Facility: **Prairie Island** Scenario No.:**1** Op-Test No.: **2012301**

Examiners: **D. McNeil** (R. Baker) Operators: _____
M. Bielby (D. Oliver) _____
D. Reeser _____

Initial Conditions: Mode: 1; Exposure: ZBC; Power: ~13%; Boron: (CB): 1897; Temperature: ~545°F Pressure: ~2235 psig; Xenon: Building In; Rods: "D" @ 174 steps; Generator: 40 MWe

Turnover: The Crew will prepare to perform a power ascension to 15% power and complete the remainder of 1C1.2 actions including transferring from the M to R sources, then raise power to 100%. Turbine overspeed and associated SP will not be performed during this power ascension. The Heater Drain Tank alarms have been authorized to leave flashing. No equipment OOS

Event No.	Malf. No.	Event Type*	Event Description
1		R (RO)	Raise power to 15%
1		N (BOP)	Transfer M to R power supplies
2		I (RO) TS (SRO)	Blue Channel Pressurizer level channel fails high
3		C (RO)	11 Charging Pump Trips.
4		I (RO/ BOP) TS (SRO)	N43 Power Range NI Fails Low
5		M (ALL)	Turbine Locks Out Initiating a Loss of All AC Power
6		C (BOP, SRO)	11 TDAFW Pump Auto Start Failure

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

QUANTITATIVE ATTRIBUTES

Malfunctions:

Before EOP Entry:

1. Blue Channel Pressurizer Level fails high
2. 11 Charging Pump trips
3. N42 PRNI fails low

After EOP Entry:

1. 11 TDAFWP fails to start automatically

Abnormal Events:

1. Blue Channel Pressurizer Level fails high
2. 11 Charging Pump trips
3. N42 PRNI fails low

Major Transients:

1. Loss of All AC (Station Blackout)

Critical Tasks:

1. E-0 – C: energize at least one AC emergency bus before reaching step 8 of ECA-0.0 which places safeguards equipment handswitches in the pull-to-lock position.
2. ECA-0.0 – B: Establish and maintain 200 GPM AFW flow to the Steam Generators prior to Step 3 of ECA-0.0.

SCENARIO OVERVIEW:

SEQUENCE OF EVENTS:

Event 1: Raise power to 15% and transfer M-R sources

- The Crew will raise reactor power to 15% per 1C1.2 Section 5.14.
- Non-Safeguards Loads will be transferred to their M source from their R source.
- A Surrogate may be provided to perform peer checking during these activities.

Event 2: Blue Channel Pressurizer Level fails high

- Charging pump speed will lower.
- The crew will respond per C47 and 1C51.3 to defeat the failed pressurizer level channel and return charging and pressurizer heaters to automatic.

Event 3: 11 Charging Pump trips

- RCP Seal Injection flows and labyrinth seal D/P will lower.
- The crew will respond per C47 and 1C12.1 to restore seal injection flow and return charging to automatic.

Event 4: N42 PRNI fails low

- The crew will respond per 1C51.2 to remove N42 PRNI from service.
- Control rods step out IF rod control is in automatic and would require restoring T_{ave} to T_{ref}.
- A Surrogate may be provided for concurrent verifications, but must not perform initial component identification at any time.

Event 5: Turbine Locks Out initiating a Loss of all AC power

- A Turbine lockout occurs accompanied by a loss of all offsite power.
- Bus 15 and D2 lock out.
- The crew will respond per 1E-0, and 1ECA-0.0 to restore power to Bus 16 via the cross tie to Unit 2.

Event 6: 11 TDAFWP fails to start automatically

- Steam Generator Levels will lower.
- The crew will respond per 1ECA-0.0 to manually start the 11 TDAFWP.

EVENT 1	1. When the crew has assumed the duty, and at the discretion of the lead evaluator, allow the crew to raise power to 15% and transfer loads to the M source. a. When directed to schedule SP 1005A, NIS Power Range Daily Calibration, within the next 12 hours, agree to write WR and schedule the SP. b. When directed to Rack Breakers 11-4, 12-4, 13-9 and 14-9 to the connected position, then enter the remotes. ***(Relative Order 1, Trigger 1)***. When Trigger 1 has completed, inform the Control Room a time step has occurred and Breakers 11-4, 12-4, 13-9 and 14-9 are in the CONNECT position. *NOTE: Per 1C1.4 Precaution 3.2, it is desirable to maintain T_{ave} within 1.5°F of T_{ref} during power changes and T_{ave} should not deviate by more than 5°F without Ops Manager and Nuclear Engineering approval.*	R(ATC) N(BOP/ SRO)	**1C1.2, Unit 1 Startup Procedure** **Section 5.14 Power Increase to 15%** • Using the VPL pop-up screen, select the VPL Raise (▲) control to raise the VPL setting to 101%. • Start raising reactor power to 15%. *(Guidance from 1C1.4 Section 5.3)* ○ *Using the "On Line Control" screen, select the desired Control Mode (VPC).* ○ *Using the "On Line Control" screen, select the desired demand rate. (0.25%/min)* ○ *Set the "Target" setting to the desired load by using the "On Line Control" screen "Target" increase/decrease (▲/▼) controls.* ○ *Select the "Go" control using the "On Line Control" screen.* • Verify 47014-0501, P-10 NUCLEAR AT POWER PERMISSIVE aqua light, is LIT • Block the power range low setting high flux trip and intermediate range high flux trip. • Check CV-3 and CV-4 OPENING on program. • Rack in and close the following breakers: ○ BKR 11-4, BUS 11 1M XFMR ○ BKR 12-4, BUS 12 1M XFMR ○ BKR 13-9, BUS 13 1M XFMR ○ BKR 14-9, BUS 14 1M XFMR • Transfer the Steam Dump System to TAVG control: • Verify the 15% HOLD time recorded in Attachment 2 has been met. (See Step 5.14.7.) • Continue with 1C1.4, Power Operation, or 1C1.3, Unit 1 Shutdown.

EVENT 2	2. When the crew has raised power satisfactorily, and/or at the discretion of the Lead Evaluator, enter the malfunction to fail the Blue Pressurizer Level channel (LT-428) high ***(Relative Order 2, Trigger 2)***
	
	a. If directed as I&C to trip bistables, report that 2 I&C technicians will be available in 1 hour. **(Note: bistables will not be tripped during this scenario.)**
	b. If contacted as Operations Management, acknowledge the report of the failure, and if asked agree to make other notifications to the NRC Resident Inspector, Duty Station Manager.
	c. If contacted as the FIN team supervisor, inform the crew that you will write a work order and assign an I&C supervisor to investigate.
		I(ATC)
		
		T.S. (SRO)
			C47012-0307, PRZR HI LVL CHANNEL ALERT
			• Check pressurizer level.
			• Control level in manual.
			  ○ Reduce level to program level.
			  ○ Maintain pressurizer pressure.
			• If channel failed, then refer to 1C51.
			
			C47012-0507, PRZR LVL DEVIATION
			• Check pressurizer level.
			• If actual pressurizer level deviation exists,…N/A.
			• If due to an instrument failure, then refer to 1C51.
			
			C47015-0203, CHARGING PUMP IN AUTO TROUBLE
			• If due to level channel malfunction, then switch pressurizer level control channels. Refer to 1C51.
			
			1C51.3, INSTRUMENT FAILURE GUIDE (1L-428 – High)
			• If the Blue channel is selected on the PRZR Level Control Selector Switch, then:
			  ○ Control pressurizer heaters manually.
			  ○ Place charging pump speed control in “Manual” and adjust pressurizer level to setpoint.
			  ○ Select position “2-1” (WHITE-RED) on PRZR Level Control selector switch.
			  ○ Return pressurizer heaters to “AUTO” if desired.
			  ○ Return one charging pump speed control to “AUTO.”
			• Ensure pressurizer level recorder not selected to Blue channel.
			• Refer to TS LCO 3.3.1, Condition A and Table 3.3.1-1 Function 9.
			• TS LCO 3.3.1 Condition K will be entered.

EVENT 3	3. When the crew has restored charging and pressurizer heaters to automatic, and/or at the discretion of the Lead Evaluator, enter the malfunction to trip 11 Charging Pump. ***(Relative Order 3, Trigger 3)*** a. If directed to investigate 11 Charging pump, after 3 minutes, report that the 11 Charging pump appears intact with no visible damage. b. If directed to log VFD faults, after 3 minutes, report that there is a VFD Overfrequency fault on 11 Charging Pump. c. If directed to verify discharge desurger is pressurized, request that the pump be taken to PTL and after 3 minutes, report that the desurger is pressurized. d. If contacted as the FIN team supervisor, inform the crew that you will write a work order and assign an Electrical Maintenance supervisor to investigate.	C(ATC)	**47015-0103, 11 CHARGING PUMP TRIP** • Start another charging pump. • Restore letdown per 1C12.1, LETDOWN, CHARGING AND SEAL WATER INJECTION. • Maintain Pressurizer level and seal injection flow. **1C12.1, LETDOWN, CHARGING AND SEAL WATER INJECTION - Section 5.3 Starting a second charging pump** • Transfer the inservice charging pump from AUTOMATIC to MANUAL speed control. • Verify that the speed controller of the charging pump to be started is in MANUAL at minimum speed. • Reduce the speed of the inservice charging pump until the seal injection flow drops from eight (8) gpm to approximately six (6) gpm. • Verify charging pump discharge header pressure 1PI-133 is less than 2400 psig. • For the charging pump to be started, verify the control switch green light is “LIT” and white light is “OFF”. • Start the second charging pump. • Adjust the charging pump speed to maintain charging pump discharge pressure, 1PI-133 less than 2500 psig and approximately eight (8) gpm seal injection. • After pressure and flow have stabilized, then simultaneously adjust charging pump speed and 1C-142, CHG LINE FLOW CONT, until: o Seal Injection flow is approximately 8 gpm. o One charging pump is in service at minimum speed, in MANUAL. • Transfer the speed control for the charging pump which is operating at greater than minimum speed from MANUAL to AUTOMATIC.

EVENT 4	4. When the crew has restored Charging and Letdown to normal, and/or at the discretion of the Lead Evaluator, enter then malfunction to fail N42 PRNI low. ***(Relative Order 4, Trigger 4)*** a. If directed as I&C to trip bistables, report that 2 I&C technicians will be available in 1 hour. **(Note: bistables will not be tripped during this scenario.)** b. If contacted as I&C Engineering to determine if it is necessary to energize the P-10 bistable, state that you will write a work order. c. If contacted as the Nuclear Engineer, state that you will perform a flux map and/or SP 1120. d. If contacted as Operations Management, acknowledge the report of the failure, and if asked agree to make other notifications to the NRC Resident Inspector, Duty Station Manager. e. If contacted as the FIN team supervisor, inform the crew that you will write a work order and assign an I&C supervisor to investigate. f. If contacted, as the Computer Group, in reference to removing N42 from service, agree to investigate. g. If desired, allow the crew to hold a crew brief.	I(ATC) T.S. (SRO) I(BOP)	**1C5 AOP1, UNCONTROLLED ROD MOTION** • Check Generator Electrical Load – STABLE • Place Rod Bank Selector Switch to "MANUAL" • Check Rod Motion – STOPPED • Check for Failed Instrument: o NIS power range channels o RCS loop Tavg channels o Turbine impulse pressure 1PT-485 • Go to 1C51, Instrument Failure Guide **47013-0201, NIS POWER RANGE NEGATIVE FLUX RATE CHANNEL ALERT** • Refer to 1C51, Instrument Failure Guide **47013-0203, NIS POWER RANGE CHANNEL DEVIATION** • Check CHANNEL DEVIATION light LIT • Check Channel disagreement • Check for dropped or misaligned rod • If due to channel failure, refer to 1C51 **1C51.2, N42 PR NIS FAILS LOW** • Place Rod Control in MANUAL, maintain T_{ave} at T_{ref}. • Refer to the following TS requirements: • Refer to T.S. LCO 3.3.1 Condition A and Table 3.3.1-1, Functions 2a, 2b, 3a, 3b, 6,16b.1 16c,16d,16e • TS LCO 3.3.1 Conditions D, E, R and Q will be entered. • Remove N-42 from service as follows: • Place Rod Stop Bypass switch in the N42 position. • Place Power Mismatch Bypass switch in the N42 position. • Place Upper Section Current Comparator Defeat switch in the N42 position and verify the Upper Section Channel Defeat Light is LIT.

		RO	• Place Lower Section Current Comparator Defeat switch in the N42 position and verify the Lower Section Channel Defeat Light is LIT. • On the Comparator and Rate Drawer, place Comparator Channel Defeat Switch in the N42 position and verify the Comparator Defeat Light is LIT. • At the N42 Power Range B drawer pull the Control and Instrument Power Fuses. • Verify the following annunciators are received o 47013-0101, 47013-0102 o 47013-0201, 47014-0203 • Verify the following status lights are lit: o 44178-0206, 44178-0207 o 44205-0204 • Restore T_{ave} to T_{ref} using control rods in one or two step increments. • Verify NR-45 is selected to an operable channel.

EVENT 5	5. When the crew has removed N42 PRNI from service, and/or at the discretion of the Lead Evaluator, enter the malfunctions to trip the turbine and initiate the Loss of ALL AC. ***(Relative Order 5, Trigger 5)*** a. As a Unit 2 operator, announce "Unit 2 reactor trip, Unit 2 reactor trip, SEC, SM report to the control room". b. Upon hearing the announcement of reactor trip, or when called as Turbine Building Operator to isolate the Unit 1 MSR's per Attachment J, then enter (***Relative Order 5a)***. c. If directed, use remotes FW134 (11 SG feed) and FW135 (12 SG feed) to throttle AFW flow as directed ***(Relative Order 5b)***. d. If directed to locally investigate D2, wait 2 minutes and perform the following: 1) Enter the remote to acknowledge the local D2 alarm panel ***(Relative Order 6, Trigger 6)***. 2) Report that D2 is tripped and locked out on generator differential currents, and that maintenance has been notified. e. If directed to locally investigate Bus 16, after 3 minutes report that the only indication on Bus 16 is associated with under voltage (there are no targets or relays indicating any faults on the bus). f. When asked status of Unit 2 SI pumps, report that Unit 2 has no running SI pumps. g. When Bus 16 is powered from Bus 26 and/or at the discretion of the Lead Evaluator, place the simulator in FREEZE.	M(ALL) C(BOP/ SRO)	**1E-0, REACTOR TRIP OR SAFETY INJECTION** • Verify Reactor Trip. • Verify Turbine Trip. • Verify both safeguards buses energized. o Transition to 1ECA-0.0. **1ECA-0.0, LOSS OF ALL SAFEGUARDS AC POWER** • Check if RCS is isolated. o PRZR PORVs – CLOSED o Letdown isolation valves - CLOSED: o Excess letdown isolation valve - CLOSED • Verify AFW Flow – GREATER THAN 200 GPM. o *Place 12 MD AFW Pump into Manual.* o *Start 12 MD AFW Pump.* ***Critical Task: Establish and maintain 200 GPM AFW flow to the Steam Generators prior to Step 3 of ECA-0.0.*** • Perform notifications. • Check Cooling Water Header Pressures – BOTH GREATER THAN 25 PSIG. • Check if Safeguards Buses are available for Sequencer loading. • Attempt to restore power to any available Safeguards Bus from Unit 1 source. • Attempt to restore power to any available Safeguards Bus from Unit 2. o Close bus 26 Bus-Tie Breaker o Close bus 16 Bus-Tie Breaker ***Critical Task: Energize at least one AC emergency bus before reaching step 8 of ECA-0.0 which places safeguards equipment handswitches in the pull-to-lock position.*** • Start one charging pump. • Return to procedure and step in effect.

RETENTION: 7 Days

UNIT 1 LPEO / PEO TURNOVER LOG

DATE: DAY/NIGHT SHIFT: Day

CAT 1 VENT OPENINGS: 0 ft^2 **SYSTEM CONDITION: GREEN**

SAFEGUARDS EQUIPMENT OOS/TECH SPEC REQUIRED ACTION STATEMENTS	
NONE	
PROTECTED EQUIPMENT	
NONE	
RAD MONITORS OOS	**ANNUNCIATORS OOS**
OUTSTANDING SP'S	**FIRE DET / PROT EQP IMPAIRMENTS**
OTHER EQUIPMENT OOS / STATUS	
HDT Annunciators have been authorized to remain flashing. **An Extra Operator is periodically monitoring the HDT system and will inform the crew if any action is required.**	
MAJOR EQUIPMENT REPAIRED / RETURNED TO SERVICE	
OPERATIONAL PLANS FOR COMING SHIFT	
Raise power to 15% and commence 24 hour soak for engineering evaluation of secondary components. **Transfer M-R sources to M source.** **10 Gallon dilutions for ~0.4°F every 15 minutes to maintain power/temperature.**	
NEW PROCEDURES / INSTRUCTIONS	

Reactivity Plan

The crew has been directed to raise reactor power from 15%.

Prior to simulator:
- verify the reactivity plan completed by the off going reactor operator
- complete a Pre-Job Brief

Current conditions are:

The Turbine is synched to the Grid.
RCS Temperature is being controlled by Steam Dumps.

Power level: 13%

Xenon: Increasing

Control Rod Position: Bank D @ 174 steps

Boron Concentration: 1897 ppm

Core Exposure: 0 MWD/MTU (Initial Startup following refueling)

Target: VPC @ 6.2 (NI Power ~15%)

Rate: 0.25% /minute

Control Mode: Valve Position Control (VPC) with Rod Control in Manual

Boration/Dilution: 10 gal dilutions every 15 minutes

Reactivity Prediction:

Change in Power Defect: -31 pcm

Differential Boron Worth: -6.65 pcm/ppm

Calculated RCS PPM change: -1.5 ppm

Assumed 2/3 rods and 1/3 RMU addition

Calculated ~~Boric Acid~~ / Reactor Makeup Water addition: 1.5 ppm change = 30 gals RMU

Calculated final Control Rod Position : Bank D @ 178 steps

Facility: **PINGP Units 1 and 2** Scenario No.: **2** Op-Test No.: **2012301**

Examiners: D. McNeil (R. Baker) Operators: _____
M. Bielby (D. Oliver) : _____
D. Reeser : _____

Initial Conditions: Mode: 1; Exposure: BOC; Power: 42.5%; Boron: (CB): 1415 ppm; Temperature: ~552°F; Pressure: ~2235 psig; Xenon: Building In; Rods: "D" @ 170; Generator: ~225 MW

Turnover: Power is to be reduced < MWe to facilitate a common cause evaluation of the 11 MFP. Crew will brief power reduction and MFP swapping prior to entering the simulator. Maintain Unit 2 @ 100% power. Equipment OOS, Nothing abnormal, only equipment related to plant specific issues.

Event No.	Malf. No.	Event Type*	Event Description
1		R (RO) N (BOP)	Reduce power to < 200 MWe
2		N (SRO) N (BOP)	Swap Running MFP (Start 12 MFP and Secure 11 MFP)
3		I (RO) TS (SRO)	12 SG Pressure Transmitter Fails High
4		I (RO) TS (SRO)	Blue Channel Pressurizer Pressure Fails High
5		M (ALL)	12 SG Tube Rupture ~ 250 gpm
6		C (BOP) C (SRO)	12 MSIV Fails to Close
7		C (BOP)	SI Pumps Fail to Auto Start
8		C (BOP)	12 MDAFW Pump Fails to Auto Start

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

QUANTITATIVE ATTRIBUTES

Malfunctions:

Before EOP Entry:

1. 12 SG Pressure fails high
2. Blue Channel Pressurizer Pressure fails high

After EOP Entry:

1. 12 MSIV fails open
2. Both Safety Injection Pumps fail to auto start
3. 12 MDAFWP fails to start automatically

Abnormal Events:

1. 12 SG Pressure fails high
2. Blue Channel Pressurizer Pressure fails high

Major Transients:

1. 12 SG Tube Rupture

Critical Tasks:

1. E-0 – F: Establish and maintain 200 GPM AFW flow to the Steam Generator(s) before transition out of E-0, unless the transition is to FR-H.1, in which case the task must be initiated before RCPs are manually tripped in accordance with step 2 of FR-H.1
2. E-0 – H: Manually start at least one Safety Injection pump before transition out of E-0.
3. E-3 – A: Isolate feedwater flow into and steam flow from the ruptured Steam Generator before a transition to ECA-3.1 occurs.
4. E-3 – B: Establish/maintain an RCS temperature so that transition from E-3 does not occur because of the inability to maintain required subcooling or such that an extreme or severe challenge to the Subcriticality and/or the Integrity CSF occurs.
5. E-3 – C: Depressurize RCS to meet SI termination criteria prior to overfilling the ruptured Steam Generator.
6. E-3 – D: Terminate SI prior to overfilling the ruptured Steam Generator.

SCENARIO OVERVIEW:

INITIAL CONDITIONS:

The 11 TDAFW Pump is OOS.

SEQUENCE OF EVENTS:

Event 1: Reduce turbine load below 200 MW
- The crew will lower turbine load to ~195 MW per 1C1.4.

Event 2: Swap running MFP
- The crew will start 12 MFP and stop 11 MFP per 1C1.4 and 1C28.2.

Event 3: 12 SG Pressure fails high
- PT-478, 12 SG Pressure, fails high.
- The 12 SG PORV will open.
- The crew will respond per C47 and 1C51 to close and manually control the 12 SG PORV.

Event 4: Blue Channel Pressurizer Pressure fails high
- PT-431, Blue Channel Pressurizer Pressure, fails high.
- Both Pressurizer spray valves will fully open and Pressurizer heaters will de-energize.
- The crew will take manual control of spray valves and close them.
- The crew will respond per C47 and 1C51.3 to change the controlling pressure channel and restore pressure.

Event 5: 12 SG Tube Rupture
- A Steam Generator tube leak will begin to ramp in on 12 SG when Blue Channel Pressurizer Pressure is failed high.
- The crew will respond to a Train “B” radiation alarm and perform 1C4 AOP2
- The Tube Leak will grow to an ~250 GPM Tube rupture.
- The crew will respond per 1E-0 and 1E-3 to trip the reactor and initiate safety injection.

Event 6: 12 MSIV fails open
- During isolations in 1E-3 the 12 MSIV will NOT close.
- The crew will respond per 1E-3 Attachment B to isolate the 12 SG.

Event 7: Both Safety Injection pumps fail to auto start
- When Safety Injection is initiated, either manually or automatically, the 11 and 12 SI pumps will not start on the ‘S’ signal.
- The crew will respond per 1E-0 Attachment L to start the pumps manually.

Event 8: 12 MDAFWP fails to auto start

- 12 MDAFWP fails to start automatically.
- The crew will respond per 1E-0 to start 12 MDAFWP.

EVENT 1	1. When the crew has assumed the duty, and at the discretion of the lead evaluator, allow the crew to reduce turbine load to ~195 MW. a. When contacted as Duty Chemist, acknowledge load change.	R(ATC)	**1C1.4, Unit 1 Power Operation, Section 5.2, step 5.2.6.** • Turn ON all pressurizer heaters • Increase letdown flow if desired (80 gpm letdown flow will already be established, no actions will be needed) • If desired, place CS-46280, ROD BANK SELECTOR, in MANUAL." • Start the load decrease as follows:

EVENT 2	2. When the crew has reduced turbine load below 195 MW and returned Rod Control to automatic, and/ or at the discretion of the Lead Evaluator, direct the crew to proceed with swap of 12 and 11 MFP, if necessary.	N(BOP, SRO)	**1C28.2 UNIT 1 FEEDWATER SYSTEM**
			5.7 Swapping FWPs
			• Reduce turbine load to approximately 200 MWe
			• Verify two (2) condensate pumps are running or start a second condensate pump per 1C28.3.
			• Start the second FWP.
			  ○ CS-46419, 12 FW PMP
			• Stop the first running FWP.
			  ○ CS-46418, 11 FW PMP
			• CLOSE the in-service FWP warm up line:
			  ○ F-22-4, 12 FW PMP WARMUP LINE
			• OPEN the FWP warmup valve for the stopped FW pump:
			  ○ F-22-3, 11 FW PMP WARMUP LINE

EVENT 3	3. When the crew has swapped 11 and 12 Main Feed Pumps, and/or at the discretion of the Lead Evaluator, enter the malfunction to fail 12 SG pressure high. ***(Relative Order 3, Trigger 3)*** a. If directed as I&C to trip bistables, report that 2 I&C technicians will be available in 1 hour **(Note: bistables will not be tripped during this scenario.)** b. If contacted as Operations Management, acknowledge the report of the failure, and if asked agree to make other notifications to the NRC Resident Inspector, Duty Station Manager. c. If contacted as the FIN team supervisor, inform the crew that you will write a work order and assign an I&C supervisor to investigate.	I(ATC) T.S. (SRO)	***Note: Per rules of usage, reference use actions may be used prior to consulting procedure as follows:*** • ***Manual control of "B" SG PORV*** ***Note: If 1C5 AOP1 is entered it should be exited on step 1*** **47011-0405. FW CONTROL SYSTEM TROUBLE** • Verify Steam Generator Level Control operating properly in automatic • Control level in manual for any Steam Generator which has shifted to manual … N/A • Refer to 1C51, Instrument Failure Guide **1C51.3 12 STEAM GENERATOR PRESSURE 1P-478 HIGH** • Take manual control of 12 SG PORV and ensure valve is closed • Verify SG Level Control operating properly in automatic • Refer to T.S. LCO 3.3.2 Condition A and Table 3.3.2-1 Function 1e • T.S. LCO 3.3.2 Condition D will be entered

EVENT 4	4. When the crew has recovered SG pressure control, and/or at the discretion of the Lead Evaluator, enter the malfunction to fail PT-431, Blue Channel Pressurizer Pressure high. ***(Relative Order 4, Trigger 4)*** 5. a. If directed as I&C to trip bistables, report that 2 I&C technicians will be available in 1 hour **(Note: bistables will not be tripped during this scenario.)** b. If contacted as Operations Management, acknowledge the report of the failure, and if asked agree to make other notifications to the NRC Resident Inspector, Duty Station Manager. c. If contacted as the FIN team supervisor, inform the crew that you will write a work order and assign an I&C supervisor to investigate. ***Note: If not diagnosed and responded to quickly enough this failure will result in a Reactor Trip and, potentially, a Safety Injection. If this should occur proceed immediately to Event 5 where the SGTR will be diagnosed during performance of 1E-0 or 1ES-0.1.*** ***Note: If RCS Pressure lowers below DNB (2175 psig) T.S. LCO 3.4.1 Condition A should be entered..***	I(ATC) T.S. (SRO)	***Note: Per rules of usage reference use actions may be used prior to consulting procedure as follows:*** • ***Manual Control of Pressurizer Spray Valves*** **47012-0408 PRZR HI/LO PRESS CHANNEL ALERT** • Check pressure high or low. • If necessary then control pressure in manual. • If due to channel failure, then refer to 1C51, INSTRUMENT FAILURE GUIDE – UNIT 1. **C51.3 Pressurizer Pressure 1P-431 High** • Place Pressurizer Pressure Controller in MANUAL and stabilize pressure. • Select position “2-1” (WHITE-RED) on channel selector switch. • When pressure returned to normal with no deviation from setpoint, then return pressure control to automatic. • Verify Pressurizer Pressure Recorder not selected to Blue channel. • Refer to the following Technical Specifications: ○ T.S. LCO 3.3.1 Condition A & Table 3.3.1-1 Functions 6, 8a, 8b. ○ T.S. LCO 3.3.2 Condition A & Table 3.3.2-1 Function 1d. ○ T.S. LCO 3.4.1.a ○ T.S. LCO 3.3.1 Conditions E and K will be entered ○ T.S. LCO 3.3.2 Condition D will be entered ○ T.S. LCO 3.4.1 Condition A might be entered

EVENT 5	6. When the crew has recovered Pressurizer pressure control, and/or at the discretion of the Lead Evaluator, enter the malfunction to cause a SGTR on 12 SG which will ramp in over the next 15 minutes. ***(Relative Order 5, Trigger 5)*** a. If directed to perform cation column frisks acknowledge the order and, after 1 minute, report 12 Steam Generator cation column has elevated activity, 11 Steam Generator cation column is reading background. b. If asked to take primary or secondary samples per RPIP 4503, state that the samples are in progress. c. If contacted as Operations Management, acknowledge the report of the failure, and if asked agree to make other notifications to the NRC Resident Inspector, Duty Station Manager. d. If directed to turn on all turbine building roof exhausters, wait 3 minutes and report all turbine building roof exhausters are running.	M(ALL) T.S. (SRO) CREW	**C47022-0108, HI RADIATION TRAIN B PANEL ALARM** • Determine the initiating alarm and respond to the alarm as specified in C47048, TRAIN B RADIATION MONITORING SYSTEM ALARM RESPONSE PROCEDURES. **C47048: 1R-15** • If primary-to-secondary leakage is confirmed by sampling or other indication, then: o Enter 1C4 AOP2, STEAM GENERATOR TUBE LEAK. • Refer to T.S. 3.7.14, and T.S. 3.4.14 ***Note: Letdown may be isolated to aid in maintaining pressurizer level.*** **1C4 AOP2, STEAM GENERATOR TUBE LEAK** • IF at any time RCS inventory can not be maintained by available charging flow, THEN perform the following: o Manually trip the reactor - enter 1E-0, Reactor Trip or Safety Injection. o WHEN reactor is verified tripped, THEN initiate Safety Injection. o Exit this procedure • Continuously monitor 1R15 and 1R19 in the Control Room for further increase.

EVENT 5 cont…	7. When the crew has determined tube leakage exceeds the available charging they will perform a reactor trip and initiate Safety Injection per 1C4 AOP2.
	
	a. Upon hearing the announcement of reactor trip, or when called as Turbine Building Operator to isolate the Unit 1 MSR's per Attachment J, then enter ***Relative Order 7 (Schedule file E-0_Att-J.sch).***
	b. When called as the Turbine Building Operator to verify the status of Turbine Building Roof Exhausters, report that the Turbine Building Roof Exhausters are all secured.
	c. When directed to perform sampling after 3 minutes report 12 SG Cation frisk had elevated counts and 11 SG Cation frisk read background.
	d. If Unit 2 is requested to support performance of Att L and/or Att B, decline to assist until at least one SI pump is running and the SRO has prioritized Att L and Att B. Upon completion of these two events, personnel may be provided to complete Att L, but no assistance will be given to perform Att B.
		RO/ BOP
		
		C(BOP)
			1E-0, REACTOR TRIP OR SAFETY INJECTION
			• Verify Reactor Trip.
			• Verify Turbine Trip.
			• Verify both safeguards buses energized.
			• Check if SI is actuated.
			• Perform Attachment L. (See page 23 for Att. L actions)
			Critical Task: Manually actuate at least one train of SI-actuated safeguards equipment before transition out of 1E-0.
			• Check AFW Status.
			  ○ 12 MD AFW Pump placed in Manual
			  ○ 12 MD AFW Pump started
			
			Note: AFW to the ruptured SG may be isolated at this point, but appropriate Heat Sink must be maintained.
			
			Critical Task: Establish and maintain 200 GPM AFW flow to the Steam Generator(s) before transition out of E-0, unless the transition is to FR-H.1, in which case the task must be initiated before RCPs are manually tripped in accordance with step 2 of FR-H.1.
			• Verify total AFW flow greater than 200 gpm.
			• Verify AFW pumps discharge pressure greater than 1000 psig.
			• Check NR SG levels greater than 5% in any SG.
			• Maintain NR SG level between 5% and 50%.
			• Check RCS temperatures stable at or trending to 547°F.
			• Check PRZR PORVS and Spray Valves closed
			• Check if RCPs should be stopped.
			• Check if SGs are not faulted.
			• Check if SG tubes are not ruptured.
			  ○ Transition to 1E-3.

EVENT 5 cont…		C(BOP, SRO)	**1E-3, STEAM GENERATOR TUBE RUPTURE**
			• Check if RCPs should be stopped.
			• Identify Ruptured SG.
			• Isolate flow from ruptured SG.
			  o Set ruptured SG PORV in auto at 75%
			  o Check Ruptured SG PORV – CLOSED
			  o Close steam supply from ruptured to 11 TDAFWP
			  o Verify Ruptured SG blowdown isolated.
			  o Close Ruptured SG MSIV. ->RNO
			  ▪ Close 11 MSIV.
			  ▪ Set 11 SG PORV to 71.8%.
			  ▪ Place Steam Dumps to off.
			Critical Task: Isolate feedwater flow into and steam flow from the ruptured Steam Generator before a transition to ECA-3.1 occurs.
			  ▪ Perform ATT B while continuing in 1E-3.
			  (NOTE: Attachment B actions are on page 22)
			• Check ruptured SG level.
			• Reset SI
			• Check ruptured SG pressure – Greater than 210 psig
			Critical Task: Establish/maintain an RCS temperature so that transition from E-3 does not occur because of the inability to maintain required subcooling or such that an extreme or severe challenge to the Subcriticality and/or the Integrity CSF occurs.
			• Initiate RCS Cooldown
			  o Determine required core exit temperature.
			  o Check one condensate pump running.
			  o Establish steam dump to condenser.
			  o Dump steam from intact SG until below core exit
			Note: ***During the cooldown, the SS must continue with step 8 to prepare the plant for depressurization.***
			• Check intact SG level…
			• Check PRZR PORVs and Block Valves…
			• Reset SI

EVENT 5 cont…			• Reset Containment Isolation
			• Establish Instrument Air to containment
			• Check if RHR pumps should be stopped…
			• Establish Charging flow…
			• Check if RCS Cooldown should be stopped…
			• Check Ruptured SG pressure – Stable or increasing
			• Check RCS subcooling based on core exit T/Cs – greater than 40°F
			Critical Task: Depressurize RCS to meet SI termination criteria prior to overfilling the ruptured Steam Generator.
			• Depressurize RCS to minimize break flow and refill PRZR…
			• Check if SI flow should be terminated:
			  ○ Subcooling > 20 [35F].
			  ○ Secondary Heat Sink exists.
			  ○ RCS Pressure is stable or increasing.
			  ○ PRZR Level > 7%.
			Critical Task: Terminate SI prior to overfilling the ruptured Steam Generator.
			• Stop SI pumps
			• Establish Charging flow…
			• Verify SI flow not required…
			
			1E-3 Attachment B, Main Steamline Isolation
			• Dispatch personnel to locally close cylinder heating isolation valves (CY-1-1 and CY-1-4)
			• Dispatch personnel to locally close air ejector suction valves (AR-5-1 and AR-5-2)
			• Verify turbine stop valves – CLOSED
			• Verify MSR steam isolation valves - CLOSED:
			  ○ CV-31096
			  ○ CV-31097
			  ○ CV-31094
			  ○ CV-31095

EVENT 5 cont…			• WHEN air ejector suction valves are closed, THEN close normal and secondary air ejector steam supply valves (MV-32327 and MV-32355) • Verify standby air ejector suction valves (MV-32346 and MV-32347) – CLOSED • Verify standby air ejector steam supply valves (MV-32328) – CLOSED • Verify 11 and 12 hogging jet suction valves (MV-32308 and MV-32309) – CLOSED • Verify 11 and 12 hogging jet steam supply valves (MV-32316 and MV-32317) – CLOSED • Verify steam dumps selected to OFF • Verify A/B main steam line free blows (CV-31645 and CV-31646) – CLOSED • Evaluate the need to transfer gland steam to heating steam

	8. 1E-0 Attachment L actions		**1E-0 Attachment L: SI Alignment Verification**
			• Verify Safeguards Component Alignment:
			• Verify both trains of SI actuated:
			  ○ Both RHR pumps - RUNNING
			  -OR-
			  ○ Both SI pumps - RUNNING
			• RNO Manually actuate SI.
			• "SI NOT READY" lights - NOT LIT
			• "SI ACTIVE" lights - LIT FOR PLANT CONDITIONS
			• "CONTAINMENT ISOLATION" lights - LIT FOR PLANT CONDITIONS
			• Check Category 1 Vent Zone Boundary:
			• Close MV-32117, 121 SFP HX INLT HDR MV A
			• Check Cooling Water Header Pressures - BOTH GREATER THAN 65 PSIG
			• Verify Plant Announcements Complete:
			• Check If Main Steamlines Are Isolated:
			• MSIVs and bypass valves – CLOSED
			• Containment instrument air valves - CLOSED:
			• Verify SI Flow:
			• Verify RHR Flow
			• Check Containment Spray Not Required
			• Check RCP Cooling
			• Verify Local Actions Complete
			• Verify Generator Breakers – OPEN
			• Verify All Heater Drain Pumps – STOPPED
			• Check Turbine Valves:
			  ○ Turbine reheat and intercept valves – CLOSED
			  ○ Open turbine drain valves
			• Verify Main Feedwater Alignment:
			  ○ Both main feedwater pumps – STOPPED
			  ○ Main and bypass FRVs - CLOSED
			• Verify All Condensate Pumps - STOPPED:
			• Place Steam Dump In "STM PRESS" Mode
			• Verify Unit 1 Cooling Water/Chilled Water Alignment:

			○ CFCU control switches - "SLOW". ○ CFCU dampers - ALIGNED TO DOME ○ Unit 1 cooling water/chilled water valves closed ○ Unit 1 CRDM shroud cooling supply and return valves – CLOSED ○ CFCU cooling water supply and return valves – OPEN ○ CFCU chilled water supply and return valves – CLOSED • Verify Control Room Ventilation Alignment: ○ Chillers and fans – RUNNING ○ Control room chiller suction/discharge tie closed - STATUS LIGHT LIT • Verify Unit 1 Cooling/Chilled Water Alignment • Check Status Of Notifications • Notify SS Of Any Discrepancies
	9. When SI has been verified to not be required and has been terminated and/or at the discretion of the Lead Evaluator, place the simulator in FREEZE.		

RETENTION: 7 Days

UNIT 1 LPEO / PEO TURNOVER LOG

DATE: DAY/NIGHT SHIFT: Day

CAT 1 VENT OPENINGS: 0 ft^2 **SYSTEM CONDITION: GREEN**

SAFEGUARDS EQUIPMENT OOS/TECH SPEC REQUIRED ACTION STATEMENTS	
11 TDAFWP is OOS for Corrective Maintenance on the Woodward Governor. T.S. 3.7.5 Condition B was entered at 0400 today. 11 TD AFWP is expected to return to service tonight at midnight.	
PROTECTED EQUIPMENT	
12 MDAFWP	
RAD MONITORS OOS	**ANNUNCIATORS OOS**
OUTSTANDING SP'S	**FIRE DET / PROT EQP IMPAIRMENTS**
OTHER EQUIPMENT OOS / STATUS	
12 MFP Recirc Valve is blocked open HDT Annunciators have been authorized to remain flashing. An Extra Operator is periodically monitoring the HDT system and will inform the crew if any action is required.	
MAJOR EQUIPMENT REPAIRED / RETURNED TO SERVICE	
OPERATIONAL PLANS FOR COMING SHIFT	
10 gal dilutions every 15 mins for ~0.25°F temp change. Lower power to 195 MW. Start 12 MFP and Stop 11 MFP for common cause evaluation of 11 MFP. 11 and 12 Condensate pumps are to remain running in anticipation of returning 11 MFP to service.	
NEW PROCEDURES / INSTRUCTIONS	

Reactivity Plan

The crew has been directed to reduce reactor power from 220 Mw to 195 Mw.

Prior to simulator:

- verify the reactivity plan completed by the off going reactor operator
- complete a Pre-Job Brief of:
  - 1C28.2 Section 5.7
  - 1C1.4 Section 5.2

Current conditions are:

11 MFP is running.
12 MFP has just been returned to service following emergent repairs.
12 MFP recirc valve is blocked open.
11 and 12 condensate pumps are running.

Power level: 43% (220 Mw)

Xenon: Increasing (Power reduced from 50% and stable to 43% over last hour)

Control Rod Position: Bank D @ 170 steps

Boron Concentration: 1411 ppm

Core Exposure: 150 MWD/MTU

Target: Turbine Load: 195 MW

Rate: 0.25% /minute

Control Mode: LOAD control with Rod Control in Manual

Boration/Dilution: 10 gal dilutions every 15 minutes

Reactivity Prediction:

Change in Power Defect: 63 pcm

Differential Boron Worth: 6.5 pcm/ppm

Calculated RCS PPM change: 4.7 ppm

Assumed 1/2 rods and 1/2 RMU addition

Calculated Boric Acid addition: 4.7 ppm change = 8 gallon Boration

Calculated final Control Rod Position : Bank D @ 163 steps

Facility: Prairie Island **Scenario No.:** 3 **Op-Test No.:** 2012301

Examiners: D. McNeil (R. Baker)
M. Bielby (D. Oliver)
D. Reeser

Operators: _____
_____
_____

Initial Conditions: Mode: 1; Exposure: MOC; Power: ~91.7%; Boron: (CB): 635 ppm; Temperature: ~ 559°F; Pressure: ~2235 psig; Xenon: Building in; Rods: "D" @ 200; Generator: 530 MWe, stable

Turnover: Power is to be lowered to 90% upon TSO request due to grid loading. The crew has a 1C1.4 Section 5.3 marked up for performance. There are no fuel conditioning requirements. Lower Reactor Power to 90% at 0.25%/minute with rods in "MANUAL" with Turbine in "AUTO" in FSP mode. A reactivity plan developed by the off going RO for the power reduction from current power to 90% is provided. Verify the reactivity plan developed by the off going reactor operator. Nuclear Engineering was not available to provide a reactivity prediction.

Event No.	Malf. No.	Event Type*	Event Description
1		I (RO) TS (SRO)	Tcold Instrument Fails High
2		R (RO)	Restore Tave to Tref (Power reduction per TSO)
3		N (BOP)	Swap Condensate Pumps
4		C (RO) TS (SRO)	Pressurizer PORV significant leakage PCV-431C
5		C (BOP)	12 Condensate Pump Trip – 11 Condensate Pump Locks Out
6		C (RO)	Reactor Fails to Auto Trip
7		M (ALL)	Main Feedwater Line Break Inside Containment
8		C (BOP)	'A' Train Safeguards Equipment Fails to Auto Actuate

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

QUANTITATIVE ATTRIBUTES

Malfunctions:

Before EOP Entry:

1. T_{cold} fails high
2. Leaking Pressurizer PORV PCV-431C
3. 12 Condensate pump trips/11 Condensate pump locks out
4. Reactor fails to trip automatically

After EOP Entry:

1. Main Feedwater line break inside containment
2. 'A' Train safeguards equipment fails to auto actuate

Abnormal Events:

1. T_{cold} fails high
2. Leaking Pressurizer PORV PCV-431C
3. 12 Condensate pump trips/11 Condensate pump locks out

Major Transients:

1. Main Feedwater line break inside containment

Critical Tasks:

1. E-0 – A: Manually trip the reactor from the control room before transition out of E-0.
2. E-2 – A: Isolate the faulted STEAM GENERATOR before transition out of E-2.

SCENARIO OVERVIEW:

INITIAL CONDITIONS:

1. No equipment is OOS.

SEQUENCE OF EVENTS:

Event 1: T_{cold} instrument fails high

- T_{cold} instrument fails high causing auctioneered T_{avg} to indicate high.
- Control rods automatically insert.
- Charging pump speed rises.
- The crew will respond per 1C5 AOP1, C47 and 1C51 to defeat the failed channel and restore Rod Control to automatic.

Event 2: Restore T_{avg} to T_{ref} and/or Power Reduction to 90% power

- The crew will reduce power per 1C1.4.

Event 3: Swap Condensate pumps

- The crew will receive a report from the condensate system engineer of abnormal noise on the 11 condensate pump and recommendation to remove it from service.
- The crew will start 13 condensate pump and place 11 condensate pump in standby per 1C28.3.

Event 4: Leaking Pressurizer PORV PCV-431C

- A small leak will develop on Pressurizer PORV PCV-431.
- The crew will respond per C47 and 1C4 AOP1 to identify and isolate the leaking PORV.

Event 5: 12 Condensate pump trips and 11 Condensate pump locks out

- 12 Condensate pump will trip.
- 11 Condensate pump will restart, if in standby, but immediately lockout.
- 11 MFP will trip in response to loss of 12 Condensate pump.
- A first out will be generated on low low SG level if the reactor is not manually tripped earlier.
- The crew will respond per C47 and 1E-0, to manually trip the reactor.

Event 6: Reactor Fails to automatically trip

- The reactor will not trip automatically.
- The crew will respond per 1E-0 to manually trip the reactor.

Event 7: Main Feedwater line break inside containment

- Upon the reactor trip a Main Feedwater line break inside containment will occur.
- The crew will respond per 1E-2 to isolate the faulted SG.

Event 8: 'A' Train safeguards equipment fails to auto actuate

- 'A' train safeguards equipment will fail to actuate automatically.
- The crew will respond per 1E-0 to manually actuate the 'A' Train safeguards equipment using the control switch in the control room.

EVENT 1 & 2	1. When the crew has assumed the duty, and at the discretion of the lead evaluator, enter the malfunction to cause the Blue Channel T_{cold} to fail high. ***(Relative Order 1, Trigger 1)*** a. If directed as I&C to trip bistables, report that 2 I&C technicians will be available in 1 hour. **(Note: bistables will not be tripped during this scenario.)** b. If contacted as Operations Management, acknowledge the report of the failure, and if asked agree to make other notifications to the NRC Resident Inspector, Duty Station Manager. c. If contacted as the FIN team supervisor, inform the crew that you will write a work order and assign an I&C supervisor to investigate. d. If desired, allow the crew to hold a crew brief.	I(RO) T.S. (SRO)	**1C5 AOP1, UNCONTROLLED ROD MOTION** • Check Generator Electrical Load – STABLE • Place Rod Bank Selector Switch to "MANUAL" • Check Rod Motion – STOPPED • Check for Failed Instrument: **C47012-0104, REACTOR COOLANT SYSTEM HI TAVG** • Check RCS Tavg • If due to an instrument malfunction: o Place rod control in manual and adjust as needed o Shift charging pumps to manual and adjust as needed o Verify steam dumps not armed o Refer to 1C51 **1C51.3, TAVG LOOP 1B 1T-403 - HIGH** • Place rod control in manual and maintain Tavg • Place charging pump speed in manual and maintain pressurizer level • If necessary, take manual control of steam dumps • Select blue channel on the Tavg defeat switch and pull out • Return the following to auto: o Rod control o Charging pump speed control o Steam dumps • Refer to T.S: o LCO 3.3.1 condition A, table 3.3.1-1 function 6, 7 o T.S. LCO 3.3.1 Condition E will be entered o LCO 3.3.2 condition A, table 3.3.2-1 function 4d o T.S. LCO 3.3.2 Condition D will be entered o TRM TLCO 3.3.3 condition A • Trip bistables

EVENT 2	2. When the crew has restored Tave to Tref, and/or at the discretion of the Lead Evaluator, deliver the direction for the crew to reduce power to 90%. 3. a. When directed by the Lead Evaluator contact the control room as the TSO and direct power reduction to 90% power. b. When contacted, as Duty Chemist, acknowledge load change. ***Note: This event only needs to be performed if, in the opinion of the Lead Evaluator, adequate performance of reactivity manipulations has not been observed for the ATC operator.***	R(ATC)	**1C1.4 UNIT 1 POWER OPERATION** **5.3 Small Turbine Load Adjustment** • IF desired, THEN place CS-46280, ROD BANK SELECTOR, in "MANUAL". Refer to Precaution 3.7. • Reduce load to 90%

EVENT 3	4. When the crew has restored Tavg to Tref, and/or at the discretion of the Lead Evaluator, notify the control room of abnormal noise in the 11 Condensate pump ***(Relative Order 3)*** a. As the Shift Manager, contact the control room and inform the Shift Supervisor the Condensate system engineer, over the course of a system walk-down, discovered an abnormal noise coming from the 11 Condensate pump and has recommended swapping the 11 and 13 Condensate pumps due to concern of imminent failure and that you agree with this course of action. Indicate the System Engineer will be writing a CAP and WR to address the pump and will contact the FIN team. b. Follow along in 1C28.3 step 5.6 and report back all local actions and checks are complete as requested after 2 minutes. None of the local checks are modeled in the simulator. c. If contacted as the SM and/or the Condensate system engineer for a recommendation on the auto/manual selector for 11 Condensate pump then recommend placing the 11 Condensate pump into pullout. d. If contacted as the Duty Chemist, acknowledge condensate pumps will be swapped. ***Note: While operating 3 condensate pumps, Heater Drain Tank alarms are likely to be received.***	N(BOP, SRO)	**1C28.3, UNIT 1 CONDENSATE SYSTEM** **Section 5.6 Swapping Condensate Pumps** • Local prestart checks • Check condensate pump gland seal water flow using the following: o Following annunciators NOT LIT: ▪ 47009-0402, 11 CONDENSATE PUMP SEAL WATER LO PRESS ▪ 47009-0403, 12 CONDENSATE PUMP SEAL WATER LO PRESS ▪ 47009-0404, 13 CONDENSATE PUMP SEAL WATER LO PRESS • Place the desired condensate pump selector switch in “MANUAL”. • Start the desired condensate pump by placing the control switch to the “START position. • Check the bearing temperatures and motor stator temperatures on ERCS • Stop the desired condensate pump by placing the control switch to the “STOP” position. ***Note: 11 Condensate may be placed in Pullout due to concerns with imminent failure.*** • If desired, then place a condensate pump selector switch in “STANDBY”. • Open the discharge vent valve of the condensate pump that was stopped – local.

EVENT 4	5. When the crew has swapped running Condensate Pumps, and/or at the discretion of the Lead Evaluator, enter the malfunction to cause Pressurizer PORV PCV-431C leakage. ***(Relative Order 4, Trigger 4)*** a. If contacted as Operations Management, acknowledge the report of the failure, and if asked agree to make other notifications to the NRC Resident Inspector, Duty Station Manager. b. If contacted as the FIN team supervisor, inform the crew that you will write a work order and assign a Mechanical Maintenance supervisor to investigate. c. If desired, allow the crew to hold a crew brief.	C(RO) T.S. (SRO)	**47012-0109 PRZR SAFETY/RELIEF VALVE FLOW** • Check flow monitor light to determine which valve opened. • Depress individual flow monitor lights to reset alarm and lights. • Check safety/relief line temperatures, they should decrease after valves reseat. • Determine cause for opening of valve. • If PORV fails to seat, then close PORV block valve with power maintained to the valve. • Evaluate T.S. 3.4.10. • Evaluate T.S. 3.4.11. • Evaluate T.S. 3.4.14 • Enter T.S. LCO 3.4.11, Condition A • Refer to 1C4 AOP1, Reactor Coolant Leak • Effect necessary repairs and return system to normal. **1C4 AOP1, REACTOR COOLANT LEAK** • Determine charging pumps can maintain pressurizer level. • Table 1: Close PORV isolation valves one at a time to try to determine which PORV is leaking • Make notifications per SWI O-28

EVENT 5 & 6	6. When the crew has closed the leaking PORVs associated block valve, and/or at the discretion of the Lead Evaluator, enter the malfunction to trip the 12 Condensate Pump. ***(Relative Order 5, Trigger 5)*** ***NOTE: When the reactor is tripped proceed immediately to Event 7.***	C(ATC) C(BOP)	**C47010:0101, 11 Feedwater Pump Locked Out** • If reactor power is greater than 85%, then manually trip the reactor and go to 1E-0, Reactor trip or Safety Injection. **C47017:0304 11 STM GEN LO LO LVL Reactor Trip** • Perform 1E-0, Reactor Trip or Safety Injection.

EVENT 7 & 8	7. When the crew has recognized the need to trip the reactor and performed a manual trip, and/or at the discretion of the Lead Evaluator, enter the Main Feedline break inside containment. ***(Relative Order 7, Trigger 7)*** a. Upon hearing the announcement of reactor trip, or when called as Turbine Building Operator to isolate the Unit 1 MSR's per Attachment J, then enter (***Relative Order 7a).*** b. If directed to open reactor trip breakers, wait 1 minute and delete malfunctions RP02A and RP02B and then report completion ***(Relative Order 7b)***. c. If directed to perform cation column frisks acknowledge the order and, after 1 minute, report BOTH 11 and 12 Steam Generator cation columns are reading background. d. If Unit 2 is requested to perform Attachment L, inform the crew Unit 2 has no available personnel.	M(ALL) C(BOP)	**1E-0, REACTOR TRIP OR SAFETY INJECTION** ***Critical Task: Manually trip the reactor from the control room before transition out of E-0.*** • Verify Reactor Trip. • Verify Turbine Trip. • Verify both safeguards buses energized. • Check if SI is actuated. • Perform Attachment L. (see page 20 for Att. L actions) • Check AFW Status • Verify total AFW flow greater than 200 gpm. • Verify AFW pumps discharge pressure greater than 900 psig. • Check SG levels NR >5% [WR > 50%] in any SG. • Control feed flow to maintain SG level NR 5% to 50% [WR between 50% and 59%]. • Check RCS temperatures stable at or trending to 547°F. • Check PRZR PORVS and Spray Valves: • PRZR PORVs closed. • PRZR Spray Valves closed. • Check if RCPs should be stopped: o Injection flow into the RCS o RCS Pressure less than 1250 [1575] psig o Operator Controlled cooldown NOT in progress • Check if SGs are not faulted. • Check no SG pressure decreasing in an uncontrolled manner. • Check no SG completely depressurized. • Transition to 1E-2. **1E-2. FAULTED STEAM GENERATOR ISOLATION** • Check MSIV and Bypass Valve closed on 11 SG. • Check if either SG is NOT faulted: • Identify faulted SG.

EVENT 7 & 8 cont…			• Isolate faulted SG.
			  ○ Isolate main feedline
			  ○ Isolate AFW flow
			  ○ Close steam supply valve to TD AFW pump
			  ○ Verify SG PORV - CLOSED
			  ○ Verify SGB isolation valve - CLOSED
			Critical Task: Isolate the faulted STEAM GENERATOR before transition out of E-2.
			• Check CST level - Greater than 10,000 Gallons.
			• Check Secondary Radiation.
			• Go To 1E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.
			
			1E-1, LOSS OF REACTOR OR SECONDARY COOLANT.
			NOTE: The crew may transition to 1ES-0.2, SI TERMINATION, from 1E-1 info page once conditions are met.
			• Check if RCPs should be stopped.
			• Check if SGs are not faulted.
			• Check intact SG levels.
			• Check secondary radiation - Normal.
			• Check PRZR PORVs and block valves.
			• Reset SI
			• Reset Containment Isolation
			• Establish Instrument Air to Containment
			• Check power supply to Charging Pumps - OFFSITE POWER AVAILABLE.
			• Check if SI flow should be terminated:
			  ○ RCS subcooling based on core exit T/Cs - GREATER THAN 20°F [35°F].
			  ○ Total feed flow to intact SGs – greater than 200 GPM
			  - OR -
			  Narrow range level in at least one intact SG –

EVENT 7 & 8 cont…			greater than 5% [WR 50%] ○ RCS pressure: ▪ Pressure - GREATER THAN 2000 PSIG. ▪ Pressure - STABLE OR INCREASING. ○ PRZR level - GREATER THAN 7% [27%]. • Go to 1ES-0.2, SI TERMINATION, Step 1. **1ES-0.2, SI TERMINATION** • Reset SI. • Reset Containment Isolation. • Establish instrument air to containment. • Stop Safeguards Pumps. • Check if charging flow has been established. • Verify SI flow is not required.

	8. 1E-0 Attachment L actions		**1E-0 Attachment L: SI Alignment Verification**
			• Verify Safeguards Component Alignment:
			• Verify both trains of SI actuated:
			  ○ Both RHR pumps - RUNNING
			  -OR-
			  ○ Both SI pumps - RUNNING
			• RNO Manually actuate SI.
			• "SI NOT READY" lights - NOT LIT
			• "SI ACTIVE" lights - LIT FOR PLANT CONDITIONS
			• "CONTAINMENT ISOLATION" lights - LIT FOR PLANT CONDITIONS
			• Check Category 1 Vent Zone Boundary:
			• Close MV-32117, 121 SFP HX INLT HDR MV A
			• Check Cooling Water Header Pressures - BOTH GREATER THAN 65 PSIG
			• Verify Plant Announcements Complete:
			• Check If Main Steamlines Are Isolated:
			• MSIVs and bypass valves – CLOSED
			• Containment instrument air valves - CLOSED:
			• Verify SI Flow:
			• Verify RHR Flow
			• Check Containment Spray Not Required
			• Check RCP Cooling
			• Verify Local Actions Complete
			• Verify Generator Breakers – OPEN
			• Verify All Heater Drain Pumps – STOPPED
			• Check Turbine Valves:
			  ○ Turbine reheat and intercept valves – CLOSED
			  ○ Open turbine drain valves
			• Verify Main Feedwater Alignment:
			  ○ Both main feedwater pumps – STOPPED
			  ○ Main and bypass FRVs - CLOSED
			• Verify All Condensate Pumps - STOPPED:
			• Place Steam Dump In "STM PRESS" Mode
			• Verify Unit 1 Cooling Water/Chilled Water Alignment:

			○ CFCU control switches - "SLOW". ○ CFCU dampers - ALIGNED TO DOME ○ Unit 1 cooling water/chilled water valves closed ○ Unit 1 CRDM shroud cooling supply and return valves – CLOSED ○ CFCU cooling water supply and return valves – OPEN ○ CFCU chilled water supply and return valves – CLOSED • Verify Control Room Ventilation Alignment: ○ Chillers and fans – RUNNING ○ Control room chiller suction/discharge tie closed - STATUS LIGHT LIT • Verify Unit 1 Cooling/Chilled Water Alignment • Check Status Of Notifications • Notify SS Of Any Discrepancies
	9. When SI has been verified to not be required and has been terminated and/or at the discretion of the Lead Evaluator, place the simulator in FREEZE		

RETENTION: 7 Days

UNIT 1 LPEO / PEO TURNOVER LOG

DATE: DAY/NIGHT SHIFT: Day

CAT 1 VENT OPENINGS: 0 ft^2 **SYSTEM CONDITION: GREEN**

SAFEGUARDS EQUIPMENT OOS/TECH SPEC REQUIRED ACTION STATEMENTS	
NONE	
PROTECTED EQUIPMENT	
NONE	
RAD MONITORS OOS	**ANNUNCIATORS OOS**
OUTSTANDING SP'S	**FIRE DET / PROT EQP IMPAIRMENTS**
OTHER EQUIPMENT OOS / STATUS	
MAJOR EQUIPMENT REPAIRED / RETURNED TO SERVICE	
OPERATIONAL PLANS FOR COMING SHIFT	
Maintain 92% power. **Reduce power if/when requested by the TSO.** **Dilute 25 gallons every 15 minutes for a ~0.1°F temperature change.**	
NEW PROCEDURES / INSTRUCTIONS	

Reactivity Plan

The crew has been informed of potential need to reduce turbine load from 530 Mw to 520 Mw.

Prior to simulator:

- verify the reactivity plan completed by the off going reactor operator
- complete a Pre-Job Brief of:
    - 1C1.4 Section 5.3

Current conditions are:

In the last hour the TSO has requested multiple small (<2%) power reductions due to grid loading.

Power level: 529 MW (91.7%)

Xenon: Building in (100% to ~92% power reduction over last hour)

Control Rod Position: Bank D @ 200 steps

Boron Concentration: 635 ppm

Core Exposure: 10000 MWD/MTU

Target: Turbine load 520 Mw (Power Level: ~90%)

Rate: 0.25% /minute

Control Mode: Load Control with Rod Control in Manual

Boration/Dilution: 25 gal dilutions every 15 minutes

Reactivity Prediction:

Change in Power Defect: 28 pcm

Differential Boron Worth: -7.2 pcm/ppm

Calculated RCS PPM change: 1.9 ppm

Assumed 1/2 rods and 1/2 RMU addition

Calculated Boric Acid / Reactor Makeup Water addition: 1.9 ppm change = 3 gals Boric Acid

Calculated final Control Rod Position : Bank D @ 197 steps