move rods out a maximum of three steps at a time (SM/SRO may suspend the 3-step withdrawal limit until the POAH is reached per 1BwGP 100-8). • Monitor reactor power and slowly raise reactor power. • Stabilize reactor power at ~ 2%-3% (use rods to level power, as needed). • Notify the SRO when reactor power is 2%-3%. • Initiate 1BwOS NR-1.
	BOP	• Provide peer checks. • Monitor the steam dumps and SG levels.
	SRO	• Acknowledge report from ATC. ○ Notify SM that reactor power is 2%-3%.
		EXAMINER'S NOTE: After reactor power is stable at 2%-3% and with Lead Examiner's concurrence, insert next event.

Scenario No: **18-1 NRC 3** Event No. 3		
Event Description: Master Pressurizer Pressure Controller (1PK-0455A) setpoint fails high		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-12-C1, PZR PRESS CONT DEV LOW HTRS ON • Master Pressurizer Pressure Controller output lowers. • PZR pressure rises.
	SRO	• Direct the ATC to review/perform BwAR 1-12-C1 actions.
	ATC	Reference BwAR 1-12-C1 and perform the following at 1PM05J: • MONITOR PZR pressure and level channels. • VERIFY PZR spray valves closed. • CHECK PZR heaters for proper operation. • CONTROL PZR pressure manually to RESTORE PZR pressure to normal. • Take manual control of 1PK-0455A.
	SRO	• Acknowledge report of 1PK-0455A failure and manual PZR pressure control. • Establish a critical parameter for PZR pressure. • Notify SM of Master Pressurizer Pressure Controller failure. • Notify SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct failure.
	BOP	• Monitor remainder of MCBs.
		EXAMINER'S NOTE: After the ATC has stabilized PZR pressure and with Lead Examiner's concurrence, insert next event.

Scenario No: **18-1 NRC 3** Event No. 4		
Event Description: IRNI channel N-36 fails low (loss of detector voltage)		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-10-B2, IR HIGH VOLT FAILURE • IRNI channel N-36 fails low at 1PM05J/1PM07J. • TSLB-4 "IR BELOW P-6 N36D" light lit. • IRNI channel N-36 LOSS OF DETECTOR VOLT light lit at 1PM07J.
	ATC	• Determine IRNI channel N-36 is failed low and inform SRO.
	SRO	• Recognize entry conditions for 1BwOA INST-1, NUCLEAR INSTRUMENTATION MALFUNCTION. • Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Enter/implement 1BwOA INST-1, Attachment B, and direct operator actions to establish the following conditions:
	ATC	• Check if IR required: • Bypass permissive light P10 – LIT.

	SRO	• Determine power limitations:
		  • Check IR channels – ONLY ONE FAILED.
		  • Check reactor power – GREATER THAN 10^{-10} AMPS.
		  • Perform the following WITHIN 2 HOURS:
		  ○ Reduce reactor power < 10^{-10} amps.
		  - OR -
		  ○ Raise reactor power > 10%.

	SRO	• Enter Tech Spec 3.3.1 Conditions A and F. • Notify SM to perform risk assessment, initiate IR, evaluate reactivity screening, notify QNE and notify maintenance to investigate/correct the failure.
	BOP	• Monitor remainder of MCBs.
		EXAMINER'S NOTE: After the IRNI failure Tech Specs are determined and with Lead Examiner's concurrence, insert next event.

Scenario No: **18-1 NRC 3** Event No. 5		
Event Description: 1CV8401A (1A letdown HX inlet valve) fails closed		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-9-B1, LP LTDWN RLF TEMP HIGH • Letdown flow drops to zero on 1FI-132 at 1PM05J. • 1CV8401A indicates closed.

	ATC	• Determine letdown has isolated.
		• Perform the actions of 1BwPR 1-9-LD, LETDOWN MALFUNCTION PROMPT RESPONSE:
		  • Close 1CV8149A-C.
		  • Close 1CV459 and 1CV460.
		  • Adjust charging flow to a minimum required for seal injection flow:
		  • Throttle 1CV121.
		  • Close 1CV182.
		  • Reference BwAR 1-9-B1 and perform the following at 1PM05J:
		  • Verify 1CV131 operating properly.
		  • Monitor VCT level and PRT level.
		  • Verify proper valve lineup.
		  • Initiate corrective actions (restore letdown).

	ATC	○ Refer to BwARs, as time permits.
	BOP	• Monitor remainder of MCBs. ○ Dispatch EO to investigate 1CV8401A.
	SRO	• Notify SM of plant status. • Request SM evaluation of Emergency Plan conditions. • Notify the SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct failure.
		EXAMINER'S NOTE: The crew will restore letdown via the 1B letdown HX per BwOP CV-22, OPERATION OF LETDOWN & REGEN HEAT EXCHANGERS and BwOP CV-17, ESTABLISHING AND SECURING NORMAL AND RH LETDOWN FLOW.

	ATC/BOP	• Swap letdown heat exchangers in accordance with BwOP CV-22, OPERATION OF LETDOWN & REGEN HEAT EXCHANGERS:
		  • Contact operators to locally align and establish CC flow to 1B LD HX and vent 1B letdown HX.
		  • Place letdown HX temperature controller in MANUAL.
		  • Dispatch EO to verify/open 1CV8467B, Letdown HX 1B outlet valve.
		  • Open 1CV8401B, Letdown HX 1B inlet valve, at 1PM05J.
		  • Place 1CV8401A, Letdown HX 1A inlet valve, C/S to CLOSE at 1PM05J.
		  • Contact an EO to locally slowly close:
		  • 1CC9452A, Letdown HX 1A CC inlet isolation valve.

	ATC/BOP	• Perform the following at 1PM05J to establish normal letdown flow through the 1B letdown heat exchanger in accordance with BwOP CV-17, ESTABLISHING AND SECURING NORMAL AND RH LETDOWN FLOW:
		  • Verify/close 1CV8149A, B, & C, letdown orifice isolation valves.
		  • Contact operators to locally verify CC aligned to 1B letdown HX (previously performed).

Scenario No: **18-1 NRC 3** Event No. 5		
Event Description: 1CV8401A (1A letdown HX inlet valve) fails closed		
Time	Position	Applicant's Actions or Behavior
		• Place 1PK-0131, letdown line pressure controller, in manual and raise demand to 40%. • Place 1TK-0130, letdown HX outlet temperature controller, in manual and raise demand to 60%. • Verify/open 1CV8152 & 1CV8160, letdown line CNMT isolation valves. • Open 1CV459 & 1CV460, letdown line isolation valves. • Verify/open 1CV8324A, charging to regen HX 1A isolation valve. • Verify/open 1CV8389A, letdown to regen HX 1A isolation valve. • Verify OFF light is lit above BTRS mode selector C/S. • Verify/open 1CV8401B, letdown HX 1B inlet valve. • Verify/closed 1CV8145, PZR aux spray valve. • Verify/open 1CV8147, charging to loop 1A isolation valve. • Open 1CV8105 & 1CV8106, charging line CNMT isolation valves. • Control 1FK-121, CV pumps flow control valve, in manual to raise charging flow to 100 gpm while concurrently adjusting 1CV182, charging header backpressure control valve, to control RCP seal injection 8-10 gpm per RCP. • Open 1CV8149A/B/C, letdown orifice isolation valves, as necessary to establish desired letdown flow while concurrently and controlling 1PK-131, letdown line pressure controller, in manual to maintain letdown pressure 360-380 psig. *(Should place 120 gpm letdown in service.)* • Adjust 1TK-0130, letdown HX outlet temperature controller, to maintain letdown temperature 90-115°F. • Place 1FK-121, 1LK-0459, 1PK-131 & 1TK-0130 in auto when plant conditions allow. • Verify 1PR06J in service at the RMS console.
	SRO	• Notify SM of plant status. • Refer to Tech Spec 3.4.13.
		EXAMINER'S NOTE: After letdown is restored via the 1B letdown HX and with Lead Examiner's concurrence, insert next event.

Scenario No: **18-1 NRC 3** Event No. 6		
Event Description: 1A Containment Chilled Water pump trip		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 0-33-D3, CNMT CHLR UNIT TROUBLE • 1A Chilled Water pump trip light – LIT. • 1A Containment Chiller trip light – LIT.
	SRO	• Direct BOP to start 1B Containment Chilled Water Pump and Chiller. • Notify SM of 1A Cnmt Chilled Water pump trip. • Request SM evaluation of Emergency Plan conditions. ○ Evaluate Containment temperature and pressure against Tech Specs 3.6.4 and 3.6.5.
	BOP	• Determine 1A Cnmt Chiller and Chilled Water pump tripped. • Reference BwAR 0-33-D3 (dispatch EO to Cnmt Chiller/Chilled Water pump). ○ Place 1A Chilled Water Pump/Chiller C/S in PTL. • Start 1B Containment Chilled Water Pump and Chiller per BwOP VP-1, RCFC REFRIGERATION UNIT AND CHILLED WATER SYSTEM STARTUP.

	BOP	**BwOP VP-1 Actions:**
		• Direct EO to locally energize oil heaters and notify WEC to track energization time of heaters - verify heaters energized for 1B VP chiller.
		• Verify OPEN:
		  • 1SX112B, Cnmt Chiller SX Inlet Vlv.
		  • 1SX114B, Cnmt Chiller SX Outlet Vlv.
		  • 1SX147B, Cnmt Chiller SX Bypass Vlv.
		  • 1SX016B, RCFC SX Supply Vlv @ 1PM06J.
		  • 1SX027B, RCFC SX Return Vlv @ 1PM06J.
		• Verify OPEN @ 1PM06J:
		  • 1WO006B, 1B + 1D Chill Wtr Inlet Cnmt Isol Vlv.
		  • 1WO020B, 1B + 1D Chill Wtr Outlet Cnmt Isol Vlv.
		  • 1WO056B, 1B + 1D Chill Wtr Outlet Cnmt Isol Vlv.
		• Direct local EO to perform steps F.5 (verify pump suction pressure and Expansion Tank level).
		• Start 1WO01PB, Chilled Water Pump at 0PM02J.
		• Direct EO to locally complete BwOP VP-1 steps F.7 - F.13.
		• Verify/place 1SX147B, 1B Byp Isol Vlv, in AUTO at 0PM02J.
		• Start the 1B Containment Chiller from the MCR:
		  • Direct EO to locally verify START/STOP switch in STOP and Local/Remote switch in REMOTE and record initial data locally.
		  • Place 1WO01CB, Chiller 1B Control Switch, at 0PM02J to AFTER CLOSE. *(chiller will start ~51 seconds later)*
		• Direct EO to locally complete steps F.17 to F.30.

	SRO	• Notify SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct the failure.
		EXAMINER'S NOTE: After the actions for the 1A Containment Chilled Water pump trip are complete and with Lead Examiner's concurrence, insert next event.

Scenario No: **18-1 NRC 3** Event No. 7		
Event Description: 1A SX pump trip with 1B SX pump failure to manually start		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-2-A1, SX PUMP TRIP • Annunciator 1-2-A2, SX PUMP DSCH HDR PRESS LOW • 1A SX pump trip light lit.

	BOP	• Determine that 1A SX pump has tripped and inform the SRO.
		• Refer to 1BwPR 1-2-A1.
		  • Attempt start of 1B SX pump.
		  • Request U-2 NSO perform 2BwPR 2-2-A1, step 2.
		  • U-2 will start 2nd SX pump and open 2SX005.
		  • U-2 will request U-1 to open 1SX005 (already open).
		  • Request SRO enter 1BwOA PRI-8, SX MALFUNCTION.
		○ Review BwAR 1-2-A1 for SX pump trip:
		  ○ Verify voltage on all 3 phases of bus 141 > 3990 volts.
		  ○ Place 1A and 1B SX pumps C/S to PTL.

	CREW	• Crew may elect to enter 1BwOA PRI-8 "ESSENTIAL SERVICE WATER MALFUNCTION." • Dispatch EOs to investigate status of 1A and 1B SX pump and breaker.
		1BwOA PRI-8 "ESSENTIAL SERVICE WATER MALFUNCTION" if required
	SRO	• *Notify SM of plant status and procedure entry.* • *Request SM evaluation of Emergency Plan conditions.* • *Enter/implement 1BwOA PRI-8 and direct operator actions to establish the following conditions:*

	ATC	• *Monitor RCP seal cooling:*
		  • *At least one of the following available:*
		  ○ *Seal injection flow to all RCPs.*
		  ○ *RCP thermal barrier CC water flow low alarms not lit.*
		  • *Monitor RCP temperatures:*
		  • *Motor bearing < 195°F.*
		  • *Lower radial bearing < 225°F.*
		  • *Seal outlet < 235°F.*

	SRO	• *Check for excessive leakage in Aux Building:*
		  • *Contact Radwaste to monitor Aux Building sumps.*
		  • *Annunciator SX PUMP SUCT VLV PIT LEVEL HIGH (1-2-D2) – NOT LIT.*

	BOP	• *Check status of SX pumps at 1PM06J:*
		  • *NONE running – GO TO Attachment B.*
		• *Start an additional U-2 SX pump (already performed).*
		• *Crosstie SX system (already performed).*
		• *Monitor U-2 SX system:*
		  • *U-2 SX pump motor amps < 180 amps.*
		  • *U-2 SX pump discharge pressure > 90 psig.*
		  • *CC HX outlet temperature < 105°F.*
		• *Check chiller operation:*
		  • *At least ONE MCR chiller running.*
		  • *Restart 1B Cnmt chiller.*

Scenario No: **18-1 NRC 3** Event No. 7		
Event Description: 1A SX pump trip with 1B SX pump failure to manually start		
Time	Position	Applicant's Actions or Behavior

		• *Check status of SX system at 1PM06J:*
		  • *Annunciator SX PUMP SUCT PRESS LOW (1-2-C1) – NOT LIT.*
		  • *Annunciator SX STRN DP HIGH (1-2-C2) – NOT LIT.*
		  • *Annunciator SX PUMP DSCH HDR PRESS LOW (1-2-A2) – NOT LIT.*
		  • *Annunciator SX PUMP DSCH HDR TEMP HIGH LOW (1-2-B2) – NOT LIT.*
		  • *1A & 1B SX pumps – NOT ROTATING.*
		• *Check for SX leakage into containment at 1PM06J:*
		  • *Annunciator CNMT DRAIN LEAK DETECT FLOW HIGH (1-1-A2) – NOT LIT.*
		• *Check CC outlet temperatures < 105°F at 1PM06J (1TI-674, 0TI-675).*
		• *Check RCP cooling at 1PM05J:*
		  • *Annunciator RCP THERM BARR CC WTR TEMP HIGH (1-7-E3) – NOT LIT.*
		  • *Annunciator RCP BRNG CC WTR TEMP HIGH (1-7-E5) – NOT LIT.*

	SRO	• Notify the SM of the status of the 1A and 1B SX pumps. • Enter Tech Spec 3.7.8 Condition A and Tech Spec 3.0.3 (plant shutdown required). • Notify the SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct failure.
		EXAMINER'S NOTE: After the actions for the 1A SX pump trip are complete and with Lead Examiner's concurrence, insert next event.

Scenario No: **18-1 NRC 3** Event No. 8 & 9		
Event Description:		Uncontrolled depressurization of all Steam Generators, Auto reactor trip failure with 1PM05J reactor trip switch failure
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-11-E1, CNMT PRESS HIGH SI/RX TRIP • All SG pressures dropping. • RCS Tave dropping. • Reactor trip breakers remain closed.
	SRO	• Direct ATC to trip the reactor.
	SRO	• Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Enter/Implement 1BwEP-0 and direct the following operator actions of 1BwEP-0.

	ATC
	
	[CT-1]
		Perform immediate operator actions of 1BwEP-0 at 1PM05J:
		• Verify reactor trip:
		  • Rod bottom lights – NOT LIT.
		Manually trip the reactor from the control room before transition out of 1BwEP-0. (Westinghouse – CT-1) (K/A Number - EPE007 EA2.02, Importance - 4.3/4.6)
		  • **Manually trip the reactor (1PM06J)** (1PM05J Rx trip switch will not work).
		  • Reactor trip & Bypass breakers – OPEN.
		  • Neutron flux – DROPPING.
		• PR channels < 5%.
		• IR SUR is negative.

	BOP	Perform immediate operator actions of 1BwEP-0:
		• Verify turbine trip:
		  • All Turbine throttle valves – CLOSED.
		  • All Turbine governor valves – CLOSED.

	BOP	Perform immediate operator actions of 1BwEP-0 at 1PM01J: • Verify power to 4 KV busses: • ESF Buses – BOTH ENERGIZED (141 & 142).

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

	SRO	• Direct BOP to perform Attachment B of 1BwEP-0
		EXAMINER'S NOTE: SRO and ATC will continue in 1BwEP-0 while BOP is performing Attachment B.

Scenario No: **18-1 NRC 3** Event No. 8 & 9		
Event Description:		Uncontrolled depressurization of all Steam Generators, Auto reactor trip failure with 1PM05J reactor trip switch failure
Time	Position	Applicant's Actions or Behavior

	BOP	**1BwEP-0 ATTACHMENT B:**
		• Verify FW isolated at 1PM04J:
		  • FW pumps – TRIPPED.
		  • FW isolation monitor lights – LIT.
		  • FW pumps discharge valves - CLOSED (or going closed) 1FW002A-C.
		• Verify DGs running at 1PM01J:
		  • DGs – BOTH RUNNING.
		  • 1SX169A/B OPEN.
		  • Dispatch operator locally monitor DGs operation.
		• Verify Generator Trip at 1PM01J:
		  • OCB 1-8 and 7-8 open (NO – open breakers 1-8 and 7-8).
		  • PMG output breaker open.
		• Verify SX pumps running:
		  • Check Unit 0 CC HX aligned to Unit 1.
		  • 1CC9473A&B – OPEN.
		  • Unit 1 SX pumps – NO U-1 SX PUMPS RUNNING.
		  • Dispatch an operator to energize and open 0/1SX007 to 4000 GPM flow to the Unit 0/1 CC HX, then open the disconnects.

	BOP	• Verify Control Room ventilation aligned for emergency operations at 0PM02J:
		  • VC Rad Monitors – LESS THAN HIGH ALARM SETPOINT.
		  • Operating VC train equipment – RUNNING.
		  • 0B Supply fan
		  • 0B Return fan
		  • 0B M/U fan
		  • 0B Chilled water pump
		  • 0B Chiller
		  • Operating VC train dampers – ALIGNED.
		  • M/U fan outlet damper – 0VC08Y NOT FULLY CLOSED.
		  • 0B VC train M/U filter light – LIT.
		  • 0VC09Y – OPEN.
		  • 0VC313Y – CLOSED.
		  • Operating VC train Charcoal Absorber aligned for train B.
		  • 0VC44Y – CLOSED.
		  • 0VC05Y – OPEN.
		  • 0VC06Y – OPEN.
		  • Control Room pressure greater than +0.125 inches water on 0PDI-VC038.
		• Verify Auxiliary Building ventilation aligned for emergency operation at 0PM02J:
		  • Two inaccessible filter plenums aligned.
		  • Plenum A:
		  • 0VA03CB – RUNNING.
		  • 0VA023Y – OPEN.
		  • 0VA436Y – CLOSED.
		  • Plenum C:
		  • 0VA03CF – RUNNING.
		  • 0VA072Y – OPEN.
		  • 0VA438Y – CLOSED.

Scenario No: **18-1 NRC 3** Event No. 8 & 9		
Event Description:		Uncontrolled depressurization of all Steam Generators, Auto reactor trip failure with 1PM05J reactor trip switch failure
Time	Position	Applicant's Actions or Behavior

		• Verify FHB ventilation aligned at 0PM02J:
		  • 0VA04CB – RUNNING.
		  • 0VA055Y – OPEN.
		  • 0VA062Y – OPEN.
		  • 0VA435Y – CLOSED.
		• Shutdown Unnecessary Plant Equipment.
		  • Trip all running HD pumps.
		• Initiate periodic monitoring of Spent Fuel Cooling.
		• Notify SRO Attachment B complete.

	ATC/ BOP	• Verify ECCS pumps running:
		  • Both CV pumps – RUNNING.
		  • Both RH pumps – RUNNING.
		  • Both SI pumps – RUNNING.

	ATC	• Perform the following at 1PM06J:
		  • Verify RCFCs running in Accident Mode:
		  • Group 2 RCFC Accident Mode lights –LIT.
		  • Verify Phase A isolation:
		  • Group 3 Cnmt Isol monitor lights – LIT.
		  • Verify Cnmt Vent isolation:
		  • Group 6 Cnmt Vent Isol monitor lights – LIT.
		  • Verify AF system:
		  • AF pumps – BOTH RUNNING.
		  • AF isolation valves – 1AF13A-H OPEN.
		  • AF flow control valves – 1AF005A-H THROTTLED.
		  • Verify CC pumps – BOTH RUNNING.
		  • Verify SX pumps – NO U-1 SX PUMPS RUNNING.

	ATC	• Check if Main Steamlines should be Isolated:
		  • CNMT pressure > 8.2 psig OR SG pressure < 640 psig.
		• Verify MS isolation:
		  • MSIVs are open (will NOT close).
		
		• Manually actuate MS isolation.
		  • ALL MSIVs remain open.
		  • Place control switches to close for ALL MSIVs (ALL MSIVs remain open).

	CREW	• Determine and announce containment is adverse when containment pressure rises above 5 psig.

	ATC	• Check if CS is required
		  • CNMT pressure > 20 psig.
		  • Group 6 CS monitor lights – LIT.
		  • Group 6 Phase B monitor lights – LIT.
		  • Stop all RCPs.
		  • Check CS eductor suction flows > 15 gpm.

Scenario No: **18-1 NRC 3** Event No. 8 & 9		
Event Description:		Uncontrolled depressurization of all Steam Generators, Auto reactor trip failure with 1PM05J reactor trip switch failure
Time	Position	Applicant's Actions or Behavior
		• Check CS eductor additive flows > 5 gpm.

	ATC	• Verify total AF flow:
		  • AF flow > 500 gpm.
		  • Check SG NR levels – NOT rising in an uncontrolled manner.

	ATC	• Verify ECCS valve alignment at 1PM06J:
		  • Group 2 Cold Leg Injection monitor lights required for injection – LIT.
		• Verify ECCS flow:
		  • High head SI flow > 100 gpm (1FI-917).
		  • RCS pressure < 1700 psig.
		  • SI pump discharge flows > 200 gpm.
		  • RCS pressure > 325 psig.

	ATC	• Check PZR PORVs and spray valves at 1PM05J:
		  • PORVs – CLOSED.
		  • PORV isol valves – BOTH energized.
		  • PORV relief paths – PORVs in AUTO, PORV isolation valves OPEN.
		  • Normal PZR spray valves – CLOSED.

	ATC/BOP	• Check RCS temperature at 1PM05J:
		  • If RCPs running, RCS Tave stable at or trending to 557˚F (NO).
		  • If RCPs not running, RCS cold leg temperatures stable at or trending to 557˚F (NO).
		  • Throttle AF flow if temperature is low.
		  ○ Crew may throttle AF flow to 45 gpm per SG.

	ATC	• Check status of RCPs at 1PM05J:
		  • RCPs – ANY RUNNING (If NO, go to next step).
		  • ECCS flow:
		  • High head SI flow (1FI-917) > 100 gpm.
		  • SI pump discharge flow (1FI-918/922) > 200 gpm.
		  • RCS pressure < 1425 psig.
		  • Trip all RCPs when RCS pressure is < 1425 psig.

	CREW	Check if SG secondary pressure boundaries are intact: • Check NO SG depressurizing uncontrollably or completely depressurized. • ALL SG pressures dropping in an uncontrolled manner.
	CREW	Transition to 1BwEP-2 "FAULTED STEAM GENERATOR ISOLATION."
		1BwEP-2 "FAULTED STEAM GENERATOR ISOLATION"
	SRO	• Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Request STA evaluation of status trees. • Enter/implement 1BwEP-2 and direct operator actions of 1BwEP–2 to establish the following conditions:

Scenario No: **18-1 NRC 3** Event No. 8 & 9		
Event Description:		Uncontrolled depressurization of all Steam Generators, Auto reactor trip failure with 1PM05J reactor trip switch failure
Time	Position	Applicant's Actions or Behavior
	BOP	• Check Main Steamline Isolation: • ALL MSIVs remain open (manual MS line isolation previously attempted).

	CREW	• Check if any SG secondary pressure boundary intact:
		  • No SG pressure stable or rising.
		  • ALL SGs depressurizing in an uncontrolled manner.
		  • GO TO 1BwCA-2.1 "UNCONTROLLED DEPRESSURIZATION OF ALL SGs."

	CREW	Transition to 1BwCA-2.1 "UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS."
		1BwCA-2.1 "UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS"
	SRO	• Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Enter/implement 1BwCA-2.1 and direct operator actions of 1BwCA–2.1 to establish the following conditions:

	BOP	• Check secondary pressure boundary:
		  • MSIVs open – attempt to close (previously attempted).
		  • MSIV bypass valves – CLOSED.
		  • SG PORVs – CLOSED.
		  • Check FW isolation monitor lights – LIT.
		  • Check 1SD002A-H – CLOSED.
		  • Check 1SD005A-D – CLOSED.

		EXAMINER'S NOTE: Throttling AF flow to 45 gpm per SG will result in a RED path on the heat sink status tree and require a transition to 1BwFR-H.1 "RESPONSE TO LOSS OF SECONDARY HEAT SINK." 1BwFR-H.1 will be entered and immediately exited due to operator action lowering AF flow to < 500 gpm.

	BOP
	
	[CT-33]
		• Control feed flow to minimize RCS cooldown.
		  • Check cooldown rate in RCS cold legs < 100°F in any 1 hour period – NO.
		Manually control AF flowrate to not less than 45 gpm per SG to minimize the RCS cooldown rate before a severe (Orange path) challenge develops to the Integrity CSF.
		(Westinghouse – CT-33) (K/A Number - EPEE12 EA2.2, Importance – 3.4/3.9)
		  • **Throttle AF flow to 45 gpm per SG.** (may have been performed in 1BwEP-0)
		  • Check RCS hot leg temperatures – Stable or dropping.
		• Check RCPs – NONE RUNNING.
		• Check PZR PORVs and Isolation Valves:
		  • PORV Isolation Valves – BOTH energized.
		  • PORVs – BOTH closed.
		  • PORV Isolation Valves – BOTH open.

Scenario No: **18-1 NRC 3** Event No. 8 & 9		
Event Description:		Uncontrolled depressurization of all Steam Generators, Auto reactor trip failure with 1PM05J reactor trip switch failure
Time	Position	Applicant's Actions or Behavior

	BOP	• Check Secondary Radiation:
		  • Reset Phase A.
		  • Open 1SD005A-D.
		  • Request Chemistry to periodically sample all SGs for activity.
		  • Check secondary radiation trends on RMS or PPC – ALL NORMAL.
		• Check if RH pumps should be stopped:
		  • RH pumps - BOTH running with suction to RWST.
		  • If RCS pressure > 325 psig and pressure is stable or rising:
		  • Reset SI and stop RH pumps/place in standby.

		EXAMINER'S NOTE: At this point in the scenario, all Critical Tasks are complete and the scenario stop criteria has been reached, with Lead Examiner's concurrence, STOP the scenario.

SHIFT MANAGER TURNOVER

DAY/DATE: : 18-1 NRC 3 ONCOMING SHIFT _____

UNIT 1 STATUS	UNIT 0 & 1 MAJOR Clearance Order's
MODE . . . . . .1 Rx Pwr. . . . . .1E-8 Amps Generator MWe. . . . .0 Max Load / Power. . . 1269 MWe Min Load/Power . . . . 600 MWe Max Ramp Rate. . . . .5 mw/min Desired Delta I . . . . .Target On Line Risk . . . . . .Green Boron @ . . . . . .1287 Control Bank. 150	None
SIGNIFICANT LCO, AAR, RETS	**UNIT 0 & 1 MAJOR ACTIVITIES**
None	None
U1 IN PROGRESS / PENDING	**ADMIN and PRIORITIES**
Equilibrium Xenon Preconditioned to 100% power, ARO. All control systems in automatic. Perform Step 26 of 1BwGP 100-2, PLANT STARTUP, to realign feedwater to the steam generators, 1FW009A-D are closed. Following completion of step 26, continue the startup per the 1BwGP 100-2T1 flowchart.	**SAFETY**: **FOCUS AREA**: **Event Free Clocks**: ***Station***: ***Ops*** **Last configuration control event:** **DOSE INFO**: Dose goal for today: **Station Priorities**
SCHEDULED ACTIVITY CONFLICT	

SHIFT MANAGER TURNOVER

UNIT 2 STATUS		UNIT 2 MAJOR Clearance Order's	
MODE	1	None	
Rx Pwr.	100%		
Generator Mwe.	1190		
Max Load / Power . . .	100%		
Min Load/Power	1264 MWe		
Max Ramp Rate.	5mw/min		
Desired Delta I	Target		
Online Risk.	Green		
Boron @	856		
Control Bank.	220		

SIGNIFICANT LCO, AAR, RETS	UNIT 2 MAJOR ACTIVITIES
Nothing	Nothing

UNIT 2 IN PROGRESS	**UNIT 2 PENDING**
	Nothing

SCHEDULED ACTIVITY CONFLICT

SHIFT MANAGER TURNOVER

NSO's		
	Unit 1	
	U1 Admin	
Layne	Unit 2	
Cavanaugh	U2 Admin	
	X	
	X	
Roesler	Field Sup.	
Mullins	WEC	
	X	
	X	
	X	
	X	
	X	
	X	
	X	
	X	
NLO's		**Circle Appropriate Assignment**
	FIN	X X
Lanka	U-1	SSD FB
Sebby	U-2	SSD FB
Jarman	ROVER	SSD FB
Jenco	MUDS	SSD FB
Ruiz	RW	SSD FB
Ashby	X	SSD FB
Thompson	X	SSD FB
Skrzypiec	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
McGaw	RP Tech	
Dobbs	RP Tech	
Gallois, Butch	Chem Tech	

SHIFT MANAGER TURNOVER

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UNIT 1 SUPERVISOR

DAY/DATE **18-1 NRC 3** ONCOMING SHIFT _____

UNIT 1 STATUS	UNIT 1 MAJOR OOS's
MODE .....1 **% Pwr** .....1E-8 amps **MWE** .....0 **Max Load**.....1269 MWe **Max VARS** .....BwGP Chart **Min Load** .....600 MWe **Max Ramp Rate** .....5 mw/min **Delta I** .....Target **Boron**.....1287 **Control Bank D** .....150 **On Line Risk** .....Green	None
UNIT 1 LCOAR / TRM / DEQUIP ENTRIES	UNIT 1 MAJOR SURVEILLANCES and PMs
	None
UNIT 1 AND COMMON IN PROGRESS (INCLUDE PAINTING)	UNIT1 AND COMMON PENDING
Equilibrium Xenon Preconditioned to 100% power, ARO. All control systems in automatic.	Perform Step 26 of 1BwGP 100-2, PLANT STARTUP, to realign feedwater to the steam generators, 1FW009A-D are closed. Following completion of step 26, continue the startup per the 1BwGP 100-2T1 flowchart.

UNIT 1 SUPERVISOR

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UNIT 1 NSO TURNOVER
DATE 18-1 NRC 3 ONCOMING SHIFT

Unit Status

Mode	1	**Max load/Power**	1269 MWe
Power	1E-8 amps	**Max ramp rate**	5 mw/min
MW Elect.	1256	**Safety Systems Status**	Green
Min load/Power	600 MWe	**Control Rod Position**	150
Delta I	Target	**Boron Concentration**	1287 ppm

In Progress	Pending
Equilibrium Xenon Preconditioned to 100% power, ARO. All control systems in automatic.	Perform Step 26 of 1BwGP 100-2, PLANT STARTUP, to realign feedwater to the steam generators, 1FW009A-D are closed. Following completion of step 26, continue the startup per the 1BwGP 100-2T1 flowchart.

Long Term

Administrative

Temporary Procedures	
Temporary Alteration	
New Equipment Status Tags	
Unit Logbook	
Unit Routine	
Aux. Electric Room Access	
Daily Orders	

LCOARs	**RETS-AAR**	**DEQUIP**
None		

Turnover Items	
1) NSO Shiftly/Daily Surveillance	
2) SSPS Channels/Bistables	
3) Sys – Safeguards	
4) Sys – Primary	
5) Sys – Balance of the Plant	
6) Alarms – SER/Annunciator	
7) Alarms – Process/RM-11	
8) Alarms – FP/others	
9) Chemistry	
10) Radiation Precautions	
11) Nuclear Instrumentation	
12) MCB Instrumentation	
13) MCB Controllers	
14) Electrical Distribution – AC	
15) Electrical Distribution – DC	
16) BwOP (proc. & step in effect)	
Comments:	

Review		US	WEC/STA	SM
Time:	Shift	Off Going		
Oncoming personnel has had a change in health status. If yes, inform Supervisor and contact OHS (nurse) ☐ Yes ☐ No				
Date	Shift	Oncoming		

Simulation Facility	Braidwood	Scenario No.: **NRC Spare**	Operating Test No.: **18-1 NRC**
Examiners:	_____	Applicant:	_____ SRO
	_____		_____ ATC
	_____		_____ BOP

Initial Conditions: IC-16

Turnover: Unit 1 is at 53%, steady state, Equilibrium Xenon, MOL. On-line risk is green. Following turnover, the Unit 1 SX pumps will be swapped per BwOP SX-7 to allow for Unit 2 surveillance testing. EOs are briefed and standing by for the SX pump swap.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IOR ZDI1VP01CDV NORMAL IMF CH01D IMF TH11A 0 IMF TH11B 0 Trigger 1 (RP:SI(1) .EQ. TRUE) IOR ZDI1IA066 CLS IOR ZLO1IA0661 OFF IRF ED053C OPEN		Fail 1D RCFC vibration reset pushbutton 1D low speed RCFC trip Both PZR PORVs fail closed SI actuation trigger 1IA066 fails closed on SI 1AF013A breaker trips on SI
1	None	N-BOP N-SRO	Swap Unit 1 SX pumps
2	SET CH:1VSVP003D = F SET CH:1VSVP003D = T	C-BOP C, T-SRO	1D high speed RCFC high vibration
3	IMF RX21A 2500	T-SRO	PZR pressure channel, 1PT-455, fails high
4	IMF RX17B FALSE IMF RX17A TRUE	C-ATC C-SRO	Rod Control failure results in auto rod withdrawal
5	IMF CV19 IMF d6mod131c12f ALARM	C-ATC C-SRO	1CV112A diverts letdown flow to the HUT
6	IOR ZDI1OG02PA TRIP DOR ZDI1OG02PA	C-BOP C-SRO	1A GS Condenser Exhauster fan trip
7	IMF TH08 .001	R-ATC N-BOP R, T-SRO	High RCS activity requiring plant shutdown
8	IMF TH03A 650 IMF TH11A/B 0 (preload)	M-All	1A SGTR with loss of PZR pressure control
9	Preload	C-ATC C-SRO	1AF013A breaker trips on SI

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

SCENARIO OVERVIEW

Unit 1 is at 53%, steady state, Equilibrium Xenon, MOL. On-line risk is green. Following turnover, the Unit 1 SX pumps will be swapped per BwOP SX-7 to allow for Unit 2 surveillance testing. EOs are briefed and standing by for the SX pump swap.

After completing shift turnover and relief, the crew will perform BwOP SX-7 to swap Unit 1 SX pumps. The BOP will swap SX pumps by starting the 1B SX pump, then stopping the 1A SX pump using peer checks as appropriate.

After the SX pump swap is complete, the 1D high speed RCFC will develop a high vibration condition. The BOP will respond using BwAR 1-3-C5 and stop the 1D RCFC. The SRO will enter Tech Spec 3.6.6 Condition C.

After the SRO has evaluated Tech Specs for the 1D RCFC vibration, PZR pressure channel, 1PT-455, will fail high. The crew will respond to the 1PT-455 failure and the SRO will enter 1BwOA INST-2. The crew will remove 1PT-455 from service in Ovation and request to bypass bistables (no NSOs are currently available, 2 hour delay). The SRO will enter Tech Spec 3.3.1 Conditions A, E & K; 3.3.2 Conditions A & D and 3.3.4 Condition A.

Once the SRO has evaluated Tech Specs from the 1PT-455 failure, an automatic rod control failure will cause rods to step out. The SRO will order the ATC to respond per 1BwPR 1-10-RD. The ATC will place rods in manual to stop the rod withdrawal. The SRO will enter 1BwOA ROD-1 to address the rod control failure. Rods will remain in Manual control for the remainder of the scenario.

After the plant is stabilized from the rod control failure, a 1CV112A failure will divert letdown flow to the HUT. 1CV112A will fail and divert letdown flow to the HUT requiring the ATC to place the 1CV112A control switch to the VCT position. If VCT level lowers to the automatic makeup setpoint (37%) before action is taken, an automatic VCT makeup will not occur, and a manual VCT makeup will be required.

Once the crew has restored letdown flow to the VCT, the 1A GS Condenser Exhauster fan will trip. The 1A GS Condenser Exhauster fan trips and the BOP will start the 1B GS Condenser Exhauster fan per BwAR 1-18-A8/BwOP GS-7 to prevent water intrusion into the main generator oil system.

Following the 1A GS Condenser Exhauster fan trip, high RCS activity will occur requiring unit shutdown. The BOP will respond to an RMS alarm for the 1PR06J and inform the SRO. The SRO will enter 1BwOA PRI-4 to address the high RCS activity. The SRO will direct Chemistry to sample the RCS for activity. The sample results will show dose equivalent I-131 at 84 µCi/gm. The SRO will enter Tech Spec 3.4.16 Conditions A and C and commence a unit shutdown.

After sufficient reactivity control is demonstrated, the 1A SG will develop a tube rupture. The BOP will respond to the main steamline rad monitor alarm. The ATC will determine that PZR level is lowering > 2% per minute. The SRO will direct the ATC to trip the reactor, verify reactor trip, insert an SI and enter 1BwEP-0. Following the reactor trip, 1IA066 will fail closed and the 1AF013A breaker will trip. The crew will transition to 1BwEP-3 to address the SGTR. The ATC will isolate AF to the 1A SG by closing 1AF005A and dispatch an EO to locally fail air and close the valve. The crew will not be able to establish PZR pressure control in 1BwEP-3 and will transition to 1BwCA-3.3, SGTR WITHOUT PRESSURE CONTROL. Scenario completion criteria is when high head ECCS is secured.

Critical Tasks:

1. Isolate feedwater flow into and steam flow from the ruptured SG before transition to 1BwCA-3.1 occurs. (Westinghouse – CT-18) (K/A number – EPE038 EA1.32, Importance – 4.6/4.7)
2. Establish/maintain RCS temperature so that transition from 1BwEP-3 does not occur because the RCS temperature is too high (1BwCA-3.1) or too low (1BwFR-P.1). (Westinghouse – CT-19) (K/A number – EPE038 EA1.36, Importance – 4.3/4.5)
3. Terminate SI before ruptured SG PORV or safety valve water release. (Westinghouse – CT-35) (K/A Number – EPE038 EA1.30, Importance – 4.0/3.8)

SIMULATOR SETUP GUIDE

- Verify/perform TQ-BR-201-0113, BRAIDWOOD TRAINING DEPARTMENT SIMULATOR EXAMINATION SECURITY ACTIONS CHECKLIST.
- Reset to IC-16, 53% power, steady state, equilibrium Xenon, MOL OR use the IC written below.
- Open SmartScenario file **18-1 NRC Spare.ssf** from the thumb drive and place the ssf in run.
- Release the **SETUP** command box.
- Ensure the simulator is in RUN (allow simulator to run during board walk down and turnover).
- Verify 1A GS Condenser Exhauster fan running, 1B GS Condenser Exhauster fan in standby.
- Verify 0A & 0C VA plenums in-service, 0B VA plenum in standby.
- Complete items on Simulator Ready for Training Checklist.
- Verify/remove any Equipment Status Tags and Danger Tags not applicable to the scenario.
- Verify/enter the following items:

IOR ZDI1VP01CDV NORMAL	Fail 1D RCFC vibration reset pushbutton
IMF CH01D	1D low speed RCFC trip
IMF TH11A 0	Both PZR PORVs fail closed
IMF TH11B 0	
Trigger 1	SI actuation trigger
IOR ZDI1IA066 CLS	1IA066 fails closed on SI
IOR ZLO1IA0661 OFF	
IRF ED053C OPEN	1AF013A breaker trips on SI

- Open SimView file "**SGTR**" to monitor void fraction on outlet of SG (1A SG PORV/safety valve water release).
- Verify SER printer is clear of data.
- If desired, write an IC after all of the set-up actions are completed. This IC may be used for running the scenario on additional simulator groups.
- Provide students with turnover sheets and copy of BwOP SX-7.
- Provide turnover of unit status to oncoming crew.
- Shutdown the 1B MFP.

Event 1: Swap Unit 1 SX pumps

When requested as an EO to start/stop both SX pumps aux lube oil pumps, release ssf command box Event 1.

Ensure **RF SW03 ON** is inserted on HOLD in SmartSummary – start/stop the 1A SX pump aux lube oil pump.
Ensure **RF SW04remf ON** is inserted on HOLD in SmartSummary – start/stop the 1B SX pump aux lube oil pump.

If asked as an EO, all 0SX115 valves are open.

As an EO, report a good start of the 1B SX pump and a good shutdown of the 1A SX pump (NO suction header vibrations are occurring, if asked).

When requested as an EO, report 1B SX pump lube oil temperature at 100°F, seal leakage is sat, bearing bracket drain holes not plugged, good oil flow in bearing oil return sightglass and 1SX01FB, 1B SX strainer, control switch in AUTO.

When requested as an EO, after the 1A SX pump is stopped, report 1A SX pump is NOT rotating (shaft is stopped).

When requested as an EO, acknowledge request to place SX chemical injection system in operation on 1B SX train.

As SM, acknowledge the SX pump swap completion.

Event 2: 1D high speed RCFC high vibration

Release ssf command box Event 2.

Ensure **SET CH:1VSVP003D = F, then SET CH:1VSVP003D = T** are inserted to cause a 1D RCFC high vibration condition.

As SM, acknowledge the report of 1D RCFC high vibration, entry into Tech Spec 3.6.6 Condition C, on-line risk assessment, request for maintenance support and IR request.

Event 3: PZR pressure channel, 1PT-455, fails high

Release ssf command box Event 3.

Ensure **MF RX21A 2500** is inserted to fail 1PT-455 high.

As SM, when NSO support for bypassing bistables is requested, report that bistables are not to be bypassed until NSO support can be obtained in ~ 2 hours and that the abnormal operating procedure should be continued.

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

Event 4: Rod Control failure results in auto rod withdrawal

Release ssf command box Event 4.

Ensure **MF RX17B FALSE and MF RX17A TRUE** are inserted to cause unexpected auto rod withdrawal.

If dispatched as an EO to the Rod Control cabinets, report no abnormal indications are present.

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

If consulted as SM for status of manual or auto rod control, report that manual rod control is available, auto rod control requires IMD troubleshooting.

Event 5: 1CV112A diverts letdown flow to the HUT

Release ssf command box Event 5.

Ensure **MF CV19 and MF d6mod131c12f ALARM** are inserted to cause 1CV112A to divert letdown flow to the HUT.

As SM, acknowledge the failure(s) and requests for on-line risk assessment, maintenance support and IR initiation.

If dispatched, EO reports NO issues found at 1CV112A.

Event 6: 1A GS Condenser Exhauster fan trip

Release ssf command box Event 6.

Ensure **OR ZDI1OG02PA TRIP, then DOR ZDI1OG02PA** are inserted to trip the 1A GS Condenser Exhauster fan.

As SM, acknowledge the 1A GS Condenser Exhauster fan trip, on-line risk assessment, request for maintenance support and IR request.

As an EO, as requested, report the following:

- Completed BwOP GS-7, steps F.1.a through F.1.e - **NO simulator action required to re-position 1OG028A/B/29A/B.**
- 1B GS Condenser Exhauster fan had a good start.
- Opened 1OG028B (1B GS Condenser Exhauster fan inlet valve).
- No cause can be determined for the 1A GS Condenser Exhauster fan trip.
- Main Turbine Turbo-Toc Oil Purifier is already running per BwOP TO-24.

If dispatched as an EO, report that the 1A GS Condenser Exhauster fan breaker is TRIPPED FREE (MCC 133V4 Cub A4).

Event 7: High RCS activity requiring plant shutdown

NOTE: From malfunction insertion until the 1st RMS alarm is ~4-5 minutes.

Release ssf command box Event 7.

Ensure **MF TH08 .001** is inserted to raise RCS activity.

As SM, acknowledge high RCS activity, procedure entry, EAL review, Tech Spec entry, request for Nuclear Engineer and the plant shutdown requirement.

As Chemistry, acknowledge RCS sample request. Five (5) minutes after request to sample, give the following results: DE I-131 = 84 µCi/gm, DE XE-133 = 75 µCi/gm and mixed bed decon factor is 65 (acceptable). Acknowledge that Chemistry has made all required notifications (if asked).

As Chemistry/Rad Protection, acknowledge requests for samples during shutdown (if required).

As TSO, acknowledge the initiation of ramp.

Event 8: 1A SGTR with loss of PZR pressure control

Release ssf command box Event 8.

Ensure **MF TH03A 650** is inserted to cause a 650 gpm SGTR on the 1A SG.

As SM, acknowledge procedure transitions, EAL evaluation and STA request.

When requested to monitor DG operation, release ssf command box DG Check.

Ensure **RF EG06 RESET** is inserted to reset 1A DG alarms.
Ensure **RF EG12 RESET** is inserted to reset 1B DG alarms.

When requested to open 0/1SX007 to obtain **8000 GPM**, release ssf command box SX007 Throttling – 8000 gpm – 0/1SX007.

Ensure **RF SW01 60** is inserted to open 0SX007 to 60%.
Ensure **RF SW02 60** is inserted to open 1SX007 to 60%.

If asked, as SM or FS, inform the crew that the fuses for 1IA066 are blown, replacement fuses blew immediately.

Event 9: 1AF013A breaker trips on SI (preload)

As SM, acknowledge procedure transitions, EAL evaluation and STA request.

When dispatched as an EO to locally close 1AF005A, wait 4 minutes, then release ssf command box Event 9.

Ensure **RF FW171 0** is inserted to locally close 1AF005A.

Scenario No: **18-1 NRC Spare** Event No. 1		
Event Description:		Swap Unit 1 SX pumps
Time	Position	Applicant's Actions or Behavior
	CUE	• From turnover, swap SX pumps per BwOP SX-7, SWAPPING ESSENTIAL SERVICE WATER PUMPS.
	SRO	• Direct BOP to perform BwOP SX-7. ○ Peer check actions of BOP.
	BOP	Refer to BwOP SX-7 and perform the following actions: • Verify/Open 1SX001B, 1B SX Pump Suction Valve. • Verify/Open 1SX0016B, RCFC 1B/1D SX Inlet Valve and 1SX027B, RCFC 1B/1D SX Outlet Valve. • Contact EO to start the 1A & 1B SX pump aux lube oil pumps. • Start 1B SX pump at 1PM06J. • Check amps on 1A & 1B SX pumps approx. equal. • Stop 1A SX pump at 1PM06J. • Check 1B SX pump discharge pressure < 112 psig. • Request EO check 1B SX pump lube oil temperature, seal leakage, bearing bracket drain holes not plugged, oil flow in bearing oil return sightglass and 1SX01FB, 1B SX strainer, control switch in AUTO. • Request EO check 1A SX pump NOT rotating from reverse flow. • Contact EO to stop the 1A & 1B SX pump aux lube oil pumps. • Verify 4 RCFCs are running. • Maintain 1SX027A open. • Monitor CC HX temperatures and throttle 0/1SX007 as needed. • Contact EO to place SX chemical injection system in operation on 1B SX train. • Inform SRO that BwOP SX-7 is complete.
	SRO	• Acknowledge SX pump swap report. ○ Notify SM that BwOP SX-7 is complete.
	ATC	• Monitor remainder of MCBs. ○ Peer check actions of BOP.
		EXAMINER'S NOTE: After the actions for swapping SX pumps are complete and with Lead Examiner's concurrence, enter next event.

Scenario No: **18-1 NRC Spare** Event No. 2		
Event Description: 1D high speed RCFC high vibration		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-3-C5, RCFC VIBRATION HIGH • HIGH VIB light for 1D RCFC is lit and its RESET light is NOT lit.

	BOP	• Reference BwAR 1-3-C5 and perform the following at 1PM06J:
		  • Determine 1D RCFC is the affected RCFC.
		  • Stop 1D high speed RCFC.
		• Recommend and place the 1D RCFC high and low speed control switches in PTL.
		• Monitor containment pressure and temperature.

	SRO	• Report 1D RCFC high vibration to the SM.
	ATC	• Monitor remainder of MCBs.
	SRO	• Enter Tech Spec 3.6.6 Condition C. • Notify SM of Tech Spec 3.6.6 entry. • Notify SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct the 1D RCFC failure.
		EXAMINER'S NOTE: After the actions for the 1D RCFC vibration are complete and with Lead Examiner's concurrence, enter next event.

Scenario No: **18-1 NRC Spare** Event No. 3		
Event Description: PZR pressure channel, 1PT-455, fails high		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-12-A2, PZR PRESS HIGH RX TRIP STPT ALERT • Annunciator 1-10-E4, OVATION SYSTEM TROUBLE • PZR pressure meter, 1PI-455A, failed high.
	ATC	• Identify/report failure of 1PT-455.
	CREW	• Identify entry conditions for 1BwOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL."
	BOP	• Monitor remainder of MCBs. ○ Refer to BwARs, as time permits.
	SRO	• Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Enter/Implement "1BwOA INST-2, Attachment B, PRESSURIZER PRESSURE CHANNEL FAILURE, and direct operator actions of 1BwOA INST-2 to establish the following conditions:

	ATC	• Check PZR pressure normal.
		• Check PZR PORVs, spray valves and heaters at 1PM05J:
		  • PZR PORVs closed.
		  • PZR spray valves normal.
		  • PZR heaters normal.
		• Check P11 interlock at 1PM05J:
		  • PZR pressure > 1930 psig – PERMISSIVE P11 light – NOT LIT.

	BOP/ATC	• Remove the failed PZR pressure channel from service:
		  • Select OWS graphic 6100.
		  • Select PZR PRESSURE in signal selectors box and enable the window.
		  • Place 1PT-455 out of service.
		  • Exit window.
		  • Select OWS graphic 6020.
		  • Select OTDT in signal selectors box and enable the window.
		  • Place RC-TY-0411G out of service.
		  • Exit window.

	ATC	• Check PZR pressure control in auto at 1PM05J:
		  • PZR PORV 1RY455A.
		  • PZR PORV 1RY456.
		  • PZR spray valve 1RY455B.
		  • PZR spray valve 1RY455C.
		  • Master PZR pressure controller 1PK-0455A.

	ATC	• Select an operable PZR pressure channel to recorder:
		  • Select OWS graphic 6020.
		  • Select DT, OPDT, OTDT RECORDER and enable the window.
		  • Select an operable channel (Loop B, C or D).
		  • Exit window.

Scenario No: **18-1 NRC Spare** Event No. 3		
Event Description: PZR pressure channel, 1PT-455, fails high		
Time	Position	Applicant's Actions or Behavior
	SRO	• Contact SM for bypassing bistables (will be delayed for 2 hours).
	SRO	• Enter Tech Spec 3.3.1 Conditions A, E, and K; 3.3.2 Conditions A and D and 3.3.4 Condition A. • Notify SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct instrument failure.
		EXAMINER'S NOTE: After the 1PT-455 failure Tech Specs are determined and with Lead Examiner's concurrence, enter next event.

Scenario No: **18-1 NRC Spare** Event No. 4		
Event Description: Rod Control failure results in auto rod withdrawal		
Time	Position	Applicant's Actions or Behavior
	CUE	• Control rod outward motion. • RODS OUT light lit at 1PM05J.

	ATC	• Identify control rods withdrawing with no valid reason.
		• Report failure to US.
		• Perform 1BwPR 1-10-RD, ROD CONTROL MALFUNCTION PROMPT RESPONSE, actions:
		  • Check turbine power stable.
		  • Place rod bank select switch to manual at 1PM05J.
		  • Check if rods are still moving (NO).
		  • Inform SRO to enter 1BwOA ROD-1, as required.

	SRO	• Notify SM of plant status and procedure entry. • Request SM to evaluate Emergency Plan conditions. • Enter/implement 1BwOA ROD-1, UNCONTROLLED ROD MOTION, and direct operator actions of 1BwOA ROD-1 to establish the following conditions:
	BOP	• Check turbine power stable. ○ Refer to BwARs, as time permits.

	ATC	• Check rod control status at 1PM05J:
		  • Rod bank select switch in manual (previously performed).
		  • Check rods stopped moving.
		• Check rod control inputs – OPERABLE (PRNI, RCS loop Tave, turbine 1st stage pressure, DEH impulse pressure, Tref).
		• Check for unexplained reactivity addition – none identified.

	SRO	• Consult with Shift Manager for status of manual rod control (available).
	ATC	• Check manual rod control operable: • Step rods IN 7 steps, then OUT 7 steps. • Restore Tave - Tref deviation to within 1°F by adjusting rod position, turbine load or boron concentration.
	SRO	• Consult with Shift Manager for status of automatic rod control (NOT available). • Refer to Tech Specs (none are applicable).
	SRO	• Notify SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct rod control failure.
		EXAMINER'S NOTE: After the actions for the auto rod withdrawal failure are complete and with Lead Examiner's concurrence, insert next event.

Scenario No: **18-1 NRC Spare** Event No. 5		
Event Description: 1CV112A diverts letdown flow to the HUT		
Time	Position	Applicant's Actions or Behavior
	CUE	• 1CV112A diverts to HUT. • VCT level lowering at 1PM05J. • Automatic VCT makeup does NOT actuate at 37%. • Annunciator 1-9-A2, VCT LEVEL HIGH-HIGH LOW (if VCT level < 20%).
	ATC	• Determine 1CV112A has repositioned to the HUT.
	BOP	○ Dispatch EO to investigate 1CV112A.
	SRO	• Notify SM of plant status.
	ATC	• Take manual control of VCT level at 1PM05J: • Place 1CV112A control switch to the VCT position.

	ATC	○ If annunciator 1-9-A2 alarms, reference BwAR 1-9-A2 and perform the following at 1PM05J:
		  • Determine that VCT level is low (1LI-112 & 1LR-0185).
		  • Determine that 1A CV pump is NOT cavitating.
		  • Place 1CV112A control switch to the VCT position.
		  • Restore VCT level via manual makeup per BwOP CV-7.
		  • Check PZR level trend and VCT relief valve for malfunction.

	SRO	• Notify SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct failure.
		EXAMINER'S NOTE: After the actions for the 1CV112A failure are complete and with Lead Examiner's concurrence, insert next event.

Scenario No: **18-1 NRC Spare** Event No. 6		
Event Description: 1A GS Condenser Exhauster fan trip		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-18-A8, GS CNDSR AIR EXHAUSTER TRIP • 1A GS Condenser Exhauster fan trip light lit.
	SRO	• Notify SM of 1A GS Condenser Exhauster fan trip.

	BOP	Reference BwAR 1-18-A8 and perform the following at 1PM02J:
		• Start 1B GS Condenser Exhauster fan per BwOP GS-7:
		  • Dispatch EO to perform steps F.1.a through F.1.e.
		  • Start the 1B GS Condenser Exhauster fan at 1PM02J.
		  • Dispatch EO to open 1OG028B (1B GS Condenser Exhauster fan inlet valve).
		• Monitor condenser vacuum.
		• Dispatch EO to determine cause of the tripped 1A GS Condenser Exhauster fan.
		• Dispatch EO to verify/start the Main Turbine Turbo-Toc Oil Purifier per BwOP TO-24.
		• Dispatch EO to verify 1B GS Condenser Exhauster fan had a good start.
		o Place the 1A GS Condenser Exhauster fan in PTL.

	SRO	• Acknowledge report of GS Condenser Exhauster fan status. • Notify SM of start of 1B GS Condenser Exhauster fan. • Contact SM to perform risk assessment, initiate IR and contact maintenance to investigate/correct fan failure.
		EXAMINER'S NOTE: After the actions for starting the 1B GS Condenser Exhauster fan are complete and with Lead Examiner's concurrence, insert next event.

Scenario No: **18-1 NRC Spare** Event No. 7		
Event Description: High RCS activity requiring plant shutdown		
Time	Position	Applicant's Actions or Behavior
	CUE	• High alarm on gross failed fuel rad monitor, 1PR06J, at RMS. ○ High alarm on containment atmosphere monitor, 1PR11J, at RMS.
	CREW	• Identify entry conditions for 1BwOA PRI-4, HIGH REACTOR COOLANT ACTIVITY.
	SRO	• Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Enter/implement 1BwOA PRI-4 and direct the following operator actions of 1BwOA PRI-4:
	SRO	• Check RCS activity. • Notify Chemistry to calculate DF for letdown mixed bed demineralizer and to sample for dose equivalent I-131 and noble gas activity. • Notify Rad Protection to monitor Aux Building radiation.
	ATC	• Verify 120 gpm letdown flow.
	SRO	• Consult with Reactor Engineering for operational guidance. • Enter Tech Spec 3.4.16 Conditions A & C. • Determine unit shutdown required. ○ Enter Tech Spec 3.4.15 Condition B if 1PR11J particulate and gas channel status changes to red (high alarm). • Check letdown mixed bed demin DF acceptable per Chemistry Procedure. • Check RCS Chemistry. • Refer to TRM 3.4.b. • Verify Chemistry has made all required notifications.
	SRO	• Notify SM of the plant shutdown requirement. • Implement actions of 1BwGP 100-4 "POWER DESCENSION." ○ Perform pre-job brief using OP-BR-108-101-1002, Attachment 4, EMERGENT RAMP REACTIVITY SUMMARY BRIEF (under the NSO desk glass) for the load ramp.
	CREW	○ Review applicable Prerequisites, Precautions, Limitations & Actions of 1BwGP 100-4. • Refer to Operator Aid for Unit 1 Contingency ReMAs for shutdown (Tech Spec Action Ramp).
	ATC	**BwOP CV-6 Attachment A, borate in automatic, via hard card.** Perform the following at 1PM05J: • Determine required boric acid volume. ○ Refer to operator aid for required boric acid addition. • Determine desired boric acid flow rate. ○ Turn on PZR backup heaters (as desired). • Set BA totalizer to desired value. • Set BA controller setpoint to desired BA flowrate. • Place MAKE-UP MODE CONT SWITCH to STOP position.

Scenario No: **18-1 NRC Spare** Event No. 7		
Event Description: High RCS activity requiring plant shutdown		
Time	Position	Applicant's Actions or Behavior
		• 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). ○ If desired, adjust 1LK-112, VCT level controller, setpoint to control VCT level. • When desired boration achieved, place RMCS M/U CONT switch to STOP. • Verify 1CV110B closed, 1CV110A closed and Boric Acid Transfer Pump stopped. - OR - **BwOP CV-6 Attachment A, batch boration, via hard card.** Perform the following at 1PM05J: ○ Turn on PZR backup heaters (as required). ○ If desired to reset Boric Acid Totalizer to 0, reset the BA blender predetermined setpoint. • Open 1CV110B. • Open 1CV110A. • Start the BA Transfer pump. ○ If desired, adjust 1LK-112, VCT level controller, setpoint to control VCT level. • When desired amount of BA has been added, stop the BA Transfer Pump. • Close 1CV110A. • Close 1CV110B. ○ Adjust 1LK-112, VCT level controller, setpoint to desired value. • Place 1CV110A/B to AUTO. • Record boration in Unit log. • Perform BwOP CV-7 to return RMCS to automatic.
	BOP	• Lower turbine load at 1PM02J or OWS drop 210 by performing the following: • Select SETPOINT. • Enter desired MWs into REF DEMAND window. • Select LEFT ENTER. • Verify correct value in REFERENCE DEMAND window. • Enter desired MW/min into the RATE window. • Select RIGHT ENTER. • Select EXIT. • Inform crew of pending ramp with an UPDATE. • Select GO/HOLD. • Verify GO/HOLD button illuminates orange. • Verify HOLD indicator illuminates RED. • Select GO. • Verify GO indicator illuminates RED while the main turbine ramps. • Verify main turbine load begins to drop. • Monitor MWe and DEHC system response at 1PM02J or OWS drop 210.

Scenario No: **18-1 NRC Spare** Event No. 7		
Event Description: High RCS activity requiring plant shutdown		
Time	Position	Applicant's Actions or Behavior

	ATC	• Monitor reactor power and turbine load lowering.
		• Monitor NIs, Tave, ΔI, PZR pressure/level at 1PM05J or PPC.
		• During boration, monitor/perform the following at 1PM05J, Ovation and/or PPC:
		  • VCT level.
		  • RCS Tave.
		  ○ Verify boration auto stops at preset value.
		  ○ Return RMCS to automatic.
		  ○ Perform periodic control rod steps to maintain Tave and Delta I within limits.

		EXAMINER'S NOTE: The crew may use 1BwOA PWR-1 "POWER REDUCTION" as the guidance to perform the fast ramp. Steps in italics below.

	CREW	***1BwOA PWR-1 "POWER REDUCTION"***
		• *Request SM evaluation of Emergency Plan conditions.*
		• *Perform a reactivity summary brief.*
		• *Check control rods in auto (NO – manual, auto failed).*
		• *Energize PZR backup heaters, as necessary.*
		• *Perform boration, as time permits, prior to the ramp per the following:*
		  ○ *Borate per Op Aid guidance.*
		  ○ *As directed by the SM/designee.*
		• *Program/start ramp not to exceed 60 mw/min with DEHC in auto (DEHC graphic 5501):*
		  • *SELECT setpoint.*
		  • *ENTER desired load into REF DEMAND window.*
		  • *SELECT LEFT ENTER.*
		  • *VERIFY the correct value appears in the REFERENCE DEMAND window.*
		  • *ENTER desired MW/MIN ramp rate into the RATE window.*
		  • *SELECT RIGHT ENTER.*
		  • *Verify the correct value appears in the RATE window.*
		  • *Notify Control Room team of the pending ramp.*
		  • *SELECT GO/HOLD.*
		  • *VERIFY GO/HOLD illuminates orange.*
		  • *VERIFY HOLD indicator illuminates red.*
		  • *SELECT GO.*
		  • *VERIFY GO indicator illuminates red while the main turbine ramps.*
		  • *VERIFY main turbine load begins to drop.*
		• *Notify TSO.*
		• *Check PZR pressure controlling at or trending to 2235 psig.*
		• *Check PZR level controlling at or trending to program level.*
		• *Maintain Tave within 4°F of Tref.*
		• *Check SG NR levels.*
		• *Notify Chemistry and RP of ramp in progress*
		• *Notify SM to perform risk assessment, initiate IR, reactivity screening, notify QNE and notify other personnel.*

Scenario No: **18-1 NRC Spare** Event No. 7		
Event Description: High RCS activity requiring plant shutdown		
Time	Position	Applicant's Actions or Behavior
		EXAMINER'S NOTE: (1) If 1PR11J gas and particulate channel alarm (BwAR 2-1PR11J), allow examinees adequate time to address Tech Spec 3.4.15, Leak Detection, before inserting next event. **(2) After reactor power is lowered to an adequate level and with Lead Examiner's concurrence, enter next event.**

Scenario No: **18-1 NRC Spare** Event No. 8 & 9		
Event Description: 1A SGTR with loss of PZR pressure control/1AF013A breaker trips on SI		
Time	Position	Applicant's Actions or Behavior

	CUE	• Annunciator 1-9-D3, CHARGING LINE FLOW HIGH LOW
		• RMS rad monitor ALERT/HIGH alarms:
		  • SJAE/GS exhaust.
		  • 1A main steamline.
		• PZR pressure and PZR level lowering.
		• Level rise/FW flow drop noted on 1A SG.

	ATC	• Initiate a manual reactor trip. • Initiate a manual SI.
	CREW	• Identify entry conditions for 1BwEP-0, REACTOR TRIP OR SAFETY INJECTION.
	SRO	• Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Enter/Implement 1BwEP-0 and direct operator actions of 1BwEP-0 to establish the following conditions:

	ATC	Perform immediate operator actions of 1BwEP-0 at 1PM05J:
		• Verify reactor trip:
		  • Rod bottom lights – ALL LIT.
		  • Reactor trip & Bypass breakers – OPEN.
		  • Neutron flux – DROPPING.

	BOP	Perform immediate operator actions of 1BwEP-0 at 1PM02J or Operator Work Station drop 210.
		• Verify turbine trip:
		  • All Turbine throttle valves – CLOSED.
		  • All Turbine governor valves – CLOSED.

	BOP	Perform immediate operator actions of 1BwEP-0 at 1PM01J: • Verify power to 4KV busses. • ESF Busses – BOTH ENERGIZED (141 & 142).

	CREW	Recognize and respond to conditions requiring a Safety Injection in accordance with 1BwEP-0 "REACTOR TRIP OR SAFETY INJECTION" step 4:
		• Check SI Status:
		  • SI First OUT annunciator – LIT.
		  • SI ACTUATED Permissive Light – LIT.
		  • SI Equipment – AUTOMATICALLY ACTUATED.
		  • Either SI pump – RUNNING.
		  • Either CV pump to cold leg isolation valve OPEN – 1SI8801A/B.
		• Manually actuate SI from 1PM05J and 1PM06J.

	SRO	• Direct BOP to perform Attachment B of 1BwEP-0.
		EXAMINER'S NOTE: SRO and ATC will continue in 1BwEP-0 while BOP is performing Attachment B.

Scenario No: **18-1 NRC Spare** Event No. 8 & 9		
Event Description: 1A SGTR with loss of PZR pressure control/1AF013A breaker trips on SI		
Time	Position	Applicant's Actions or Behavior

	BOP	**1BwEP-0 Attachment B:**
		• Verify FW isolated at 1PM04J:
		  • FW pumps – TRIPPED.
		  • FW isolation monitor lights – LIT.
		  • FW pumps discharge valves – CLOSED (or going closed) 1FW002A-C.
		• Verify DGs running at 1PM01J:
		  • DGs – BOTH RUNNING.
		  • 1SX169A/B OPEN.
		  • Dispatch operator locally monitor DGs operation.
		• Verify Generator Trip at 1PM01J:
		  • OCB 1-8 and 7-8 open.
		  • PMG output breaker open.
		• Verify SX pumps running:
		  • Check Unit 0 CC HX aligned to Unit 1.
		  • 1CC9473A&B OPEN.
		  • Unit 1 SX pumps – BOTH RUNNING.
		  • Dispatch an operator to energize and open 0/1SX007 to 8000 GPM flow to the Unit 0/1 CC HX, then open the disconnects.
		• Verify Control Room ventilation aligned for emergency operations at 0PM02J:
		  • VC Rad Monitors – LESS THAN HIGH ALARM SETPOINT.
		  • Operating VC train equipment – RUNNING.
		  • 0B Supply fan
		  • 0B Return fan
		  • 0B M/U fan
		  • 0B Chilled water pump
		  • 0B Chiller
		  • Operating VC train dampers – ALIGNED.
		  • M/U fan outlet damper – 0VC08Y NOT FULLY CLOSED.
		  • 0B VC train M/U filter light – LIT.
		  • 0VC09Y – OPEN.
		  • 0VC313Y – CLOSED.
		  • Operating VC train Charcoal Absorber aligned for train 0B.
		  • 0VC44Y – CLOSED.
		  • 0VC05Y – OPEN.
		  • 0VC096Y – OPEN.
		  • 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:
		  • 0VA03CB – RUNNING.
		  • 0VA023Y – OPEN.
		  • 0VA436Y – CLOSED.
		  • Plenum C:
		  • 0VA03CF – RUNNING.
		  • 0VA072Y – OPEN.
		  • 0VA438Y – CLOSED.

		• Verify FHB ventilation aligned at 0PM02J:
		  • 0VA04CB – RUNNING.
		  • 0VA055Y – OPEN.
		  • 0VA062Y – OPEN.
		  • 0VA435Y – CLOSED.
		• Shutdown Unnecessary Plant Equipment.
		  • Trip all running HD pumps.
		• Initiate periodic monitoring of Spent Fuel Cooling.
		• Notify SRO Attachment B complete.

	ATC/
	BOP
		• Verify ECCS pumps running:
		  • Both CV pumps – RUNNING.
		  • Both RH pumps – RUNNING.
		  • Both SI pumps – RUNNING.

	ATC/
	BOP
		• Perform the following at 1PM06J:
		  • Verify RCFCs running in Accident Mode:
		  • Group 2 RCFC Accident Mode lights – LIT (NO – 1D low speed RCFC NOT running).
		  • 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.

	ATC/ BOP	• Verify AF system:
		  • AF pumps – BOTH RUNNING.
		  • AF isolation valves – 1AF13A-H OPEN.
		  • AF flow control valves – 1AF005A-H THROTTLED.
		• Verify CC pumps – BOTH RUNNING.
		• Verify SX pumps – BOTH RUNNING.
		• Check if Main Steamline Isolation is required.
		  • SG pressures > 640 psig.
		  • Cnmt pressure < 8.2 psig.
		• Check if CS is required:
		  • CNMT pressure has remained < 20 psig.

	ATC
	
	[CT-18]
	
	[CT-18]
		• Verify total AF flow:
		  • AF flow greater than 500 gpm.
		  • Check SG NR levels not rising in an uncontrolled manner (NO – 1A SG level rising).
		Isolate feedwater flow into and steam flow from the ruptured SG before transition to 1BwCA-3.1 occurs. (Westinghouse – CT-18) (K/A number – EPE038 EA1.32, Importance – 4.6/4.7)
		  • Close 1AF013A (will NOT close).
		  • **Close 1AF013E.**
		  • Set 1AF005A & 1AF005E pots to 0% demand.
		  • **Dispatch EO to locally close 1AF005A.**

	ATC	• Verify ECCS valve alignment at 1PM06J: • Group 2 Cold Leg Injection monitor lights required for injection – LIT.

	ATC	• Verify ECCS flow:
		  • High head SI flow > 100 gpm (1FI-917).
		  • RCS pressure > 1700 psig.

	ATC	• Check PZR PORVs and spray valves at 1PM05J:
		  • PORVs – CLOSED.
		  • PORV isol valves – BOTH energized.
		  • PORV relief paths – PORVs in AUTO, PORV isolation valves OPEN.
		  • Normal PZR spray valves – CLOSED.

	ATC/BOP	• Check RCS temperature at 1PM05J:
		  • With RCPs running, RCS Tave stable at or trending to 557°F.
		  • Throttle AF flow if RCS temperature is low.

	ATC	• Check status of RCPs at 1PM05J:
		  • All RCPs – RUNNING.
		  • Check RCP trip criteria:
		  • High head SI flow > 100 gpm.
		  • RCS pressure > 1425 psig – continue in 1BwEP-0.

	BOP	• Check if SG secondary pressure boundaries are intact at 1PM04J:
		  • Check pressure in all SGs:
		  • No SG pressure dropping in an uncontrolled manner.
		  • No SG completely depressurized.

	BOP	• Check if SG tubes are intact:
		  • Check the following have remained < alert alarm setpoint at RMS:
		  • 1PR08J, SG Blowdown.
		  • 1PR27J, SJAE/GS Exhaust (NO).
		  • 1AR22/23A-D, 1A-D Main Steam Lines (NO).

	CREW	Transition to 1BwEP-3 “STEAM GENERATOR TUBE RUPTURE”

Scenario No: **18-1 NRC Spare** Event No. 8 & 9		
Event Description: 1A SGTR with loss of PZR pressure control/1AF013A breaker trips on SI		
Time	Position	Applicant's Actions or Behavior
		1BwEP-3 "STEAM GENERATOR TUBE RUPTURE"
	SRO	• Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Request STA evaluation of status trees.
	SRO	• Enter/implement 1BwEP-3 and direct operator actions of 1BwEP-3 to establish the following conditions:

	ATC	• Check if RCPs should be stopped:
		  • RCPS - ANY RUNNING.
		  • High head SI flow > 100 gpm.
		  • RCS pressure > 1425 psig.

	BOP
	
	[CT-18]
	
	[CT-18]
	
	[CT-18]
		• Identify ruptured SG 1A.
		  • 1A SG level rising uncontrollably.
		  • 1A Main steam line rad monitor ABNORMAL for plant conditions.
		• Isolate ruptured SG:
		  • Verify 1A SG PORV CLOSED in AUTO.
		  • Verify 1SD002A & B CLOSED.
		Isolate feedwater flow into and steam flow from the ruptured SG before transition to 1BwCA-3.1 occurs. (Westinghouse – CT-18) (K/A number – EPE038 EA1.32, Importance – 4.6/4.7)
		  • **CLOSE 1A MSIV** and MSIV bypass valve**.**
		• Check ruptured SG NR level > 10%.
		  • **CLOSE 1AF013E** (may have already been performed in 1BwEP-0).
		  • Attempt to close 1AF013A (breaker is tripped).
		  • Set 1AF005A and 1AF005E pots to 0% demand (may have already been performed in 1BwEP-0).
		  • **Dispatch EO to locally close 1AF005A** (may have already been performed in 1BwEP-0).

	BOP	• Check ruptured SG pressure > 330 psig.
	SRO	• Determine RCS temperature to which the RCS must be cooled down to allow depressurization of the RCS to ruptured SG pressure.

	BOP/
	ATC
	
	[CT-19]
		• Block MS Isolation SI after P-11 reached.
		Establish/maintain RCS temperature so that transition from 1BwEP-3 does not occur because the RCS temperature is too high (1BwCA-3.1) or too low (1BwFR-P.1). (Westinghouse – CT-19) (K/A number – EPE038 EA1.36, Importance – 4.3/4.5)
		• **Dump steam at maximum rate via:**
		  ○ **Steam dumps in steam pressure mode.**
		  ○ **Intact SG PORVs.**
		
		  • Bypass Steam Dump P-12 interlock when setpoint is reached by holding steam dump off/reset switches in bypass.
		  • Dispatch an operator with keys to standby 1SI101A & B.

Scenario No: **18-1 NRC Spare** Event No. 8 & 9		
Event Description: 1A SGTR with loss of PZR pressure control/1AF013A breaker trips on SI		
Time	Position	Applicant's Actions or Behavior
	BOP	• Check intact SG levels. • Control AF flow to maintain intact SG levels between 30% and 50%.

	ATC	• Check PZR PORVs and ISOL Valves:
		  • PORV isolation valves – Both ENERGIZED.
		  • PORVs – CLOSED.
		  • PORV isolation valves – Both OPEN.

	BOP	• Reset SI:
		  • Depress BOTH SI Reset Pushbuttons at 1PM06J.
		  • Verify SI ACTUATED permissive light NOT LIT at 1PM05J.
		  • Verify AUTO SI BLOCKED permissive light LIT at 1PM05J.

	BOP	• Reset Phase A. • Depress BOTH Phase A Reset Pushbuttons at 1PM06J.

	BOP	• Restore IA to Cnmt.
		  • Check a station air compressor is running at 0PM01J.
		  • OPEN 1IA065 and 1IA066 at 1PM11J (1IA066 will NOT open).

	BOP	• Check if RH pumps should be stopped:
		  • RH pumps – Any running with suction aligned to RWST.
		  • RCS pressure > 325 psig.
		  • Stop BOTH RH pumps and place in standby.

	BOP	• Check if RCS cooldown should be stopped.
		  • Check CETCs < required temperature.
		  • Reduce steam flow from steam dumps or intact SG PORVs.
		  • Maintain CETCs < required temperature.
		• Check ruptured SG pressure stable or rising.
		• Check RCS subcooling acceptable per Figure 1BwEP 3-2 (+20°F).

	ATC	• Attempt to depressurize RCS:
		  • Determine normal PZR spray at 1PM05J – NOT available (1IA066 will not open, NO Cnmt IA).
		  • Check PZR PORVs at least 1 available at 1PM05J:
		  • Attempt to open 1RY455A and 1RY456.
		  • Determine BOTH PZR PORVs will not open.

	ATC/
	BOP
		• Try to establish aux spray:
		  • Verify at least one SI pump running.
		  • Verify at least one CV pump running.
		  • Terminate high head ECCS:
		  • Reset SI recirc sump isol valves/CV pump miniflow valves.
		  • OPEN CV pump miniflow valves - 1CV8110, 1CV8111, 1CV8114 & 1CV8116.

Scenario No: **18-1 NRC Spare** Event No. 8 & 9		
Event Description:	1A SGTR with loss of PZR pressure control/1AF013A breaker trips on SI	
Time	Position	Applicant's Actions or Behavior
	[CT-35]	**Terminate SI before ruptured SG PORV or safety valve water release. (Westinghouse – CT-35) (K/A Number – EPE038 EA1.30, Importance – 4.0/3.8)** • **CLOSE CV pump cold leg injection valves - 1SI8801A & B** (this critical task may be performed later in 1BwCA-3.3). • Place 1CV182 at 0%. • Open 1CV8105 & 1CV8106. • Attempt to open 1CV8145. • Determine aux spray unavailable without IA to CNMT.
	CREW	Transition to 1BwCA-3.3 "SGTR WITHOUT PRESSURIZER PRESSURE CONTROL"
		1BwCA-3.3 "SGTR WITHOUT PRESSURIZER PRESSURE CONTROL"
	SRO	• Notify SM of plant status and procedure entry. • Request SM evaluation of Emergency Plan conditions. • Enter/Implement 1BwCA-3.3 and direct operator actions of 1BwCA–3.3 to establish the following conditions:
	BOP	• Check 1A SG NR level: ○ Greater than 88%, GO TO Step 7, CHECK IF ECCS FLOW CAN BE TERMINATED (on next page). ○ Less than 88%, continue with next step.
	CREW	• Determine normal PZR spray unavailable until IA can be restored to CNMT.
	CREW	• Attempt to restore PZR PORV: • Open PORV isol valves (already open). • Open PZR PORV(s) as necessary (neither PZR PORV will open), continue with next step.
	ATC/BOP **[CT-35]**	Try to Establish Auxiliary Spray: • At least one 1 SI pump running. • At least one 1 CV pump running. • Terminate High-Head ECCS: • Reset SI recirc sump isol valves. • Reset Cent CHG pump miniflow isol valves. • Verify CENT CHG pump miniflow isol valves OPEN: ▪ 1CV8110 ▪ 1CV8111 ▪ 1CV8114 ▪ 1CV8116 • **Close CENT CHG pumps to cold legs injection isol valves:** ▪ **1SI8801A** (closed in 1BwEP-3). ▪ **1SI8801B** (closed in 1BwEP-3).

Scenario No: **18-1 NRC Spare** Event No. 8 & 9		
Event Description: 1A SGTR with loss of PZR pressure control/1AF013A breaker trips on SI		
Time	Position	Applicant's Actions or Behavior

		• Establish charging flow:
		  • Place 1CV182 at 0%.
		  • Open 1CV8105 & 1CV8106.
		  • Determine aux spray unavailable without IA to CNMT.

	BOP	• Check intact SG NR levels > 10%. • Maintain SG NR levels between 30% and 50%.

	ATC	• Check PZR level:
		  ○ Less than 14%, return to step 1 of 1BwCA-3.3.
		  ○ Greater than 14%, continue to next procedure step (Step 7).

	CREW	• Check if ECCS flow can be terminated: **(Step 7)**
		  • RCS Subcooling - ACCEPTABLE per Iconic display or Attachment A and Figure 1BwCA 3.3-1.
		  • Secondary heat sink - established.
		  • RVLIS Plenum - 15% or greater.
		  • Ruptured SG 1A rising in an uncontrolled manner or off scale high.

	BOP/ATC **[CT-35]**	**Terminate SI before ruptured SG PORV or safety valve water release. (Westinghouse – CT-35) (K/A Number – EPE038 EA1.30, Importance – 4.0/3.8)** • **Stop BOTH SI pumps.** • **Stop all but one CV pump.**

	ATC/BOP
	
	[CT-35]
		• Terminate high head ECCS:
		  • Reset SI recirc sump isol valves/CV pump miniflow valves.
		  • Reset SI CV pump miniflow isolation valves - 1CV8114 and 1CV8116.
		  • Verify CV pump miniflow valves OPEN - 1CV8110, 1CV8111, 1CV8114 & 1CV8116.
		  • **Close CV pump cold leg injection valves - 1SI8801A & B** (performed earlier in 1BwEP-3 or earlier in 1BwCA-3.3 if 1A SG level was < 88%).

		EXAMINER'S NOTE: At this point in the scenario, all Critical Tasks are complete and the scenario stop criteria has been reached, with Lead Examiner's concurrence, STOP the scenario.

SHIFT MANAGER TURNOVER

DAY/DATE: : 18-1 NRC SPARE ONCOMING SHIFT

UNIT 1 STATUS	UNIT 0 & 1 MAJOR Clearance Order's
MODE . . . . . .1 Rx Pwr. . . . . .53 Generator MWe. . . . .614 Max Load / Power. . . 1269 MWe Min Load/Power . . . . 600 MWe Max Ramp Rate. . . . .5 mw/min Desired Delta I . . . . .Target On Line Risk . . . . . .Green Boron @ . . . . . .694 Control Bank. 150	None
SIGNIFICANT LCO, AAR, RETS	**UNIT 0 & 1 MAJOR ACTIVITIES**
None	None
U1 IN PROGRESS / PENDING	**ADMIN and PRIORITIES**
Equilibrium Xenon Preconditioned to 100% power, ARO. All control systems in automatic. Following turnover, swap Unit 1 SX pumps per BwOP SX-7 to allow for Unit 2 surveillance testing. EOs are briefed and standing by for the SX pump swap.	**SAFETY**: **FOCUS AREA**: **Event Free Clocks**: ***Station***: ***Ops*** **Last configuration control event:** **DOSE INFO**: Dose goal for today: **Station Priorities**
SCHEDULED ACTIVITY CONFLICT	

SHIFT MANAGER TURNOVER

UNIT 2 STATUS		UNIT 2 MAJOR Clearance Order's	
MODE	1	None	
Rx Pwr.	100%		
Generator Mwe.	1190		
Max Load / Power . . .	100%		
Min Load/Power	1264 MWe		
Max Ramp Rate.	5mw/min		
Desired Delta I	Target		
Online Risk.	Green		
Boron @	856		
Control Bank.	220		

SIGNIFICANT LCO, AAR, RETS	UNIT 2 MAJOR ACTIVITIES
Nothing	Nothing

UNIT 2 IN PROGRESS	**UNIT 2 PENDING**
Nothing	Nothing

SCHEDULED ACTIVITY CONFLICT

SHIFT MANAGER TURNOVER

NSO's		
	Unit 1	
	U1 Admin	
Layne	Unit 2	
Cavanaugh	U2 Admin	
	X	
	X	
Roesler	Field Sup.	
Mullins	WEC	
	X	
	X	
	X	
	X	
	X	
	X	
	X	
	X	
NLO's		**Circle Appropriate Assignment**
	FIN	X X
Lanka	U-1	SSD FB
Sebby	U-2	SSD FB
Jarman	ROVER	SSD FB
Jenco	MUDS	SSD FB
Ruiz	RW	SSD FB
Ashby	X	SSD FB
Thompson	X	SSD FB
Skrzypiec	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
	X	SSD FB
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	X	SSD FB
McGaw	RP Tech	
Dobbs	RP Tech	
Gallois, Butch	Chem Tech	

SHIFT MANAGER TURNOVER

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UNIT 1 SUPERVISOR

DAY/DATE **18-1 NRC SPARE**_____ ONCOMING SHIFT _____

UNIT 1 STATUS	UNIT 1 MAJOR OOS's
MODE .....1 **% Pwr** .....53 **MWE** .....614 **Max Load**.....1269 MWe **Max VARS** .....BwGP Chart **Min Load** .....600 MWe **Max Ramp Rate** .....5 mw/min **Delta I** .....Target **Boron**.....694 **Control Bank D** .....150 **On Line Risk** .....Green	None
UNIT 1 LCOAR / TRM / DEQUIP ENTRIES	UNIT 1 MAJOR SURVEILLANCES and PMs
None	None
UNIT 1 AND COMMON IN PROGRESS (INCLUDE PAINTING)	UNIT1 AND COMMON PENDING
Equilibrium Xenon Preconditioned to 100% power, ARO. All control systems in automatic.	Following turnover, swap Unit 1 SX pumps per BwOP SX-7 to allow for Unit 2 surveillance testing. EOs are briefed and standing by for the SX pump swap.

UNIT 1 SUPERVISOR

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UNIT 1 NSO TURNOVER
DATE 18-1 NRC SPARE ONCOMING SHIFT

Unit Status

Mode	1	**Max load/Power**	1269 MWe
Power	53	**Max ramp rate**	5 mw/min
MW Elect.	614	**Safety Systems Status**	Green
Min load/Power	600 MWe	**Control Rod Position**	150
Delta I	Target	**Boron Concentration**	694 ppm

In Progress	Pending
Equilibrium Xenon Preconditioned to 100% power, ARO. All control systems in automatic.	Following turnover, swap Unit 1 SX pumps per BwOP SX-7 to allow for Unit 2 surveillance testing. EOs are briefed and standing by for the SX pump swap.

Long Term

Administrative

Temporary Procedures	
Temporary Alteration	
New Equipment Status Tags	
Unit Logbook	
Unit Routine	
Aux. Electric Room Access	
Daily Orders	

LCOARs	**RETS-AAR**	**DEQUIP**
None		

Turnover Items	
1) NSO Shiftly/Daily Surveillance	
2) SSPS Channels/Bistables	
3) Sys – Safeguards	
4) Sys – Primary	
5) Sys – Balance of the Plant	
6) Alarms – SER/Annunciator	
7) Alarms – Process/RM-11	
8) Alarms – FP/others	
9) Chemistry	
10) Radiation Precautions	
11) Nuclear Instrumentation	
12) MCB Instrumentation	
13) MCB Controllers	
14) Electrical Distribution – AC	
15) Electrical Distribution – DC	
16) BwOP (proc. & step in effect)	
Comments:	

Review		US	WEC/STA	SM
Time:	Shift	Off Going		
Oncoming personnel has had a change in health status. If yes, inform Supervisor and contact OHS (nurse) ☐ Yes ☐ No				
Date	Shift	Oncoming		